UPPER COLUMBIA RIVER

FINAL
Macroinvertebrate Tissue Study Data Summary Report

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ACRONYMS AND ABBREVIATIONS

ACG	analytical concentration goal
ALS	ALS Environmental
BERA	baseline ecological risk assessment
CDD	chlorinated dibenzo-*p*-dioxin
CDF	chlorinated dibenzofuran
COC	chain of custody
DL	detection limit
DQO	data quality objective
DSR	data summary report
EDL	estimated detection limit
EMPC	estimated maximum possible concentration
ESI	Environmental Standards, Inc.
EPA	U.S. Environmental Protection Agency
FSR	field summary report
GPS	global positioning system
HHRA	human health risk assessment
ID	identification
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MDL	method detection limit
MQO	measurement quality objective
MS	matrix spike
MSD	matrix spike duplicate
OCDF	octachlorodibenzofuran
OPR	ongoing precision and recovery
PARCC	precision, accuracy or bias, representativeness, completeness, and comparability
PCB	polychlorinated biphenyl
QA	quality assurance
QC	quality control

QAPP	quality assurance project plan
QL	quantitation limit
RBC	risk-based concentration
RI/FS	remedial investigation/feasibility study
RL	reporting limit
RPD	relative percent difference
SD	standard deviation
SRM	standard reference material
TAL	target analyte list
TAI	Teck American Incorporated
TEF	toxic equivalency factor
TEQ	toxic equivalents
TOC	total organic carbon
UCR	Upper Columbia River
USFWS	U.S. Fish and Wildlife Service

UNITS OF MEASURE

°C	degrees Celsius
g	gram(s)
in.	inch(es)
kg	kilogram(s)
kg/d	kilogram(s) per day
m	meter(s)
mg/kg	milligram(s) per kilogram
mm	millimeter(s)
ng	nanogram(s) per kilogram
pg/g	picogram(s) per gram
ww	wet weight
µg/kg	microgram(s) per kilogram

1 INTRODUCTION

This report presents the results of the 2016 macroinvertebrate tissue study (herein referred to as the study) conducted for the Upper Columbia River (UCR) Site (herein referred to as the Site).[1] The study was designed to inform exposure assessments for humans and wildlife receptors that consume benthic macroinvertebrates from the Site. Sampling and chemical analyses were conducted under the U.S. Environmental Protection Agency (EPA)-approved macroinvertebrate tissue study quality assurance project plan (QAPP) (Exponent et al. 2016) and QAPP addendum (Windward et al. 2016). The study was conducted as part of the remedial investigation/feasibility study (RI/FS) for the Site in support of the baseline ecological risk assessment (BERA) (to be completed by Teck American Incorporated [TAI]) and the baseline human health risk assessment (HHRA) (to be completed by EPA).

TAI collected mussels and crayfish from the Site and reference areas during two separate sampling events: one in spring 2016 (April 26 through May 19) and one in fall 2016 (September 7 through October 6). Following finalization of the compositing plan in spring 2017, individual organisms were combined into composite samples at ALS Environmental (ALS) in Kelso, Washington. Chemical analyses for metals, methyl mercury, and inorganic arsenic were conducted by ALS; chemical analyses for polychlorinated biphenyl (PCB) congeners and dioxins/furans were conducted by Vista Analytical in El Dorado Hills, California, on a subset of samples.

1.1 STUDY PURPOSE AND DATA QUALITY OBJECTIVES

The primary objective of this study is to characterize the concentrations of chemicals in the tissues of macroinvertebrates sampled from the Site for use in the exposure assessments for humans and wildlife receptors that consume these organisms. Mussels and crayfish were selected as representative macroinvertebrates, because they are present in the UCR and are consumed by both humans and wildlife. For the HHRA, chemistry data for mussels (soft body tissue) and crayfish (the whole body and shell, minus the carapace and stomach)[2] will be used to evaluate the exposures of humans who ingest shellfish. For the BERA, chemistry data for mussels (soft body tissue) and crayfish (all body parts, including the shell, carapace, and stomach) will be used to evaluate the exposure of aquatic-dependent, invertebrate-feeding fish, birds, and mammals

[1] The Site, as defined in the June 2, 2006, Settlement Agreement (USEPA 2006) is “the areal extent of hazardous substances contamination within the United States in or adjacent to the Upper Columbia River, including the Franklin D. Roosevelt Lake (“Lake Roosevelt”), from the border between the United States and Canada downstream to the Grand Coulee Dam, and all suitable areas in proximity to such contamination necessary for implementation of the response actions.…”

[2] Includes the head, claws, abdomen, tail, and shell around the claws and tail.

that forage for shellfish in nearshore waters. EPA's level of effort technical memorandum (USEPA 2013) was used to guide the development of the requirements and design rationale for data-collection activities presented in the QAPP (Exponent et al. 2016). As part of the data quality objective (DQO) development process, the goals of the study were identified.

The primary goals of the study are:

- To determine if total concentrations of target analyte list (TAL) metals,[3] methyl mercury, inorganic arsenic, PCB congeners, and dioxins/furans in mussel and crayfish tissues pose unacceptable risk to human consumers.
- To determine if chemical concentrations of TAL metals in mussel and crayfish tissues pose unacceptable risk to invertivorous fish and wildlife species.

1.2 REPORT ORGANIZATION

This report is organized into the following sections:

- **Section 1—Introduction.** This section provides background information, identifies the purpose of the study, and outlines the organization of the report.
- **Section 2—Study Design and Methods.** This section describes the study design, field sampling methods, sample compositing scheme, and laboratory methods, including tissue processing and chemical analytical methods.
- **Section 3—Quality Assurance Project Plan Deviations.** This section discusses deviations from the QAPP.
- **Section 4—Data Validation Assessment.** This section provides a summary of the validation assessment of the analytical results.
- **Section 5—Results.** This section presents a summary of the analytical results.
- **Section 6—Summary.** This section presents a summary of the study and its results.
- **Section 7—References.** This section presents bibliographic information for the documents cited in this report.

Figures, maps, and data tables are provided following Section 7. Data tables presented herein are also provided in electronic format, including raw data (provided on CD-ROM). Data may also be obtained directly from the project database, accessible at http://teck-ucr.exponent.com.

[3] TAL metals include aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.

2 STUDY DESIGN AND METHODS

This section summarizes the study design and methods (including field collection and laboratory methods), which were presented in detail in the QAPP (Exponent et al. 2016) and QAPP addendum (Windward et al. 2016). Also included in this section is a discussion of the rationale for the sample compositing plan and a description of the composite samples.

2.1 STUDY DESIGN

The following sections describe the study design, including sampling areas and numbers of samples, temporal considerations, and chemical analyses for tissue samples.

2.1.1 Sampling Areas and Number of Samples

Macroinvertebrates were collected from six sampling areas at the Site (A1 through A6) and two reference areas that are not part of the Site (the Sanpoil River and Buffalo Lake[4]) (Map 2-1). The following factors were considered when selecting the sampling areas, as described in more detail in the QAPP (Exponent et al. 2016):

- Spatial coverage of the Site—One sampling area was identified in each of the six river reaches to provide thorough spatial coverage of the Site and to include a variety of different river habitats (i.e., lacustrine, transitional, and riverine).
- Human use areas—Portions of sampling areas A5 and A6 were identified as potential local source areas for mussels and crayfish that may be consumed by people. The selection of these human use areas was based on data provided in the Site tribal consumption and resource use survey data summary reports (Westat 2012; EI 2012), as well as anecdotal information provided by a Spokane Tribe of Indians representative (Knudson 2015). In addition, sampling area A2 was identified as an area to be evaluated in the HHRA because of the presence of sediment with total organic carbon (TOC) concentrations greater than 1 percent at some locations (Exponent et al. 2016).
- U.S. Fish and Wildlife Service (USFWS) mussel and crayfish survey results—Sampling areas were selected to include locations where mussel and/or crayfish collection was successful during the USFWS surveys in 2012 and 2013 (see Appendix B of the QAPP for details).

[4] Buffalo Lake was used as an alternative reference area because of the lack of suitable sampling habitat at Rebecca Lake.

- Location of fish sampling areas—When possible, the mussel and crayfish sampling areas were selected to overlap with the sampling areas for the UCR fish tissue study (Parametrix et al. 2009).

Reference areas were selected based on information regarding locations where tribal survey respondents had reported collecting mussels and crayfish (EI 2012).

In each of the sampling areas, the collection of six composite samples was targeted for both mussels and crayfish, with a target of at least five organisms per composite. It was estimated that five organisms would provide sufficient mass for analysis; however, to ensure sufficient tissue mass the number of organisms was not limited to five if more could be collected. In accordance with the QAPP, all species of mussels and crayfish were targeted for collection. In addition, an invasive clam, *Corbicula fluminea*, was collected when found during sampling.

2.1.2 Temporal Considerations

The spring 2016 sampling event was timed to coincide with the annual reservoir drawdown period, when water levels were expected to be lowest and mussels most accessible. On average, the lowest water levels occur from late April to mid-May (Figure 2-1). In spring 2016, water levels were higher than expected based on previous years. Because sufficient numbers of mussel and crayfish samples could not be collected in accordance with the level of effort specified in the QAPP, an additional sampling event was conducted in fall 2016. The second sampling event was timed to take place within the same year as the first event, during early fall when relatively warm water temperatures were expected to result in greater crayfish activity.

2.1.3 Chemical Analyses

Data from all areas of the Site will be used for the BERA, whereas only data from sampling areas A2, A5, and A6 and the reference areas will be used for the HHRA. Tissue samples for use in the BERA were analyzed for TAL metals and total solids only. Tissue samples for use in both the BERA and HHRA were analyzed for TAL metals, methyl mercury, inorganic arsenic, PCB congeners, and dioxins/furans, and prioritized for analysis in this order, as specified in the QAPP. For all mussel samples, the soft tissue of the mussel (including any liquid inside the shell) was analyzed. When consuming crayfish, people are most likely to consume the whole body minus the carapace and stomach,[5] whereas wildlife are most likely to consume the entire crayfish. Therefore, at locations relevant to both the BERA and HHRA, the carapace and stomach of the sample were analyzed separately from the remaining portion of the crayfish. Results from the whole body minus the carapace and stomach samples will be used for the HHRA, and estimates

[5] Whole body minus the carapace and stomach leaves the head, claws, abdomen, tail, and shell around the claws and tail.

of the whole-body concentration based on the relative weights and concentrations of each sample type will be used for the BERA (see Appendix C for whole-body concentration calculation methods).

At locations relevant to the BERA only, all portions of the crayfish were included for chemical analyses to represent whole-body concentrations.

2.2 FIELD SAMPLING METHODS

This section summarizes field methods used for the collection, labeling, and transport of macroinvertebrates. Sample collection was conducted in accordance with the QAPP (Exponent et al. 2016) and QAPP addendum (Windward et al. 2016) during two sampling events in 2016, as described in the field summary reports (FSRs) (Appendix A) and summarized in the following subsections. Cultural resources monitors and EPA technical oversight personnel were present during field sampling.

2.2.1 Spring 2016 Sample Collection

The first sampling event took place from April 26 to May 19, 2016. Field reconnaissance was conducted within each sampling area prior to sample collection to select locations with suitable habitat and good spatial coverage.

Mussels collection was attempted along shoreline transects that appeared to contain suitable mussel habitat (i.e., gently sloping beaches with finer sediments such as silt). Each transect consisted of a maximum of 150 meters (m) of shoreline and was searched from approximately 10 m above the waterline to the maximum wadeable water depth. In each sampling area, 10 to 20 transects were searched; all live mussels found on the sediment surface were collected, regardless of size. Dead mussels were collected if intact tissue was attached to the shell. All mussels collected from the Site were species within the *Anodonta* genus, and all mussels collected from the Sanpoil River reference area were western pearlshell (*Margaritifera falcata*). An invasive clam species, *Corbicula fluminea*, was found in sampling area A6 and was therefore collected as specified in the QAPP.

Crayfish were collected by placing baited traps in areas with suitable crayfish habitat (i.e., locations with loose cobbles and boulders and tree or plant debris).[6] Traps were deployed at each sampling area until the target mass and target number of organisms were collected, or until the maximum level of effort specified in the QAPP was met. In each area, 11 to 26 locations were sampled, for a total of 90 to 150 trap-nights per area (TAI 2016). Bait consisted of chicken, salmon, or cat food and was contained so that it could not be consumed by the crayfish. Non-native

[6] A few crayfish were collected by hand without a trap.

northern crayfish (*Orconectes virilis*) was the primary species collected. Additionally, native signal crayfish (*Pacifastacus leniusculus*) were collected in sampling areas A2 and A5 and the Sanpoil River reference area. Maps of the mussel and crayfish sampling locations from the spring 2016 event are presented in the FSR dated August 2016 (Appendix A; see Figures 2 through 9).

2.2.2 Fall 2016 Sample Collection

Fall sampling was conducted from September 7 to October 6, 2016. This supplemental mussel and crayfish sampling effort was conducted because the target number of samples identified in the QAPP (Exponent et al. 2016) had not been collected during the spring 2016 sampling event. The sampling plan for the fall event was designed to include areas where more organisms were needed to complete the interim sampling plan (Windward et al. 2016). Completion of the interim plan included supplementation of some of the proposed composites from the spring sampling event in order to achieve targeted numbers and/or tissue mass per composite sample.

Fall mussel sampling was conducted in sampling areas A1, A3 through A6, and the Sanpoil River reference area. Specific mussel sampling locations within the targeted sampling areas were chosen based on locations where mussels had been collected previously during the spring 2016 sampling event, or by USFWS in 2012 and 2013 (Windward et al. 2016). Sampling was conducted from the shoreline in sampling area A1 and the Sanpoil River reference area, and by scuba diving in sampling areas A1 and A3 through A6.

Mussel sampling along shoreline transects in sampling area A1 and the Sanpoil River reference area was conducted using the same sampling methodology described in Section 2.2.1 of this document. Mussel sampling conducted by scuba diving in sampling areas A1 and A3 through A6 was carried out by EPA's scientific dive team (see Appendix A, which includes the EPA Dive Report as part of the fall FSR). Prior to scuba diving, TAI conducted camera reconnaissance for approximately 4 to 8 hours in each sampling area to determine specific locations where mussels were present and could be collected safely by divers. The camera was mounted to a sled and pulled by a boat along transects of varying lengths. The video feed was reviewed in real time, and global positioning system (GPS) coordinates for locations where mussels were observed were noted. The dive team later returned to these locations to collect mussels. Divers followed meandering transects no longer than 100 m and collected mussels by hand. The duration and number of dives varied by area and depended on the amount of time needed to collect sufficient numbers of organisms to meet the targets specified in the QAPP addendum (Windward et al. 2016). Only live organisms were collected during the fall sampling event.

Fall crayfish sampling was conducted in sampling areas A1 through A4. The collection methods were the same as those used in the spring 2016 sampling event, except that traps were baited with salmon only. Sampling continued within each sampling area until the targeted mass, targeted number of organisms, or maximum level of effort was reached (Windward et al. 2016). Maps of the mussel and crayfish sampling locations from the fall 2016 event are presented in the FSR dated January 2017 (Appendix A; see Figures 3 through 10).

2.2.3 Sample Identification, Labeling, and Shipping

In the field, mussels and crayfish were identified to the lowest practical taxonomic level, photographed, weighed, and measured. Health status (i.e., live or dead) and any condition issues (e.g., signs of disease, missing claws) were also noted for each organism. Individual mussels and crayfish were wrapped in food-grade heavy duty aluminum foil with the dull side in contact with the organisms, sealed in a plastic bag, and placed in a second resealable plastic bag with a label containing a unique identification (ID), consistent with the procedures described in the QAPP.[7] Packaged samples were stored in coolers with ice in the field and transferred to a freezer at the end of the sampling day. Samples were kept in the freezer until they were transported, in coolers with dry ice, to ALS. Samples collected in the spring were shipped overnight to ALS, and samples collected in the fall were hand delivered to ALS by field personnel.

Each sample ID contained a unique sampling location identifier followed by an individual organism identifier. Sampling location identifiers consisted of the following:

- Two-digit sampling area code—A1 to A6 for Site sampling areas, RL for Buffalo Lake,[8] and SR for Sanpoil River
- Sample type code—MB for mussel beach and CT for crayfish trap
- Two-digit sequential number.

For example, sampling location identifier "A4-MB01" indicates mussel beach location #01 in sampling area A4.

Each individual organism identifier consisted of a species code and an individual number, as follows:

- Species code—MU for mussels, CL for clam, or CR for crayfish
- Two-digit individual number—sequential number for each individual collected in a given sampling area (e.g., mussel #03 collected in sampling area 4).

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[7] A large number of clams were collected from one sampling location. In order to save time and allow the field crew to continue sampling, these organisms were packaged together and not individually weighed or measured.

[8] Samples were collected at the Buffalo Lake alternative reference area because Rebecca Lake, the primary reference area identified in the QAPP, was not accessible due to thick shoreline vegetation at the time of sampling. The RL code was used for Buffalo Lake samples because it had been pre-programmed into the field computer system for samples expected to be collected at the Rebecca Lake reference area.

For example, sample ID "A4-MB01-MU-03" indicates mussel #03 collected from mussel beach location #01 in sampling area 4. The same naming convention was used for organisms collected during both sampling events. In order to distinguish between samples collected in the spring and fall, unique, sequential sample location numbers were used, even if the same location was sampled in both seasons. For example, mussel beach location #01 (MB01) sampled in the spring could be labeled as mussel beach location #23 (MB23) if it was resampled in the fall and represented the 23rd sequential beach location.

2.3 SAMPLE COMPOSITING

Following the spring 2016 sampling event, an interim compositing plan was designed for the purpose of informing the fall 2016 sampling event. A draft version of this interim plan was initially submitted to EPA by TAI on June 9, 2016 (Section 1 of Appendix B). The primary goal of the draft compositing scheme was to, as much as possible, create composite samples representing organisms that were grouped together spatially within each area, with organisms of different weights distributed evenly among the composite samples. EPA responded on July 22, 2016, with recommended revisions to TAI's draft interim plan; these revisions were based on the goal of creating composites comprising organisms of the same species, from the same or nearby areas, and of similar size classes, where possible (Section 2 of Appendix B). EPA's revised interim compositing plan specified the sampling areas and numbers of samples needed to complete the sampling, which included the supplementation of some of the spring samples with fall organisms as necessary to achieve targeted numbers and/or tissue mass per composite sample. The targeted areas and numbers presented in the QAPP addendum for the second sampling event (Windward et al. 2016) were the same as those presented by EPA in their interim compositing plan dated July 22, 2016.

TAI submitted a draft final compositing plan to EPA on October 27, 2016, upon completion of sampling in fall 2016, followed by a memorandum describing the rationale for the plan on November 3, 2016 (Section 3 of Appendix B). This draft final compositing plan was based on the same primary goals as EPA's interim compositing plan. The draft final compositing plan did not change the grouping of organisms per composite, except in cases where separate composites from one sampling area were combined into a single sample because additional organisms (i.e., beyond the minimum targeted amount) collected in the fall allowed for the creation of more composites.

EPA responded to TAI's draft final compositing plan with a letter dated December 21, 2016 (Section 4 of Appendix B), recommending the stratification of organisms by size instead of area as a primary objective; this recommendation represented a departure from the previously agreed upon compositing approach. EPA's letter was followed by a series of communications between TAI and EPA, discussing the rationale and pros/cons of the size-based approach (TAI communications to EPA dated January 12, 2017, and February 10, 2017, and EPA communications to TAI dated January 26, 2017, and March 10, 2017; see Sections 5 through 8 of Appendix B). TAI's concerns regarding the size-based compositing approach were 1) it deviated from the QAPP, 2) it would contribute to bias and uncertainty in the exposure assessments, and 3) the proposed evaluation of the size/contaminant correlation was not appropriate because the study was not designed to address this inquiry (see summary in Appendix B, Section 9, letter from TAI to EPA dated March 23, 2017). Therefore, on March 23, 2017, TAI informed EPA that compositing would follow the October 27, 2016, draft final interim compositing plan, which had been based on the collaborative (i.e., EPA and TAI) interim plan from July 2016.

In addition to grouping organisms spatially and distributing organisms of different weights evenly, the final compositing plan included the following components:

- Only live organisms were included.
- Crayfish composites were separated by species when both northern and signal crayfish were collected from the same area, with the exception of one sample from sampling area A5.
- Organisms that were in a delayed cooler were grouped together in the same samples (see Section 3.1.1 for a discussion of this QAPP deviation).
- Crayfish collected with cat food bait were composited in the same samples, if possible (see Section 3.1.1 for a discussion of this QAPP deviation).
- All clams collected from sampling area A6 were combined into one composite sample, which was analyzed in addition to six composite mussel samples from sampling area A6.
- Organisms collected from four locations in the lower Sanpoil River reference area (SR-MB08, SR-MB11, SR-CT01, and SR-CT02) were not included for analysis because of EPA concerns that this area could be influenced by the reservoir (see EPA addendum dated July 22, 2016, in Appendix B).

The number of targeted composited samples was met in each area, with two exceptions: 1) the Buffalo Lake reference area, where no mussels were found, and 2) sampling area A1, where no live crayfish were collected (Table 2-1). The numbers of individual mussels and crayfish in each composite are presented in Table 2-2. There was only one clam composite sample, which consisted of 125 small clams collected during the spring sampling event from sampling area A6. Data for individual organisms that went into each composite, along with composite sample IDs, are presented in Table 2-3 for mussels and Table 2-4 for crayfish. Data for individual clams for the single clam composite sample (A6-CL-C001-ST) were not recorded because of the large number of small organisms that was collected. Sampling locations for individual organisms that went into each composite are presented on Maps 2-2 through 2-8 for mussels, Map 2-9 for clams, and Maps 2-10 through 2-16 for crayfish.

2.4 LABORATORY METHODS

Macroinvertebrate samples were received by ALS and stored, frozen, at or below -20 degrees Celsius (°C) until compositing and processing. Organisms were dissected, composited, freeze-dried, and homogenized prior to chemical analysis.

2.4.1 Tissue Processing

Macroinvertebrates were processed in accordance with the tissue processing standard operating procedure addendum presented in Appendix C of the QAPP (Windward et al. 2016). Mussels and clams were dissected from the shell, and the soft tissue and liquid inside the shell were composited. Crayfish were processed in one of two ways, depending on the area from which they had been collected. Crayfish from BERA-only areas did not require dissection and were freeze-dried whole. Crayfish from areas applicable to the HHRA were dissected into two components: 1) whole-body minus carapace and stomach (for use in the HHRA); and 2) carapace and stomach (for use with the whole-body minus carapace and stomach component to calculate a whole-body concentration for the BERA). Crayfish were dissected by cutting the carapace with a fillet knife or scissors to expose the internal organs. The stomach was removed with a Scoopula®, and the carapace was separated from the body. If the stomach had ruptured during freezing, the residual stomach contents were removed with a Scoopula® and included with the carapace and stomach in a jar for freeze-drying. The remainder of the body (i.e., the head, claws, abdomen, tail, and shell around the claws and tail) was freeze-dried in a separate jar.

After organisms had been apportioned into designated composites and freeze-dried, samples were homogenized with a stainless-steel grinder and/or a mortar and pestle. Aliquots of freeze-dried, homogenized tissue from HHRA areas were sent to Vista Analytical for organics analyses.[9] EPA splits were taken from a predetermined subset of samples for metals analysis, identified in Table 2-5.

2.4.2 Chemical Analyses

Samples were analyzed, in accordance with the QAPP (Exponent et al. 2016), for the chemicals listed in Table 2-5 using the methods listed in Table 2-6. Analytical procedures used for this study were standard EPA-approved methods with detection limits (DLs) sufficiently low to provide concentration data below risk-based concentrations (RBCs) when possible (Table 2-7). The QAPP

[9] For crayfish, only the whole-body minus carapace and stomach component was relevant for the HHRA and aliquoted for organics analyses.

specified an analytical priority of chemicals for use in the event that the target sample masses were not achieved (see Table 2-6); this prioritization was emphasized in the QAPP to achieve DLs below levels of concern for the constituents of greatest interest (Exponent et al. 2016).

Macroinvertebrates collected from BERA-only areas were analyzed for TAL metals and total solids. Mussels and crayfish collected from HHRA areas were analyzed for TAL metals, total solids, methyl mercury, inorganic arsenic, PCB congeners, dioxins/furans, and lipids, as sample mass allowed. In addition, one clam composite was analyzed for TAL metals and total solids. ALS performed all tissue compositing, homogenization, and analyses for metals (including methyl mercury and inorganic arsenic) and total solids. Vista Analytical conducted the PCB congeners, dioxins/furans, and lipids analyses.

3 QUALITY ASSURANCE PROJECT PLAN DEVIATIONS

This section describes deviations from the QAPP (Exponent et al. 2016) and QAPP addendum (Windward et al. 2016) that occurred during field sampling and chemical analyses.

3.1 FIELD SAMPLING

Procedures presented in the QAPP (Exponent et al. 2016) and QAPP addendum (Windward et al. 2016) were followed to the extent possible during field sampling. Deviations from the QAPP and QAPP addendum were categorized in the field as either “changes” or “modifications.” Change request forms are presented in Appendix D of this data summary report (DSR); protocol modification forms are presented in Appendix F of both the spring and fall FSRs (see Appendix A of this DSR for the FSRs) and summarized in the following sections. Changes generally occurred prior to sampling and were approved by EPA and recorded on change request forms. Modifications were usually minor procedural adjustments (e.g., to increase sampling efficiency) or planning oversights that were identified during sampling and recorded on protocol modification forms.

3.1.1 QAPP Changes

Two changes to the QAPP occurred during the spring sampling event (see Appendix D). The first of these extended the boundary of sampling area A5 to the north to allow sampling in more suitable habitat after no mussels were found within the original sampling area A5 boundary. The second change, which allowed the field crew to check crayfish traps once per day instead of twice per day, was instigated because there was insufficient time during daylight hours to check traps a second time.

One change to the QAPP Addendum occurred during the fall sampling event and involved how samples were labeled (Appendix D). The sample labeling procedure specified in the QAPP addendum (Windward et al. 2016) was not followed because the field computers had been pre-programmed with the same naming convention used during the spring sampling event. The sample type codes “MB” and “CT” were used instead of the sample type codes specified in the QAPP addendum (i.e., “MCA” and “CTA”). All documentation (e.g., logbooks, chain of custody [COC] records) was consistent with the labeling system used during the spring sampling event.

A deviation that was not documented in the FSRs occurred for signal crayfish. Five signal crayfish (two collected in the spring and three collected in the fall) that did not meet the minimum length of 3.25 in. were inadvertently collected from the Sanpoil River, an HHRA location. Lengths ranged from 2.5 to 3.0 in. for these five crayfish, which were composited along with one other signal crayfish that was 3.3 in. long. The average length of the six crayfish in this composite sample was 2.9 in. Smaller crayfish were more challenging to identify to the species level, and it was not immediately known upon collection whether the smaller organisms were native crayfish.

3.1.2 QAPP Modifications

During the spring sampling event there were 17 QAPP modifications, as follows[10] (see Appendix F of the spring FSR located in Appendix A of this document for additional details):

- In order to avoid contact with cold water and reduce sediment disturbance, grabbers rather than nets were used to handle mussels.
- The original measurements collected for one group of mussels were not saved in the computer. The organisms were unpacked, remeasured, and repacked in the evening after collection.
- The analytical laboratory requested the use of plastic coolers instead of boxes with Styrofoam™ inserts for sample shipping.
- The sampling crew and EPA monitor were allowed to conduct reconnaissance on beaches without the presence of a cultural resources monitor. No specimens were collected and no ground was disturbed when a cultural resources monitor was not present.
- The following modifications were made to the plan to check crayfish traps twice per day
    - Traps were generally deployed in the afternoon and checked the following morning due to time limitations.
    - Some traps were checked more than once per day.
- At sampling area A5, five mussel transects outside of the area boundary defined in the QAPP were inadvertently surveyed after being cleared by the cultural resources monitor. No mussels were collected at these locations.
- No photograph was taken for one crayfish collected at sampling area A6.
- One mussel was collected with a net from a dock instead of by beach transect.

[10] One additional modification included in the spring FSR (Modification #6) stated that traps were set outside of sampling area A5 (to the south where the Spokane River enters the main stem of the UCR) because of a large shoal in the central portion of the area resulting in water depths too shallow for setting crayfish traps. However, this modification appears to have been inadvertently added because the original sampling area, as identified in the QAPP, already extended as far south just north of the confluence of the Columbia and Spokane rivers. In addition, no traps or sampled crayfish were recorded outside of the A5 boundary.

- Three crayfish were collected by hand or with grabbers instead of from a trap (each was documented on a separate modification form).
- The coordinates for one crayfish trapping location at Buffalo Lake were recorded twice due to a discrepancy with the GPS unit. The second waypoint was labeled "BL" (instead of "RL") in the GPS unit in order to distinguish it from the first waypoint. The sample IDs for crayfish from Buffalo Lake were not affected because no crayfish were collected at this location.
- One crayfish sample was mislabeled after collection. The error was corrected before the sample was transferred to the field freezer.
- One crayfish was rewrapped in foil in the field after it became partially unwrapped. The organism was always contained within a plastic storage bag.
- One cooler of samples was delayed by the shipping carrier and arrived at ALS 3 days later than anticipated. Upon arrival at the laboratory, the cooler was found to have an internal temperature of 14.1°C, which exceeded the QAPP-specified sample storage temperature of 0°C. The laboratory inspected the samples upon receipt and noted that they were thawed but still cold and showed no signs of degradation. The samples were placed into frozen storage at -20 C until processing. Holding times for chemical analysis of tissue samples have not been established, and the condition of the organisms upon receipt is not believed to have affected sample preparation or analysis (see also Section 4.2). Data were not qualified by the validator due to this issue.

Five modifications to the QAPP occurred during the fall sampling event, as follows (see Appendix F of the fall FSR for additional details):

- In two instances, inclement weather or lack of time resulted in the need to check crayfish traps once instead of twice per day.
- The analytical laboratory requested the use of plastic coolers instead of boxes with Styrofoam™ inserts for sample shipping.
- Field photographs were not taken at two crayfish sampling locations.

3.2 CHEMICAL ANALYSES

The following deviations from the QAPP occurred as a result of laboratory sample processing or analysis:

- A change request approved by EPA was issued to extend the holding time listed in the QAPP for TAL metals from 6 months to 1 year (Appendix D). There is no established metals holding time for frozen tissue samples, but holding times of 1 to 2 years are commonly used (e.g., PSEP 1997).

- The QAPP specified that data from the reference areas would be compared to Site data in the HHRA. The use of reference data for the BERA was not specified in the QAPP (Exponent et al. 2016). Thus, only the whole-body minus the carapace and stomach portion of crayfish was originally planned for analysis. However, based on agreement between EPA and TAI (see communications from EPA to TAI dated January 26, 2017, in Section 6 of Appendix B), the crayfish carapace and stomach component from samples collected in the reference areas was also analyzed for metals.
- One crayfish composite sample was prepared with a matrix spike (MS) and laboratory duplicate, instead of an MS and matrix spike duplicate (MSD) for metals as specified in the QAPP (Exponent et al. 2016). Additional quality control (QC) samples were not prepared in order to conserve the remaining sample mass.
- Two mussel composite samples were inadvertently omitted from their intended digestion batch. Insufficient mass was available to prepare a MS/MSD, and standard reference material (SRM) was not included as required by the QAPP (Exponent et al. 2016). The samples were prepared with a laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) instead.

The deviations that occurred during field sampling and chemical analysis are unlikely to have affected data quality. A thorough quality assurance (QA) review was conducted by the data validator, and no data were qualified as a result of any QAPP deviation (see Section 4 for data validation summary).

4 DATA VALIDATION ASSESSMENT

Data validation was performed by Environmental Standards, Inc. (ESI) of Valley Forge, Pennsylvania, in accordance with the QAPP (Exponent et al. 2016) and based on EPA guidance from applicable analytical methods and the following documents:

- Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (EPA 540-R-08-005) (USEPA 2009)
- USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (EPA 540-R-013-001) (USEPA 2014a)
- USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (EPA 540-R-014-002) (USEPA 2014b)
- USEPA Contract Laboratory Program National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review (EPA 540-R-11-016) (USEPA 2011).

Stage 2B validation was conducted for the majority of the data. Approximately 14 percent of the data underwent Stage 4 validation. Data were qualified, as needed, based on an evaluation of the following data quality and QC criteria:

- Holding times
- Condition of samples upon receipt by laboratory
- Sample preparation
- Initial and continuing calibrations
- Laboratory and equipment blank results
- MS/MSD results
- SRM results
- LCS/LCSD results
- Laboratory duplicate and field split results
- Ongoing precision and recovery (OPR) standard results
- Mass tuning
- Labeled standard recoveries
- Reporting limit (RL) standard results
- Interference check sample results
- Serial dilution results
- Internal standard performance
- Ion abundance and signal-to-noise ratios
- Instrument sensitivity
- Retention times

- Instrument raw data and qualitative identification
- Analytical sequence.

The ESI data validation reports are available on the Downloads page of the project database (http://teck-ucr.exponent.com). The results of the data validation for overall data quality of chemistry results, sample transport and holding times, and equipment blank data are presented in Sections 4.1, 4.2, and 4.3, respectively. Specific data quality considerations identified by the data validator for inorganic tissue data and organic tissue data are summarized in Sections 4.4 and 4.5, respectively.

4.1 OVERALL DATA QUALITY

Chemistry data for equipment rinsate blanks and macroinvertebrate tissues met quality requirements in accordance with the QAPP (Exponent et al. 2016). A summary of the qualifiers assigned to equipment blank and tissue results is presented in Tables 4-1 through 4-4. No data were rejected and all data were deemed usable with the qualifiers presented. The following data qualifiers were applied by ESI:

- EMPC (estimated maximum possible concentration)—Chromatographic peaks were present in the expected retention time window; however, the peaks did not meet all of the conditions required for a positive identification. The DL represents the maximum possible concentration if the analyte were present.
- J—The result was considered estimated. For this dataset, J flags were applied due to high field split relative percent difference (RPD), low MS/MSD recovery, high serial dilution percent difference, high extraction standard recovery, and/or concentration between the DL and the RL.
- J- —The result was considered estimated and may be biased low. For this dataset, J- flags were applied due to low MS/MSD or SRM recovery, according to the functional guidelines.
- J+ — The result was considered estimated and may be biased high. For this dataset, J+ flags were applied due to high SRM recovery, according to the functional guidelines.
- U—The analyte was not detected at or above the DL.
- UJ—The analyte was not detected, and the DL was considered approximate due to bias identified during the QA review.
- U*—The analyte was considered not detected because a similar concentration was detected in an associated blank sample. Values for the DL and RL were replaced with the reported result value if the reported result exceeded the RL.

Data quality indicators for precision, accuracy or bias, representativeness, completeness, and comparability (PARCC) were specified in the QAPP, and measurement quality objectives (MQOs) were listed in Table B5-2 of the QAPP (Exponent et al. 2016). The data validator used the project-specific MQOs to evaluate tissue data for the quantitative components of PARCC (i.e., precision and accuracy or bias). A laboratory duplicate, MS/MSDs, and field splits were used to assess precision. The evaluation of accuracy and bias was based on the results of QC samples such as MSs, internal standards, and equipment and method blanks. The data validator also assessed sample handling, laboratory methods, and holding times to evaluate the representativeness and comparability of analytical data. Data were qualified as necessary by ESI when MQOs were not met. A data completeness goal of 90 percent was specified in the QAPP for the analysis of all composite samples (Exponent et al. 2016). No data were rejected, and data completeness was 100 percent for all inorganic chemicals. For organics, there were 55 macroinvertebrate composites targeted for PCB congener and dioxins/furans analysis. Of these, two mussel composites (A2-MU-C001-ST and A6-MU-C001-ST) lacked sufficient mass to analyze for PCB congeners, and four mussel composites (A2-MU-C001-ST, A6-MU-C001-ST, A6-MU-C006-ST, and SR-MU-C006-ST) lacked sufficient mass to analyze for dioxins/furans. Data completeness for PCB congeners was 96 percent, and data completeness for dioxins/furans was 93 percent.

The following sections present the rationale for the application of qualifiers by the data validator, and summarize data validation results for sample transport and holding times, equipment blanks, and tissue data. One laboratory duplicate for metals was included in the validation assessment, and is, therefore, also indicated in the qualifier counts in Section 4.4[11]. Because of sample mass limitations, there were no laboratory duplicates analyzed for organics. Tables 4-1 through 4-4 show both the number of qualifiers applied by the analytical laboratory and the number of qualifiers applied by the data validator.

4.2 SAMPLE TRANSPORT AND HOLDING TIMES

This section presents the results of the data quality review related to sample transport and also to holding times of laboratory samples prior to analysis.

[11] ESI validates and qualifies laboratory QC samples (e.g., laboratory duplicates) for all UCR datasets. Tissue masses were limited for the macroinvertebrate samples and only one laboratory duplicate was analyzed. Field splits and MS/MSDs were used to assess precision, which is consistent with the QAPP (Exponent et al. 2016).

4.2.1 Sample Transport

As described in Section 3.1.1, there was a shipping delay for one sample cooler, which subsequently arrived at the analytical laboratory with an elevated internal temperature. Composites A1-MU-C001-ST, A1-MU-C002-ST, A5-CR-C004-PB, A5-CR-C004-CS, A5-CR-C005-PB, A5-CR-C005-CS, A5-CR-C006-PB, and A5-CR-C006-CS contained organisms that were shipped in the delayed cooler. The laboratory inspected the samples upon receipt and noted that while thawed, they were still cold and showed no signs of degradation. The samples were placed in frozen storage at -20°C until processing. Data were not qualified due to this issue.

Chemical concentrations in delayed shipment samples were compared to those in non-delayed shipment samples in an attempt to determine whether sample thawing could have affected the results. This comparison was conducted separately for each affected tissue type by area: mussel composites from sampling area A1 (Table 4-5) and crayfish composites from sampling area A5 (Table 4-6 for partial body samples and Table 4-7 for carapace and stomach samples). These tables also indicate the species, season of collection, location of collection, and average organism size for each composite sample, which are other factors that may have contributed to differences in chemistry results.

For mussel composites from sampling area A1, many metal/metalloid concentrations were higher in samples from the delayed shipment (all collected in the spring from one beach location) than in non-delayed samples (all collected in the fall from one dive location). However, because seasonal variability, organism size, and location may also affect metal concentrations, it is not possible to determine whether the difference is due to the delayed shipment or some other factor.

For crayfish composites from sampling area A5, concentrations of most metals/metalloids are relatively similar between the delayed and non-delayed shipment samples. All crayfish from area A5 were collected in the spring. Some of the PCB congener concentrations were higher in the delayed shipment samples, although this could be associated with the higher average organism size in those samples. Assuming that the larger organisms are older, this is consistent with expectations for bioaccumulative chemicals.

In summary, although it is possible that the delay in sample shipment could have affected chemical tissue concentrations, comparisons are inconclusive because of the limited number of samples that can be compared and the presence of other factors that may also affect tissue chemistry.

4.2.2 Holding Times

Holding times were evaluated for each composite based on the earliest collection date of the individual organisms in the composite[12]. A holding time of 1 year was specified in the QAPP for all analyte groups except TAL metals, which, excluding mercury, had a specified holding time of 6 months[13]. The holding time for TAL metals (excluding mercury) was extended to 1 year based on an EPA-approved change request (Appendix D). The 1-year holding time was used by the data validator to evaluate all data, and there were no holding time exceedances for any inorganic or organic results.

4.3 EQUIPMENT BLANK DATA

Data qualifiers applied to equipment blank results are summarized in Table 4-1. No equipment blank data were qualified as a result of any of the QC parameters evaluated by the data validator.

Equipment blank concentrations were converted to the same units as the tissue data in order to evaluate contamination (e.g., equipment blank results for metals were divided by 1,000 to convert from parts per billion to parts per million). Equipment blank concentrations did not warrant the qualification of any tissue results.

4.4 INORGANIC TISSUE DATA

This section summarizes data quality considerations for inorganic tissue results (i.e., TAL metals, methyl mercury, and inorganic arsenic), including the laboratory duplicate, as qualified by ESI based on an evaluation of various factors (e.g., LCS and MS/MSD recoveries, laboratory blank concentrations, and duplicate results). Numbers of qualified results are listed in the following subsections. In addition, a qualifier is indicated if it was applied to the laboratory duplicate. Qualifier counts are also summarized in Tables 4-2, 4-3, and 4-4 for mussels, crayfish, and clams, respectively.[14] Inorganic tissue data were qualified due to laboratory blank, field split, MS, SRM, and serial dilution results, as detailed in the following subsections. All other QC parameters were within control limits.

[12] Some of the sample collection dates listed on the COC forms were incorrect. The correct dates were listed in the final ALS sample receipt confirmations; these are the same collection dates that were used by the data validator and are included in the project database.
[13] The holding time for mercury was listed as 1 year in the QAPP, separately from other TAL metals.
[14] Laboratory QC samples are not included in the UCR database. Therefore, qualifiers applied to the laboratory duplicate are not included in the qualifier summary tables.

4.4.1 Blanks

Tissue concentrations were qualified as not detected (U* flagged) due to the presence of the analyte at concentrations similar to those in the associated laboratory blanks for the following analytes and numbers of samples:

- Antimony in 30 out of 45 mussel samples, 62 out of 81 crayfish samples, 1 out of 1 crayfish laboratory duplicate, and 1 out of 1 clam sample
- Thallium in 12 out of 45 mussel samples and 13 out of 81 crayfish samples
- Total inorganic arsenic in 6 out of 27 mussel samples.

4.4.2 Field Splits

Tissue concentrations were qualified as estimated (J flagged) due to a high field split RPD for methyl mercury in 2 out of 34 crayfish samples.

4.4.3 Matrix Spikes

Tissue concentrations were qualified as estimated (J flagged) due to a MS/MSD recovery that was not within the control limit for manganese in 16 out of 81 crayfish samples.

Tissue concentrations were qualified as estimated (biased low, J- flagged) due to a low MS/MSD recovery that was not within the control limits for the following analytes and numbers of samples:

- Iron in 10 out of 81 crayfish samples
- Potassium in 10 out of 45 mussel samples
- Total inorganic arsenic in 9 out of 27 mussel samples and 6 out of 34 crayfish samples
- Zinc in 10 out of 81 crayfish samples.

4.4.4 Standard Reference Materials

Tissue concentrations were qualified as estimated (biased low, J- flagged) due to a low SRM recovery that was not within the control limit for iron in 13 out of 45 mussel samples and 1 out of 1 clam samples.

Tissue concentrations were qualified as estimated (biased high, J+ flagged) due to a high SRM recovery that was not within the control limit for lead in 10 out of 81 crayfish samples.

4.4.5 Serial Dilutions

Tissue concentrations were qualified as estimated (J flagged) due to a high percent difference for cobalt in 2 out of 45 mussel samples, and for silver in 10 out of 81 crayfish samples.

4.5 ORGANIC TISSUE DATA

This section summarizes the organic tissue results (i.e., PCB congeners and dioxins/furans) qualified by ESI. Data qualifiers are also summarized in Tables 4-2, 4-3, and 4-4 for mussels, crayfish, and clams, respectively. Qualifiers were applied as needed based on an evaluation of various factors (e.g., calibration and extraction standard recoveries and laboratory blank concentrations). Organic tissue data were qualified due to method blank, field split, ion abundance ratio, and extraction standard results, as detailed in the following subsections. All other QC parameters were within control limits.

4.5.1 Blanks

Tissue concentrations were qualified as not detected (U* flagged) due to the presence of the analyte in an associated method blank for PCB-11 in 6 out of 25 mussel samples and 4 out of 34 crayfish samples, and for PCB-194 in 1 out of 25 mussel samples.

A method blank concentration was similar to the sample concentrations for octachlorodibenzofuran (OCDF) in 6 crayfish samples in work order 1700495, and for PCB-68 in 6 crayfish samples in work order 1700561. These method blanks were flagged as EMPC by the laboratory and were not used to qualify data; therefore, the sample results are not qualified. The data validator advised caution in using these results for decision-making purposes.

4.5.2 Field Splits

Tissue concentrations were qualified as estimated (J flagged) due to a high field split RPD for PCB-28 in 2 out of 34 crayfish samples, and for PCB-44 in 2 out of 25 mussel samples.

4.5.3 Ion Abundance Ratios

Tissue concentrations were qualified as EMPC due to out-of-control ion abundance ratios for various dioxins/furans and PCB congeners (see Table 4-2).

The ion abundance ratio for PCB-47 was outside acceptance limits for the calibration verification standard analyzed on May 8, 2017. Data were not qualified as a result of this issue, because the ion abundance ratio acceptance criteria were met for PCB-47 in the associated samples.

4.5.4 Extraction Standards

Tissue concentrations were qualified as estimated (J flagged) due to high extraction standard recovery in 1 out of 34 crayfish samples for each of the following PCB congeners: PCB-196/203, PCB-197, PCB-198, PCB-199, PCB-200, PCB-201, PCB-202, and PCB-209.

The tissue concentration was UJ qualified due to a low extraction standard recovery for PCB-1 in 1 out of 25 mussel samples.

The tissue concentration was UJ qualified due to high extraction standard recovery for PCB-204 in 1 out of 34 crayfish samples.

5 RESULTS

This section summarizes the macroinvertebrate tissue results and analytical concentration goal (ACG) screens for each analyte group.

Summary statistics for all chemicals are presented for Site and reference areas in Tables 5-1a, 5-1b, 5-2a, 5-2b, 5-3a, 5-3b, 5-4a, 5-4b, and 5-5 for mussels from Site and reference areas, whole-body crayfish from Site and reference areas, partial-body crayfish from Site and reference areas, crayfish carapace and stomach from Site and reference areas, and clams, respectively. In tables containing data relevant to the HHRA (i.e., Tables 5-1a, 5-1b, 5-3a, 5-3b, and 5-5), the human health RBCs and percent of detected results greater than the human health RBCs are also presented. The chemical concentration and lipid content data are also plotted by sampling area in Figures 5-1a through 5-1ai and 5-2a through 5-2ai. ACGs were compared to actual method detection limits (MDLs) for non-detected concentrations of TAL metals, methyl mercury, and inorganic arsenic (Table 5-6), and to estimated detection limits (EDLs)[15] for non-detected PCB and dioxin/furan congeners (Tables 5-7 and 5-8), as summarized in the following sections.

5.1 TAL METALS, METHYL MERCURY, AND INORGANIC ARSENIC

All tissue composites were analyzed for TAL metals and total solids. Mussels, clams, and crayfish collected from HHRA sampling areas (i.e., A5, A6, RL, and SR) and sampling area A2 (an area sampled because of TOC concentrations greater than 1 percent in some areas) were also analyzed for methyl mercury and inorganic arsenic. Summary statistics for TAL metals, methyl mercury, and inorganic arsenic are presented in Tables 5-1a through 5-5. Figures 5-1a through 5-1z and 5-2a through 5-2z present results for mussels/clams and crayfish, respectively.

Actual MDLs for non-detected TAL metals, methyl mercury, and inorganic arsenic were compared to the ACGs specified in the QAPP (Exponent et al. 2016). Actual MDLs exceeded ACGs for the following analytes and numbers of samples (Table 5-6):

- Antimony in 6 mussel samples, 31 crayfish samples, and 1 clam sample
- Inorganic arsenic in 6 mussel samples
- Thallium in 2 mussel samples.

Among the non-detected results greater than the ACG, the maximum exceedance was 1.1 to 2.5 times the ACG. Actual MDLs were below the ACG for all other non-detected results.

[15] The EDL was the sample-specific detection limit.

5.2 PCB CONGENERS AND DIOXINS/FURANS

All tissue composites from HHRA sampling areas were analyzed for PCB congeners, dioxins/furans, and lipids, with the exception of 2 mussel samples that did not have sufficient mass for PCB congener analyses and 4 mussel samples that did not have sufficient mass for dioxin/furan analyses[16]. Summary statistics for all analytes are presented in Tables 5-1a through 5-5. Results for total PCB congeners, PCB toxic equivalent (TEQ), dioxin TEQ, total TEQ, and lipids are shown in Figures 5-1aa through 5-1ai and 5-2aa through 5-2ai for mussels/clams and crayfish, respectively. Mammalian TEQs were calculated by summing the products of the concentration of each toxic PCB or dioxin/like congener and its specific toxic equivalency factor (TEF) from Van den Berg et al. (2006). The 12 individual dioxin-like PCB congeners were used for PCB TEQ; the 17 individual dioxin/furan congeners were used for dioxin TEQ; and both the 12 dioxin-like PCB congeners and the 17 dioxin/furan congeners were used for total TEQ. Congeners that were undetected for a given sample were assigned a value equal to one-half the sample-specific DL for use in the TEQ calculation.

EDLs for non-detected PCB congeners and dioxins/furans were compared to the ACGs specified in the QAPP (Exponent et al. 2016). The ACGs were based on target quantitation limits (QLs) provided by the organics laboratory. All dioxin/furan EDLs for non-detected samples were below their respective ACGs. For PCB congeners, 34 non-detected mussel results, 41 non-detected crayfish results, and 1 non-detected clam result were greater than their respective ACGs (Table 5-7). Of these 76 exceedances, 56 were for results qualified as EMPC, and 10 were for results with elevated DLs due to blank contamination (U* qualified). The maximum exceedance for each congener was 1.0 to 8.4 times the ACG.

Mammalian TEF-adjusted EDLs[17] were compared to ACGs (i.e., TEF-adjusted QLs) for non-detected dioxin-like PCB congeners and dioxin/furan congeners. There was one exceedance each for mussels and crayfish (1.1 and 1.5 times the ACG, respectively) (Table 5-8).

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[16] PCBs and dioxins/furans were not analyzed if tissue mass was insufficient to meet the targets specified in the QAPP (Exponent et al. 2016).
[17] EDLs for each dioxin-like PCB congener and dioxin/furan congener were multiplied by the appropriate mammalian TEF from Van den Berg et al. (2006).

6 SUMMARY

The primary objective of this study was to characterize the concentrations of chemicals in the mussel and crayfish tissues sampled from the Site for use in the exposure assessments for humans and wildlife receptors that consume these organisms. TAI collected mussels and crayfish from six sampling areas at the Site and two reference areas outside of the Site during two separate sampling events. Data from all six Site sampling areas (A1–A6) will be used for the BERA, while data from only three Site sampling areas (A2, A5, and A6) will be used in the HHRA. The sampling event conducted in spring 2016 (April 26 through May 19) followed the original QAPP (Exponent et al. 2016) and the subsequent sampling event in fall 2016 (September 7 through October 6) followed the QAPP addendum (Windward et al. 2016). Small *Corbicula* clams were observed at one sampling location in spring and were therefore collected for analysis in addition to mussels and crayfish.

After finalization of the compositing plan in spring 2017, individual organisms were combined into composite samples based on tissue type and sampling area. The following numbers and types of composite samples were analyzed:

- Mussels—soft tissue
  - 36 from six Site areas (A1, A2, A3, A4, A5, and A6)
  - 6 from the Sanpoil River reference area
- Clams—soft tissue
  - 1 from Site area A6
- Crayfish—separated into two portions (carapace and stomach, and whole body minus carapace and stomach)
  - 18 from three HHRA and BERA Site areas (A2, A5, and A6)
  - 12 from the Sanpoil River and Buffalo Lake reference areas
- Crayfish—whole body
  - 12 from two BERA-only Site areas (A3 and A4).

All mussel, crayfish, and clam composites were analyzed for TAL metals. A subset of samples were analyzed for inorganic arsenic, methyl mercury, PCB congeners, and dioxins/furans specifically for use in the HHRA, in accordance with the QAPP (Exponent et al. 2016) and QAPP addendum (Windward et al. 2016). Data completeness was greater than the 90 percent goal specified in the QAPP for all analyte groups. The ACGs specified in the QAPP were met for approximately 96 percent of non-detected results. Of the 124 ACG exceedances, all were less than three times the ACG except for 15 PCB congener exceedances that were qualified EMPC or U* by the data validator. Based on the data validation assessment, no data were rejected and all data are considered usable with the qualifiers presented.

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FIGURES

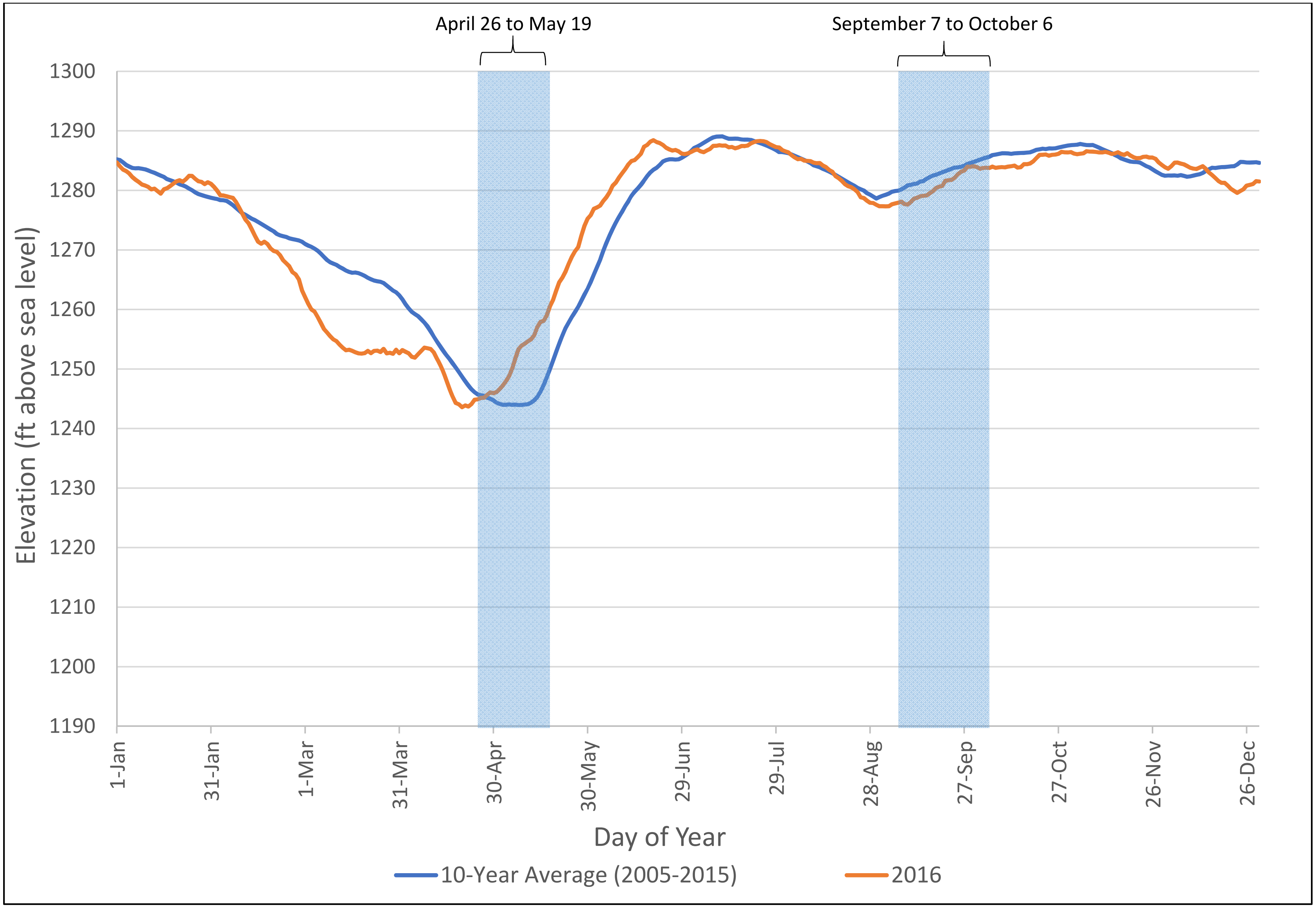
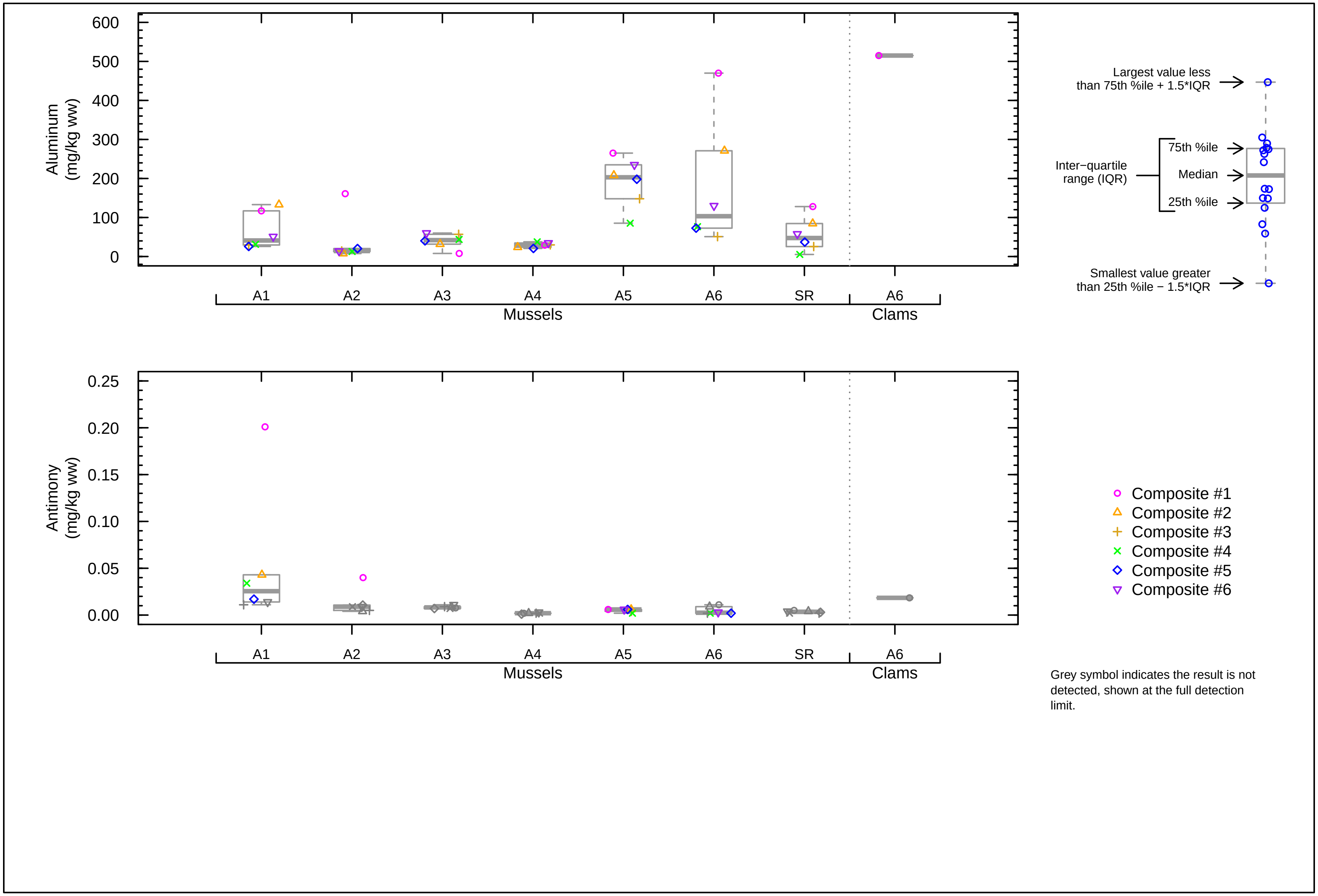
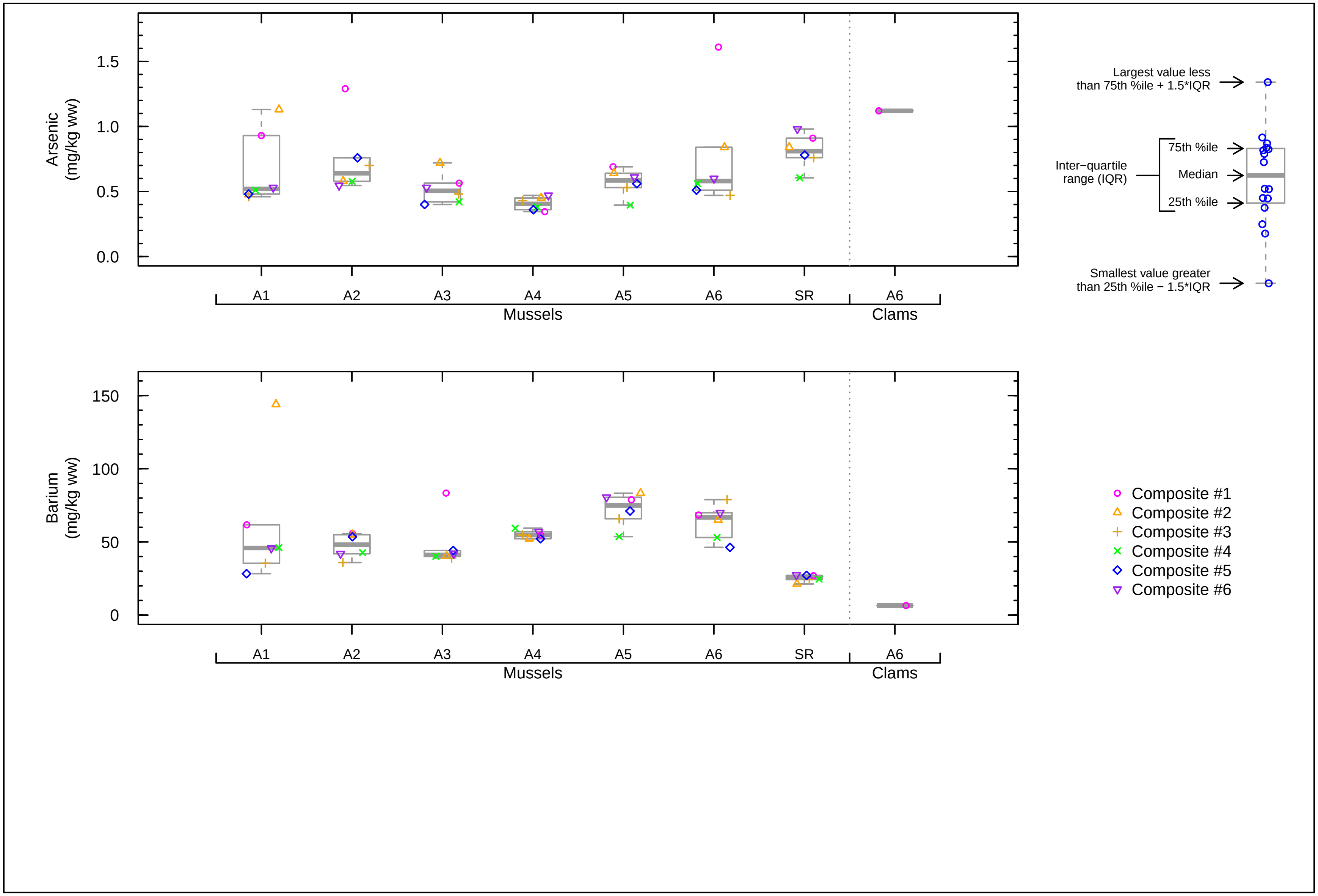


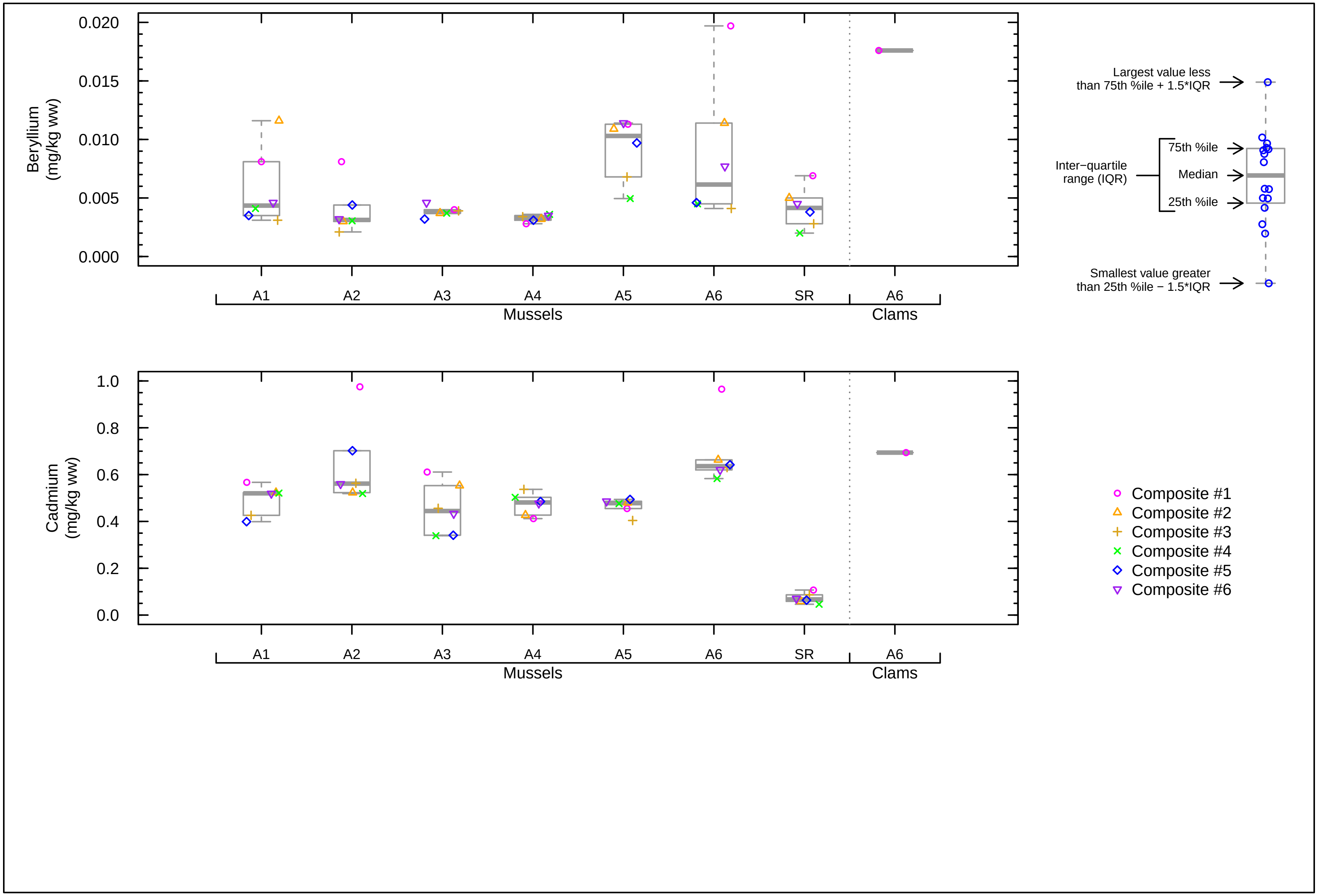
Figure 2-1. Lake Roosevelt Water Levels



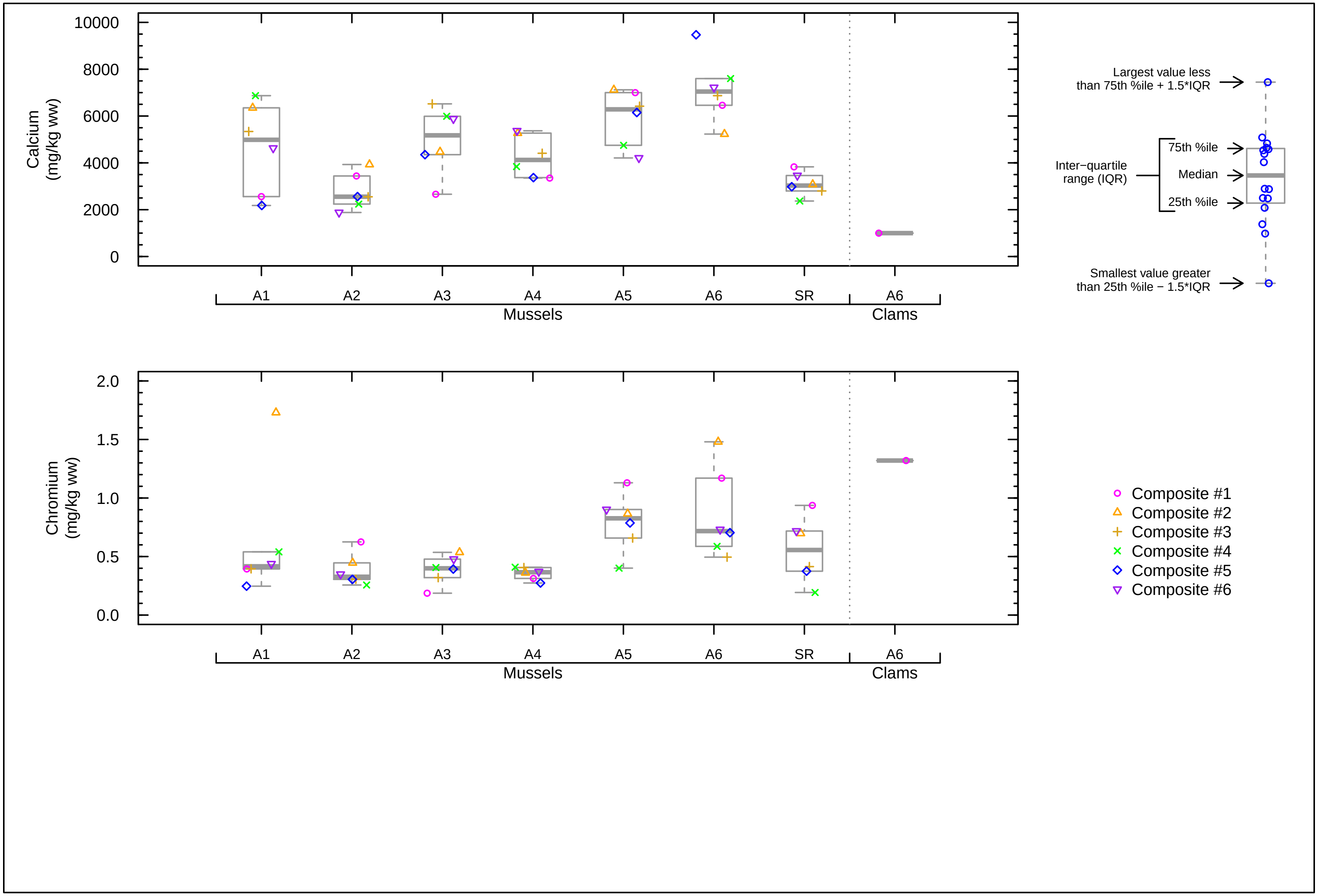
Figures 5−1a and 5−1b. Aluminum and Antimony Concentrations in Mussels and Clams by Area



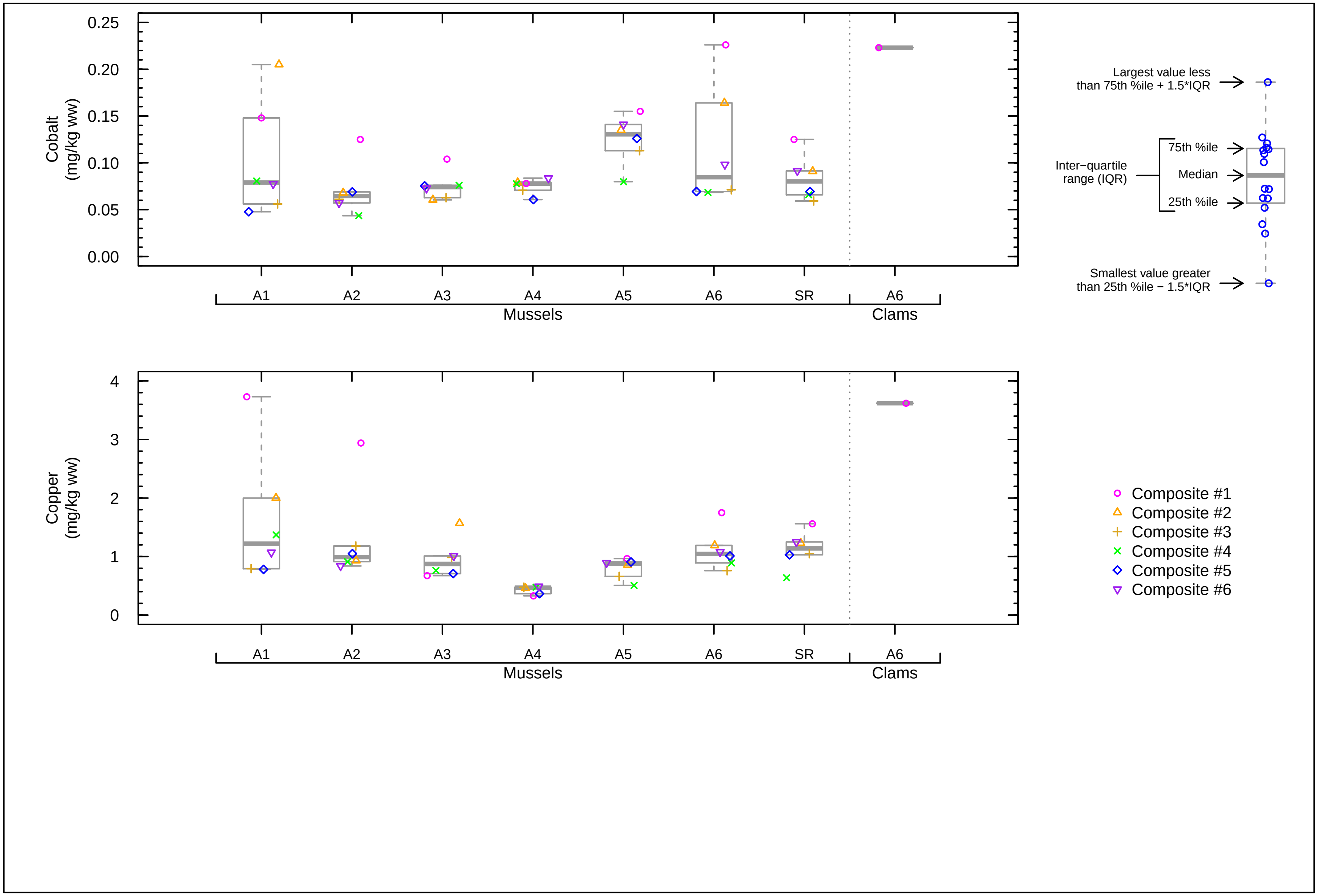
Figures 5−1c and 5−1d. Arsenic and Barium Concentrations in Mussels and Clams by Area



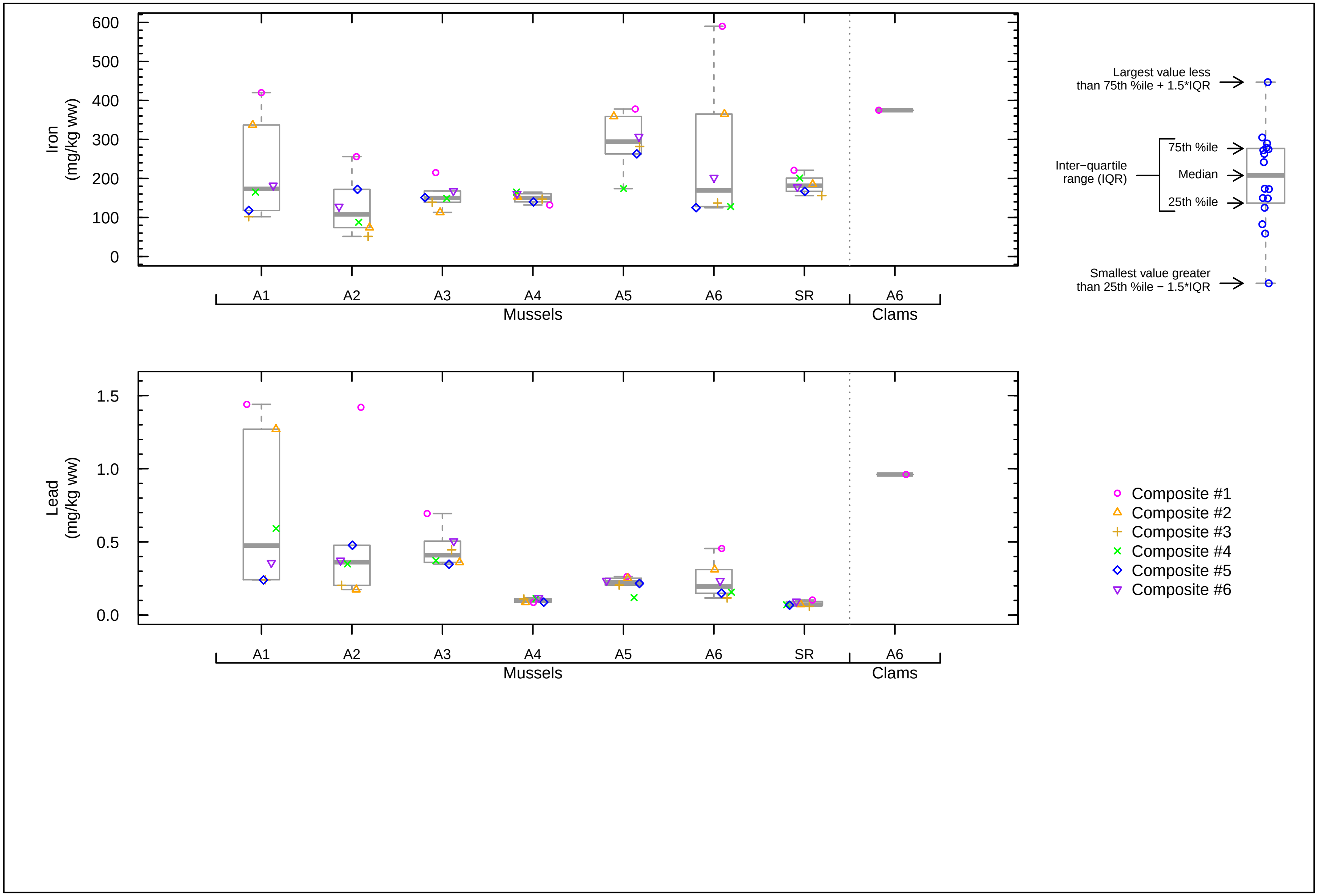
Figures 5−1e and 5−1f. Beryllium and Cadmium Concentrations in Mussels and Clams by Area



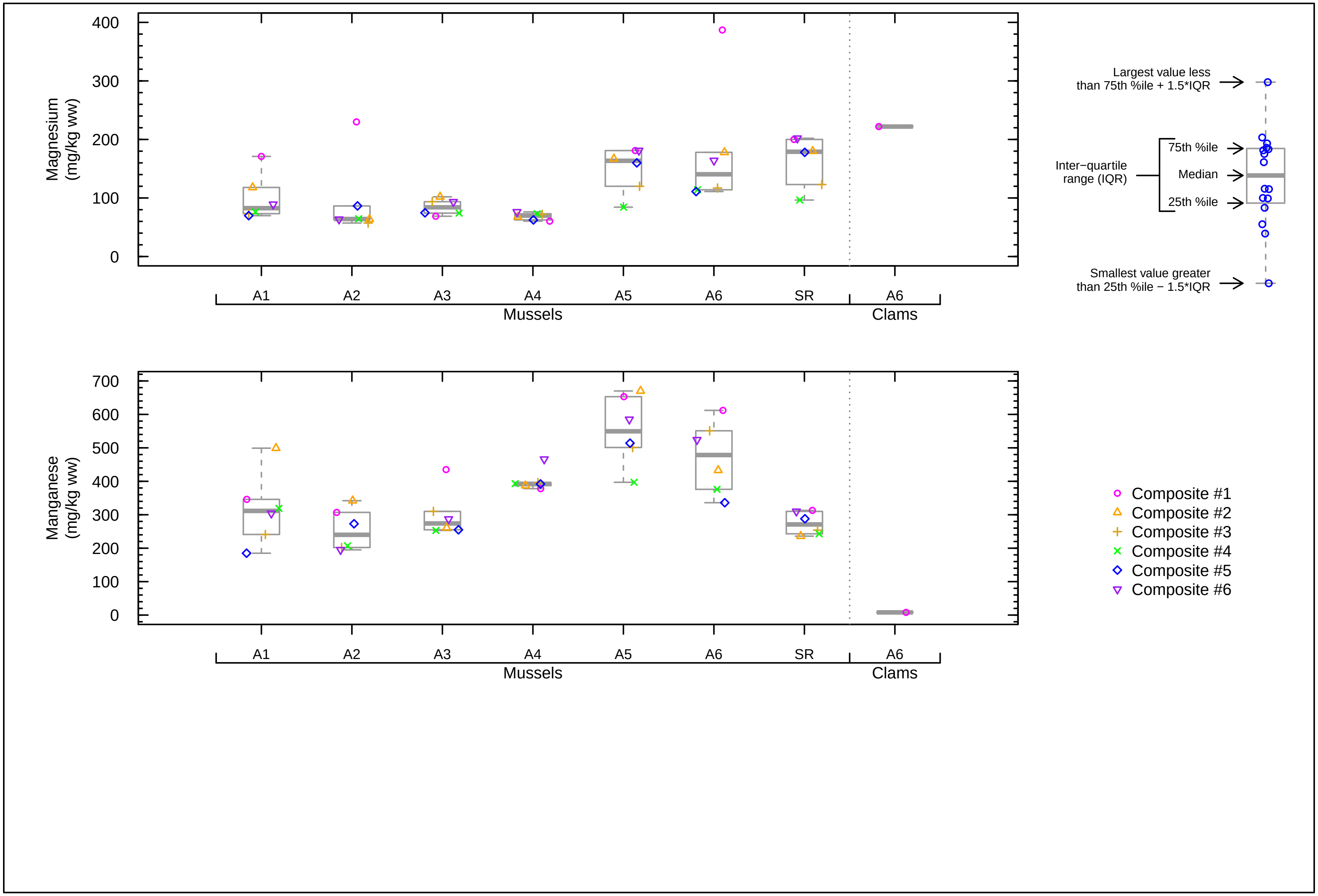
Figures 5−1g and 5−1h. Calcium and Chromium Concentrations in Mussels and Clams by Area



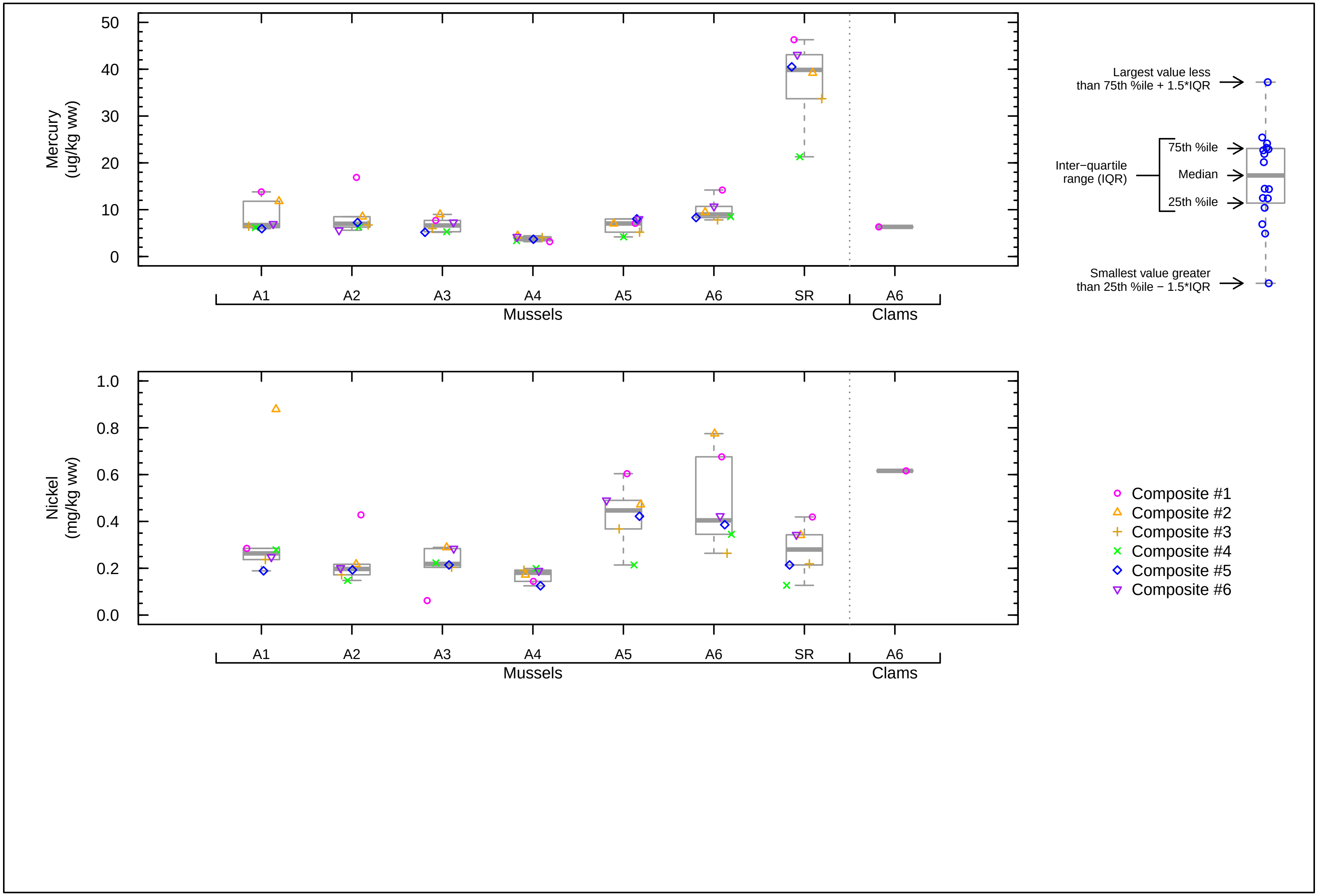
Figures 5−1i and 5−1j. Cobalt and Copper Concentrations in Mussels and Clams by Area



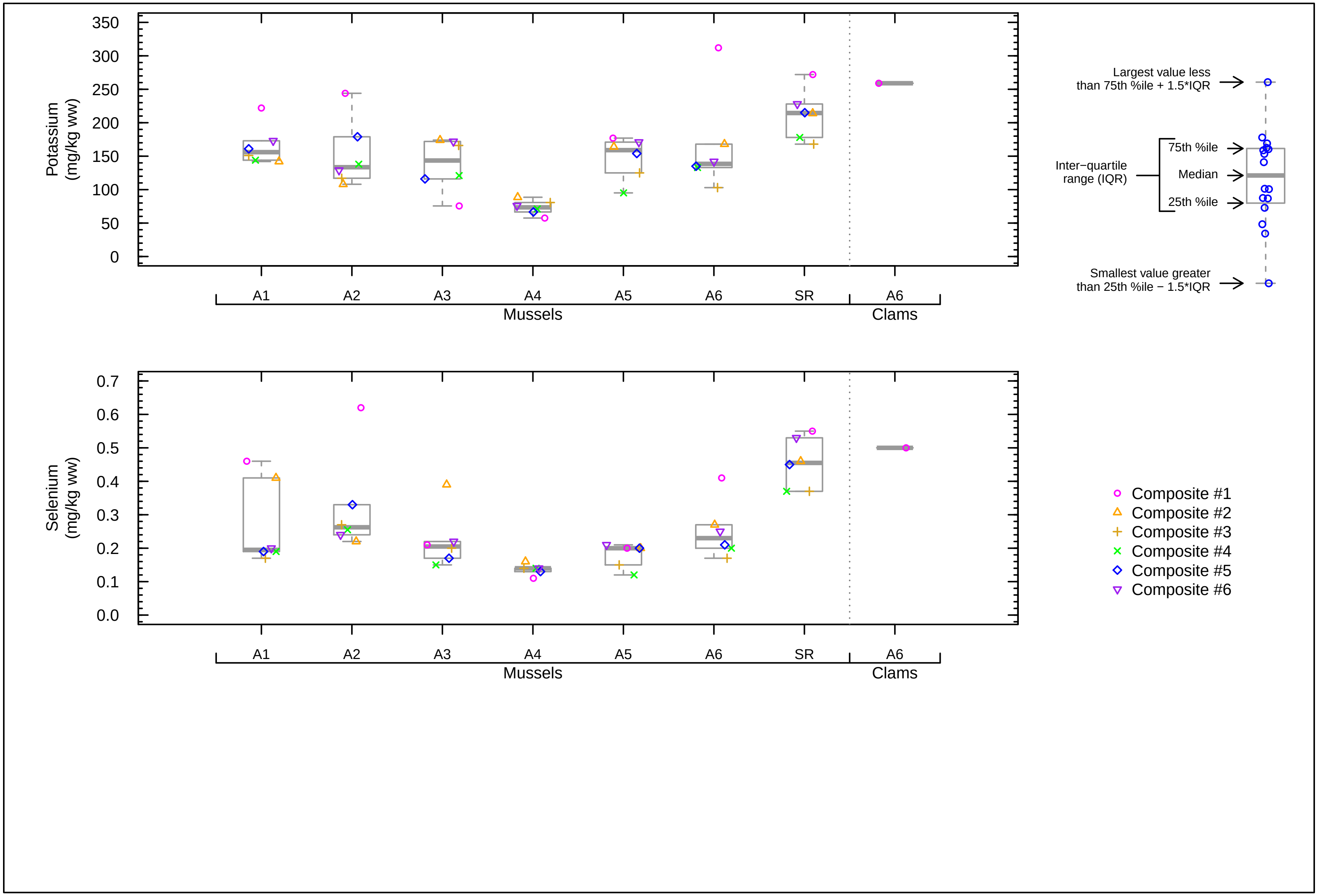
Figures 5−1k and 5−1l. Iron and Lead Concentrations in Mussels and Clams by Area



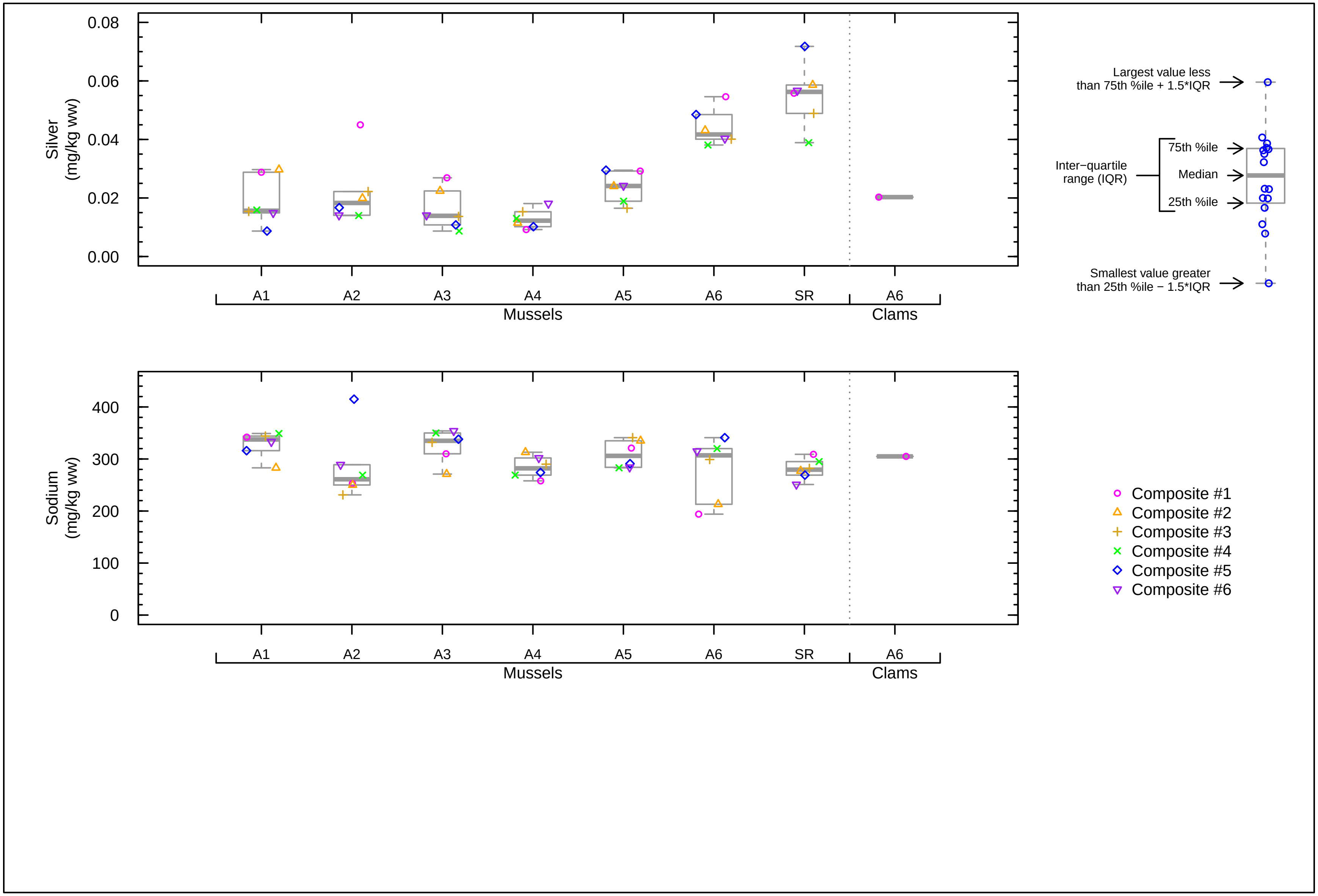
Figures 5−1m and 5−1n. Magnesium and Manganese Concentrations in Mussels and Clams by Area



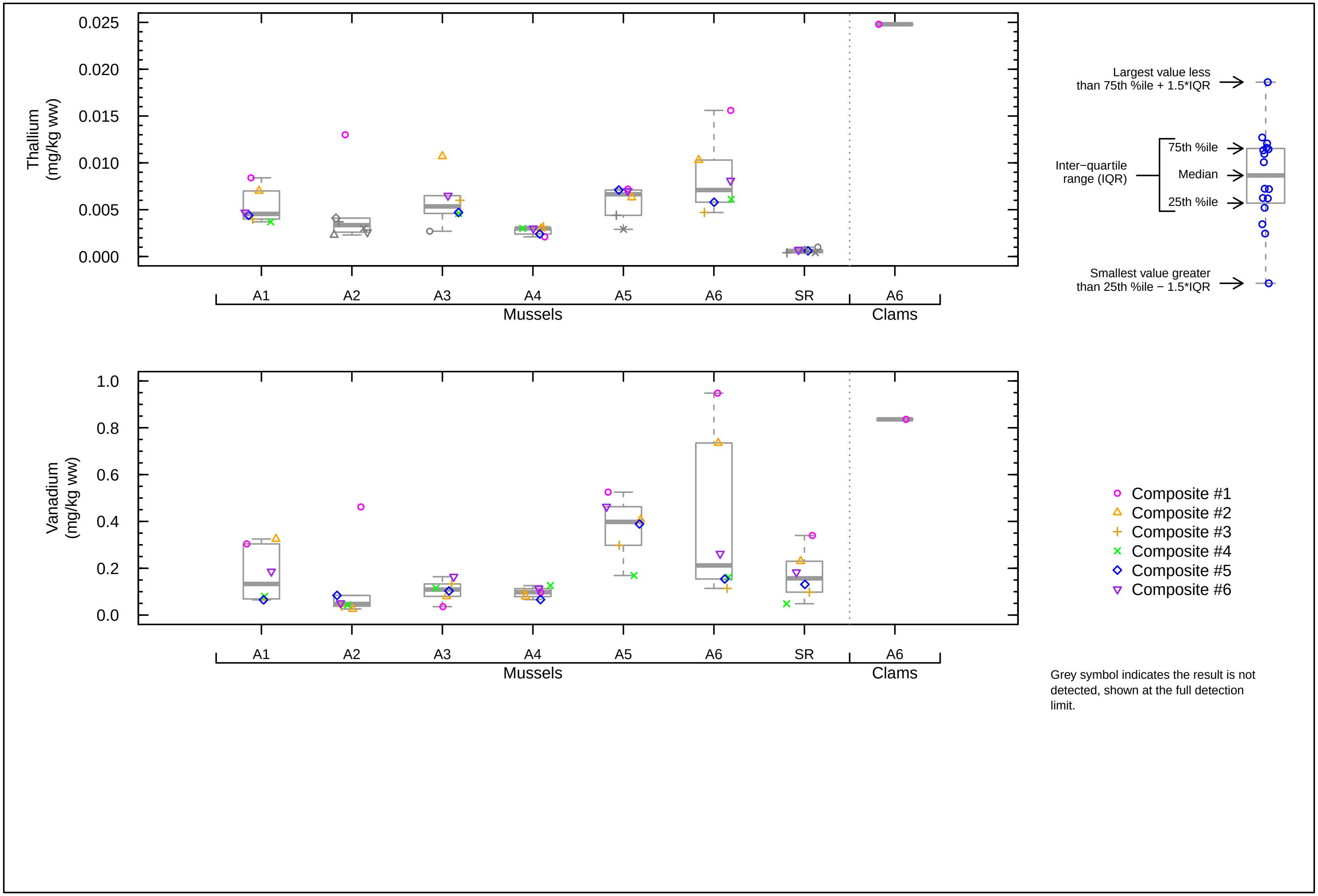
Figures 5−1o and 5−1p. Mercury and Nickel Concentrations in Mussels and Clams by Area



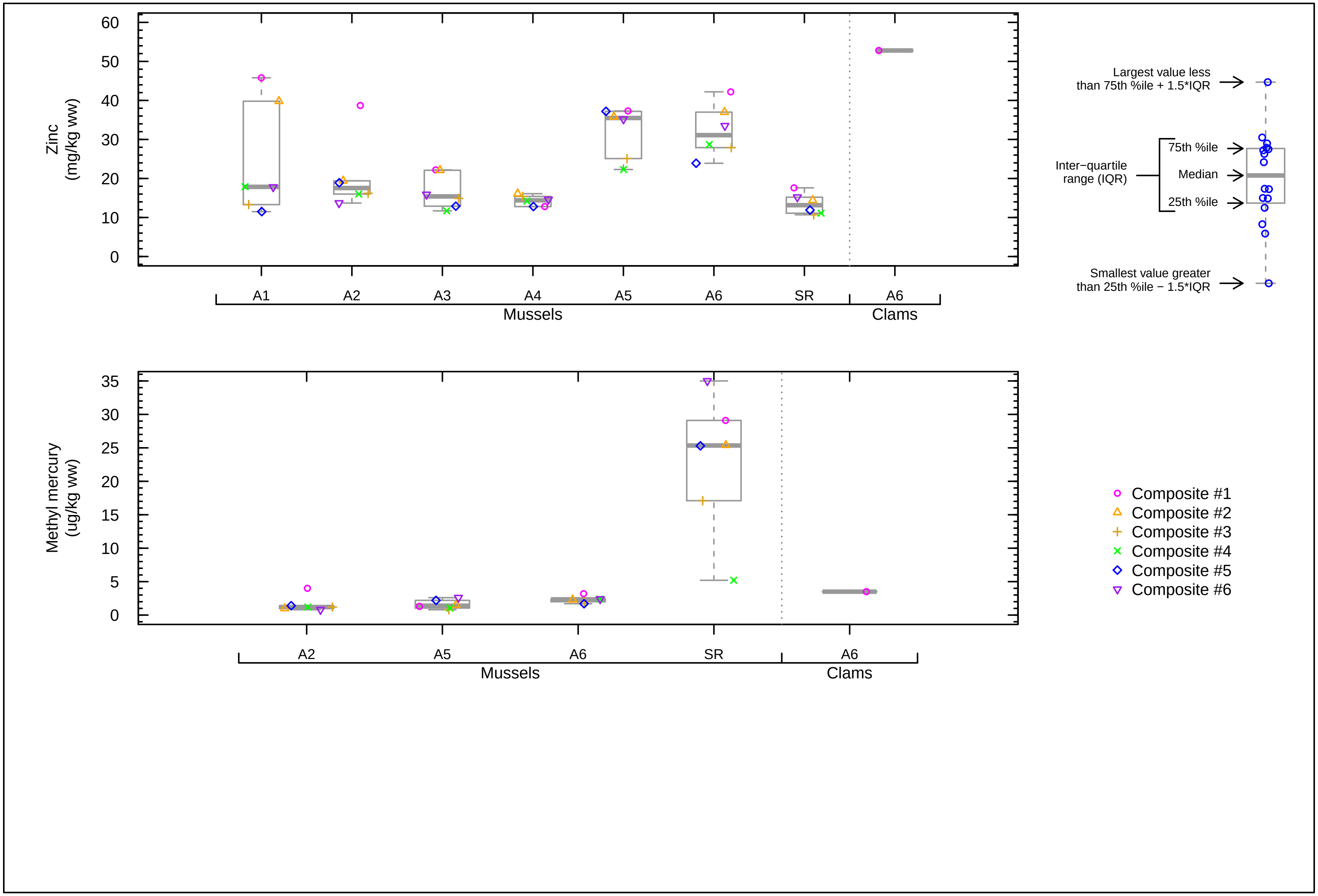
Figures 5−1q and 5−1r. Potassium and Selenium Concentrations in Mussels and Clams by Area



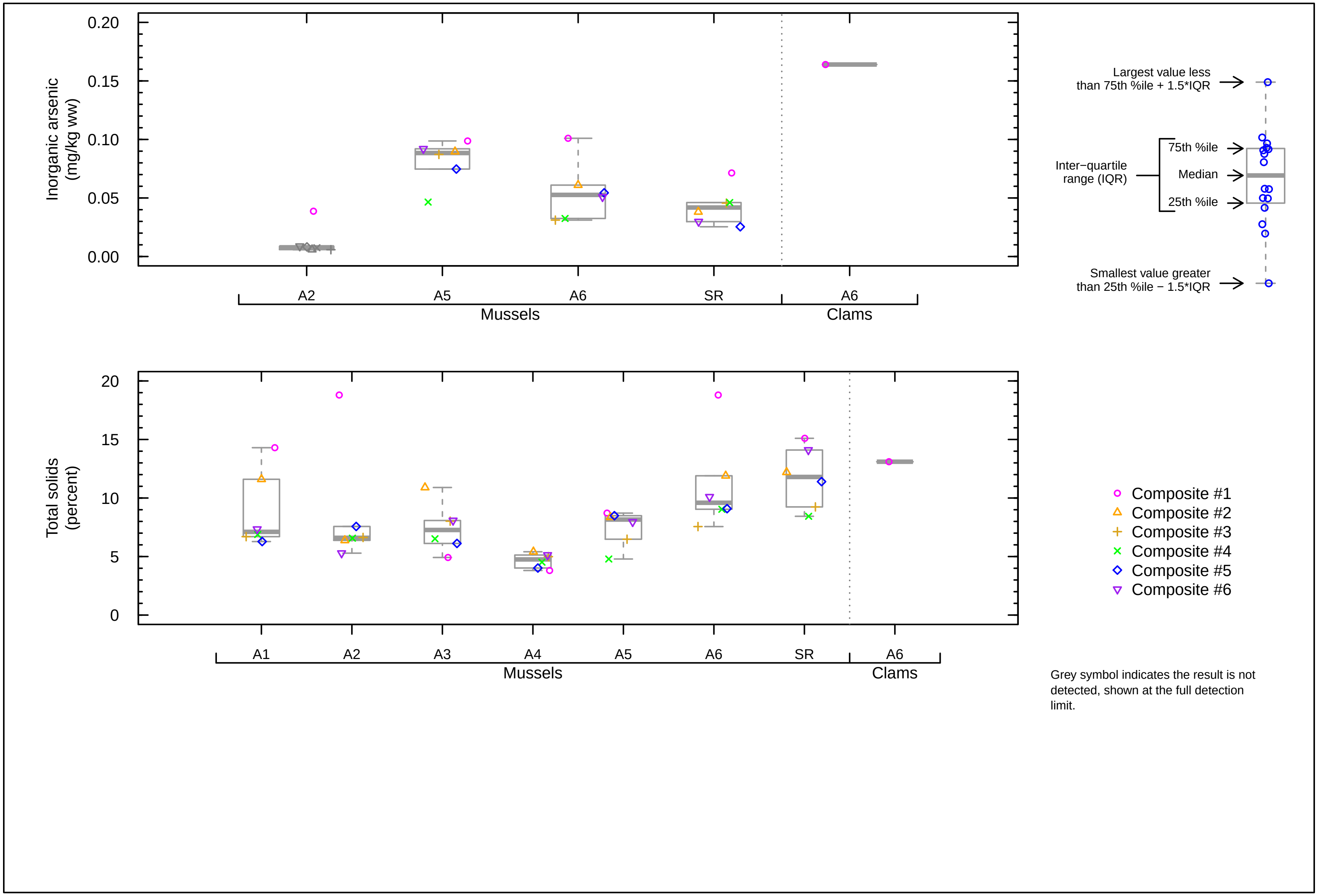
Figures 5−1s and 5−1t. Silver and Sodium Concentrations in Mussels and Clams by Area



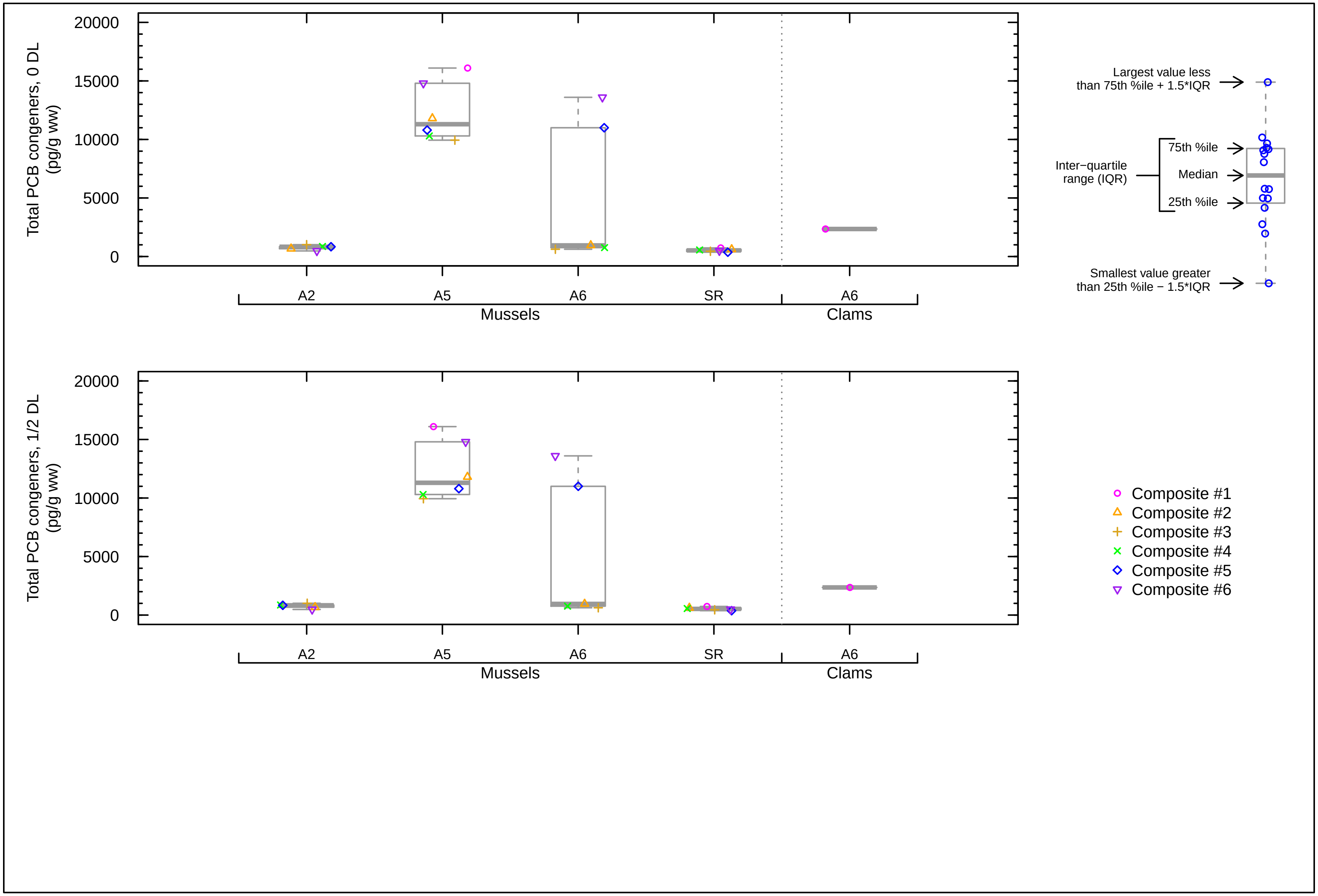
Figures 5−1u and 5−1v. Thallium and Vanadium Concentrations in Mussels and Clams by Area



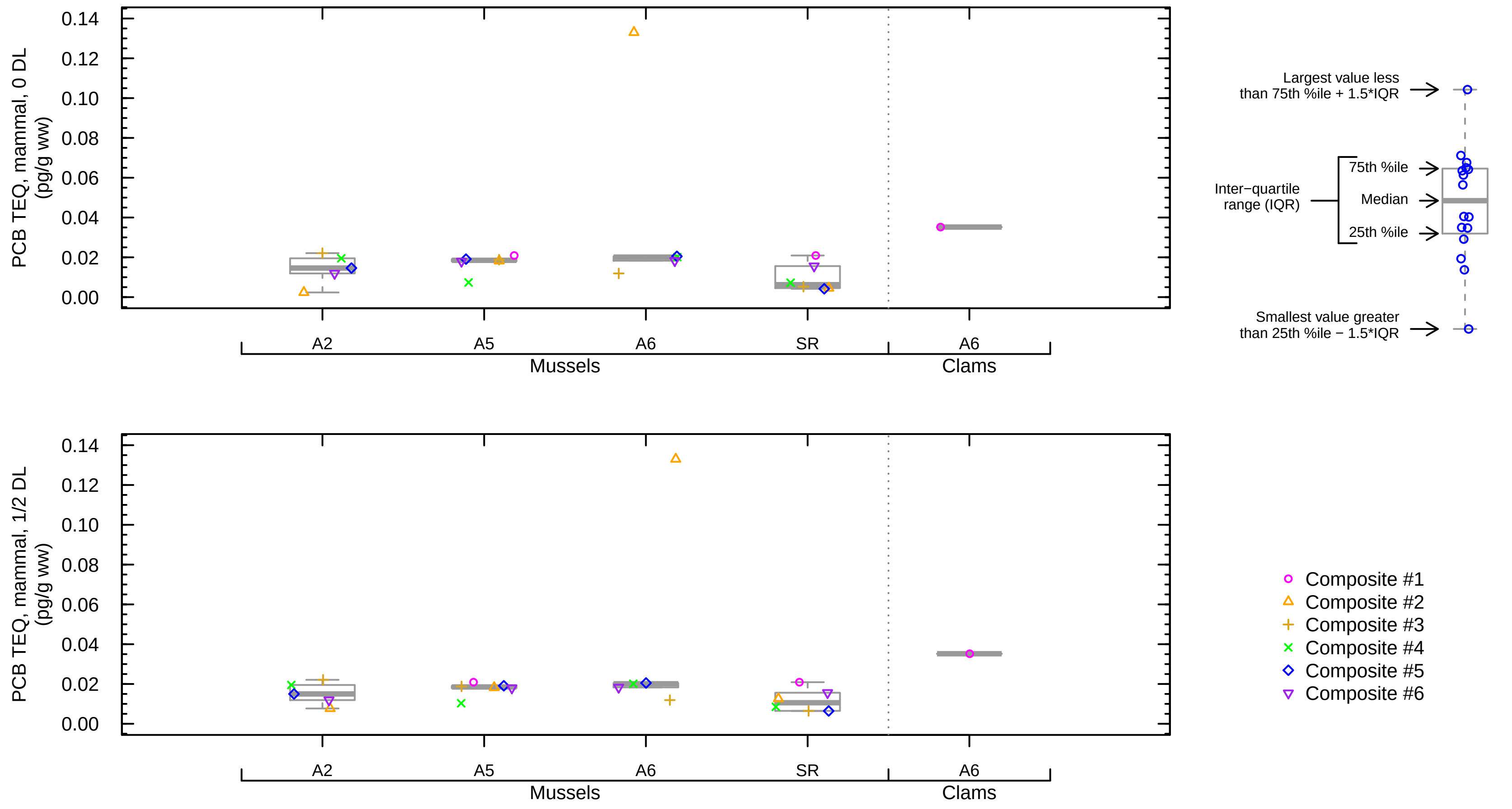
Figures 5−1w and 5−1x. Zinc and Methyl Mercury Concentrations in Mussels and Clams by Area



Figures 5−1y and 5−1z. Inorganic Arsenic and Total Solids Concentrations in Mussels and Clams by Area

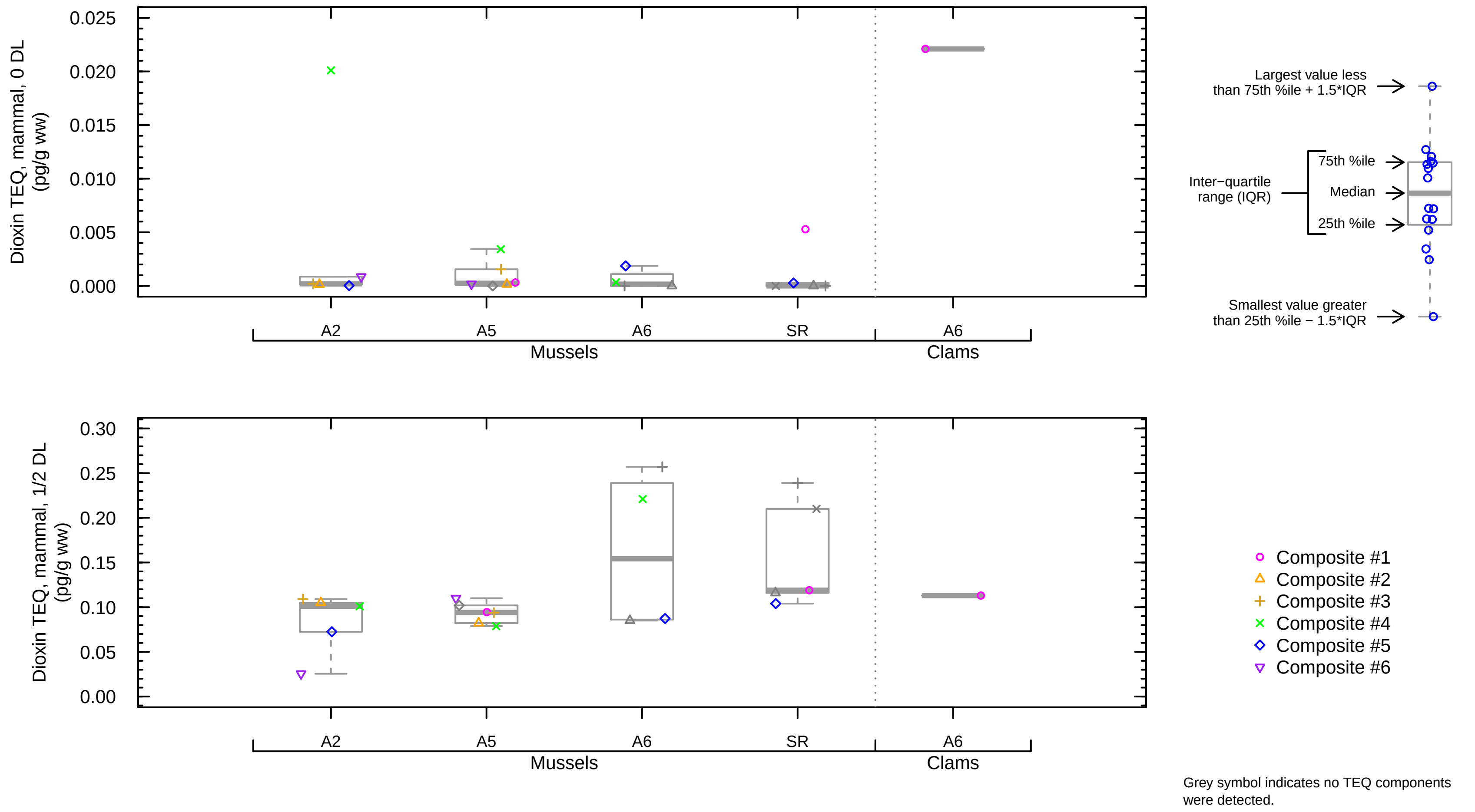


Figures 5−1aa and 5−1ab. Total PCB Congeners Concentrations in Mussels and Clams by Area



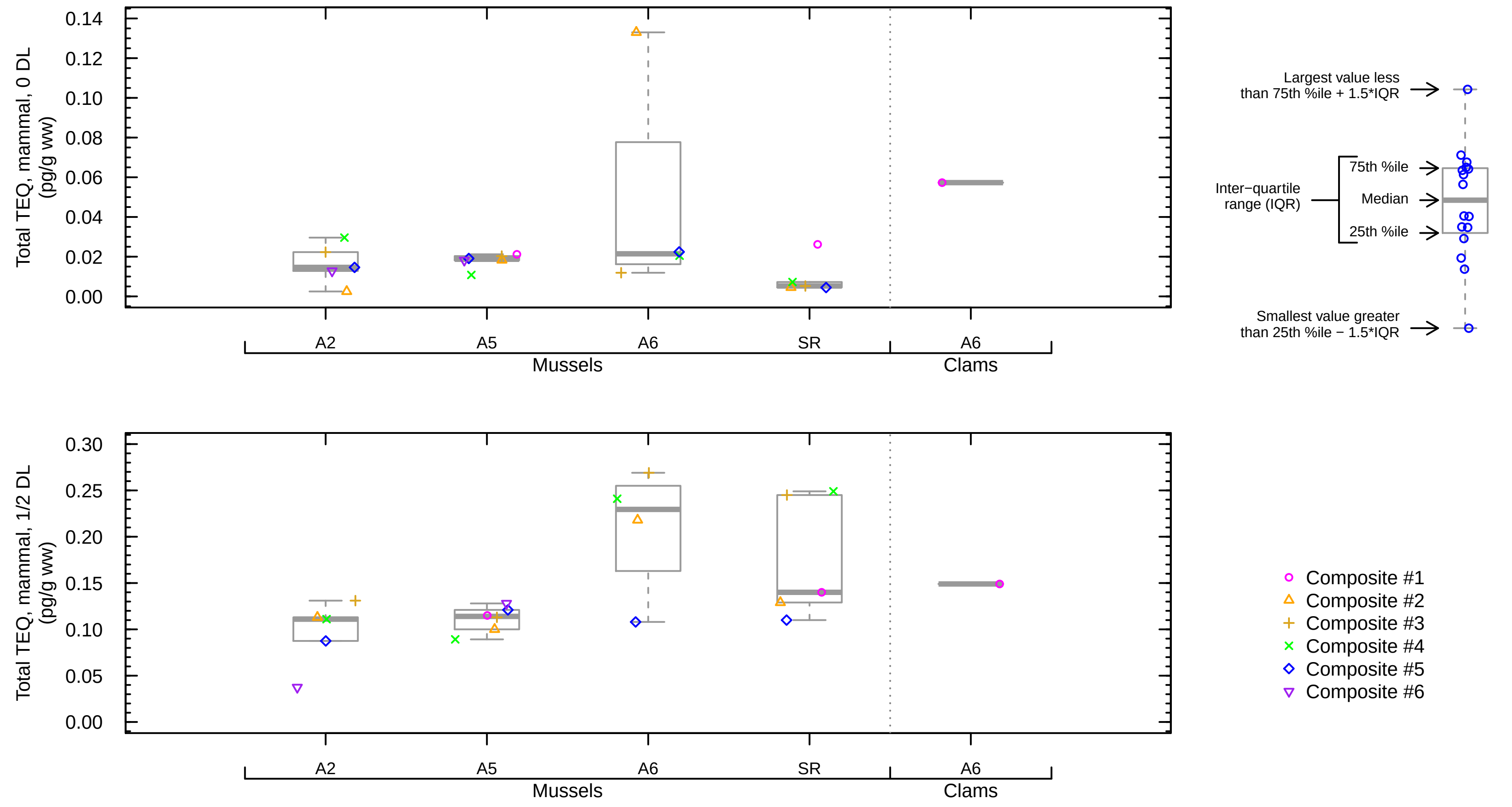
Note: PCB TEQ was calculated by summing the products of the concentrations of each of the 12 individual dioxin−like PCB congeners and its specific mammalian TEF from Van den Berg et al. (2006). Congeners that were undetected for a given sample were assigned either a value equal to one−half the sample−specific detection limit (DL) or zero for use in the TEQ calculation, as indicated in the axis label.

Figures 5−1ac and 5−1ad. PCB TEQ Concentrations in Mussels and Clams by Area



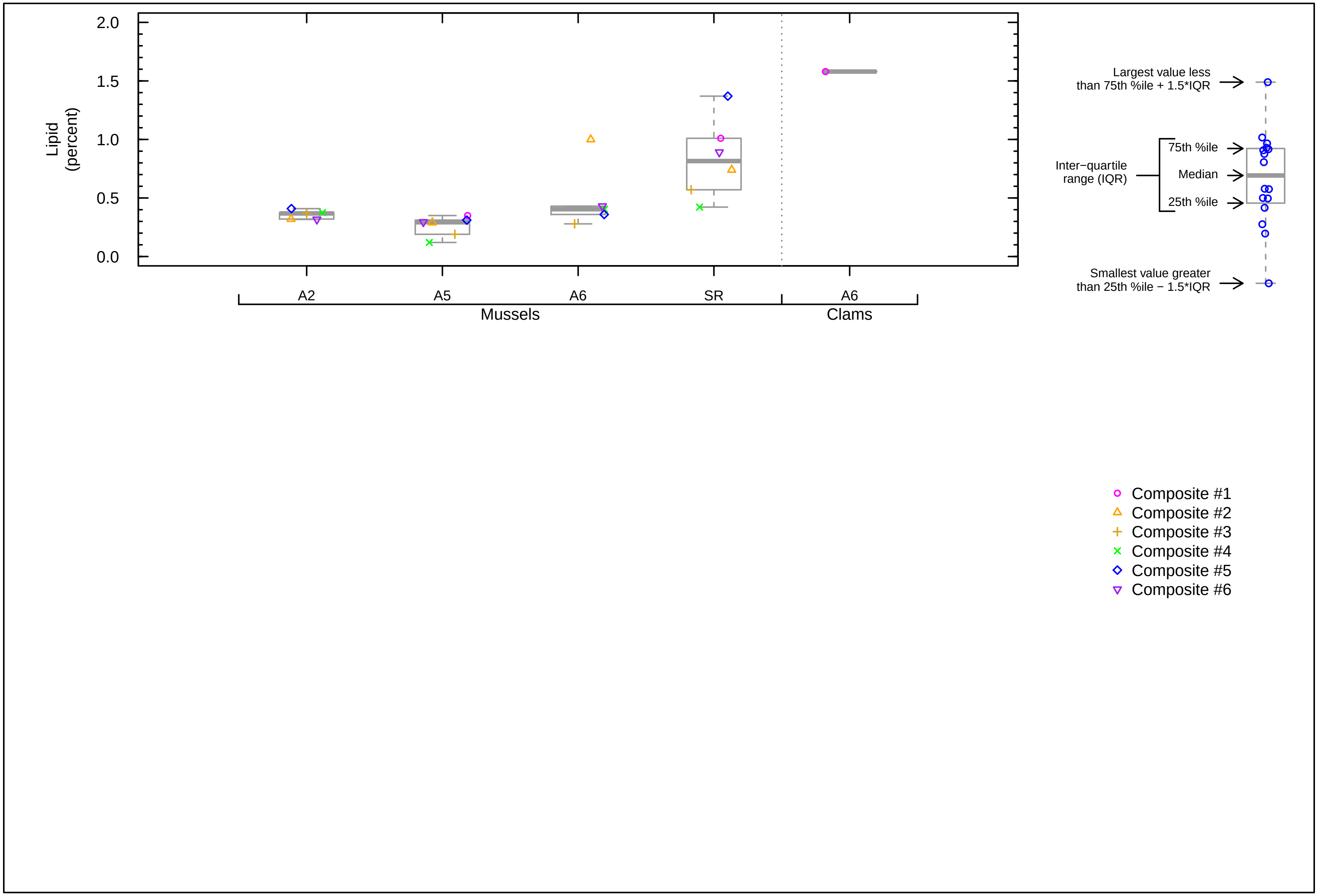
Note: Dioxin TEQ was calculated by summing the products of the concentrations of each of the 17 individual dioxin/furan congeners and its specific mammalian TEF from Van den Berg et al. (2006). Congeners that were undetected for a given sample were assigned either a value equal to one−half the sample−specific detection limit (DL) or zero for use in the TEQ calculation, as indicated in the axis label.

Figures 5−1ae and 5−1af. Dioxin TEQ Concentrations in Mussels and Clams by Area

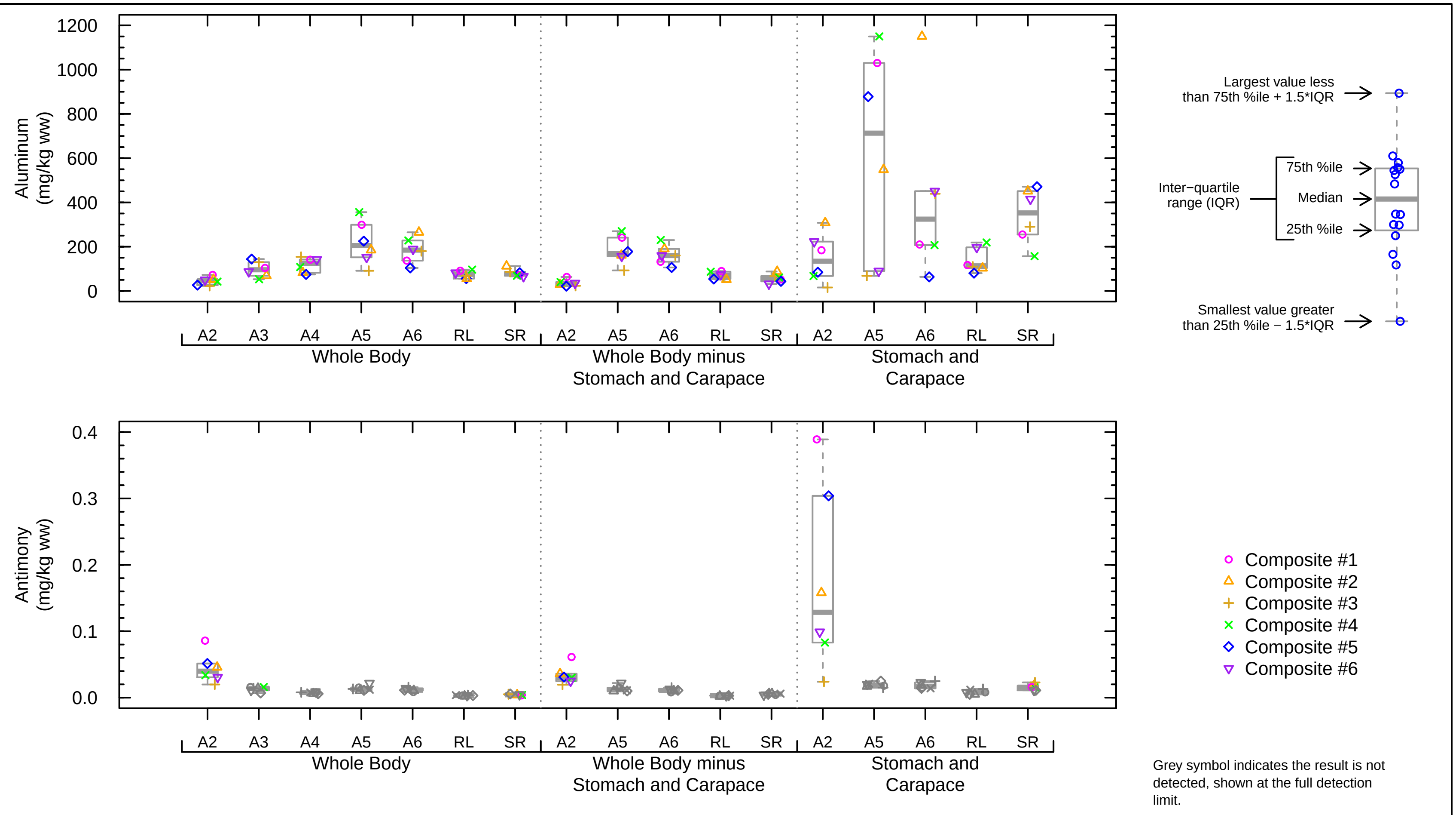


Note: Total TEQ was calculated by summing the products of the concentrations of each of the 17 individual dioxin/furan congeners and the 12 individual dioxin−like PCB congeners and its specific mammalian TEF from Van den Berg et al. (2006). Congeners that were undetected for a given sample were assigned either a value equal to one−half the sample−specific detection limit (DL) or zero for use in the TEQ calculation, as indicated in the axis label.

Figures 5−1ag and 5−1ah. Total TEQ Concentrations in Mussels and Clams by Area

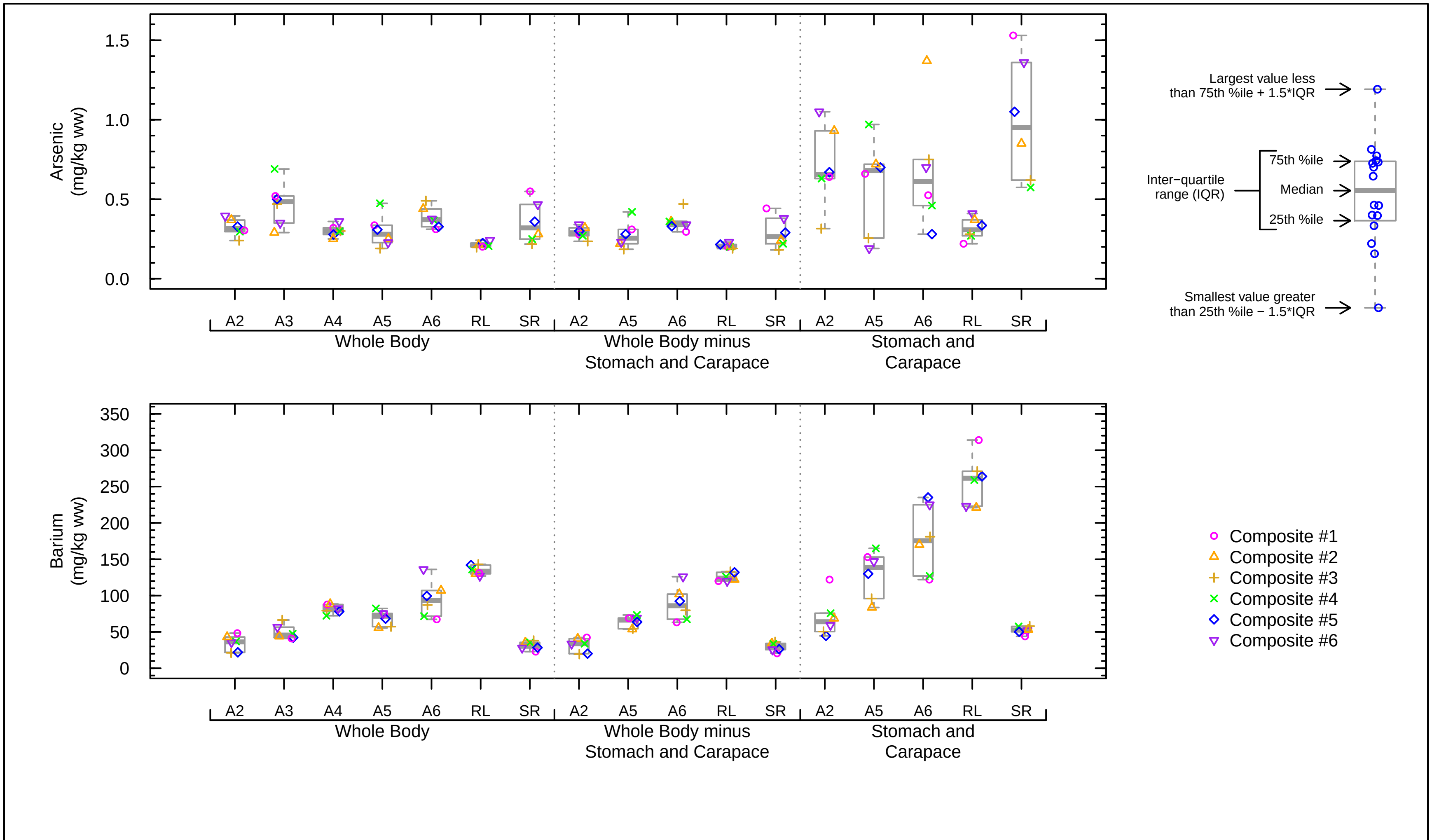


Figures 5−1ai. Lipid Concentrations in Mussels and Clams by Area



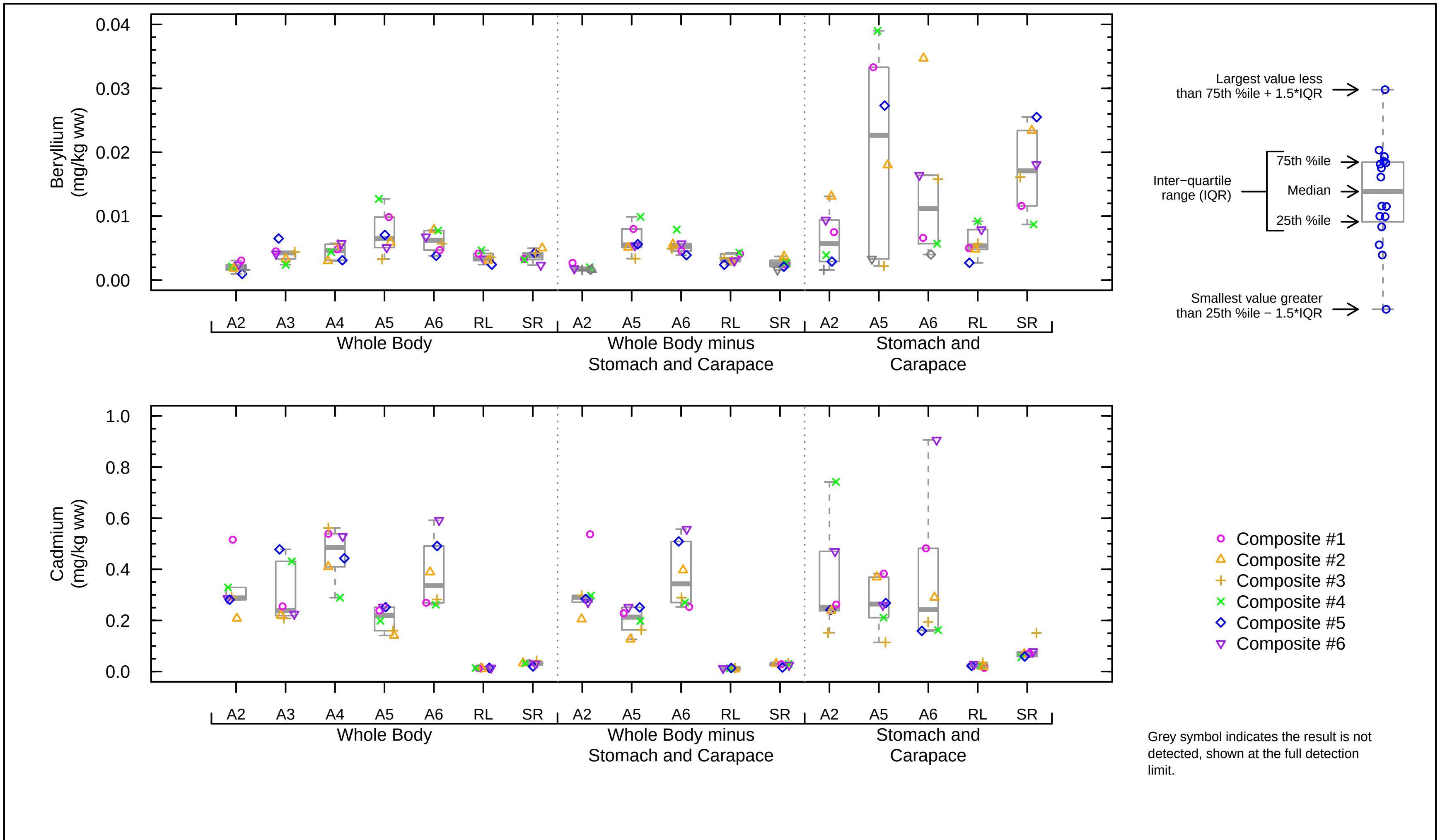
Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2a and 5−2b. Aluminum and Antimony Concentrations in Crayfish by Area and Tissue Type



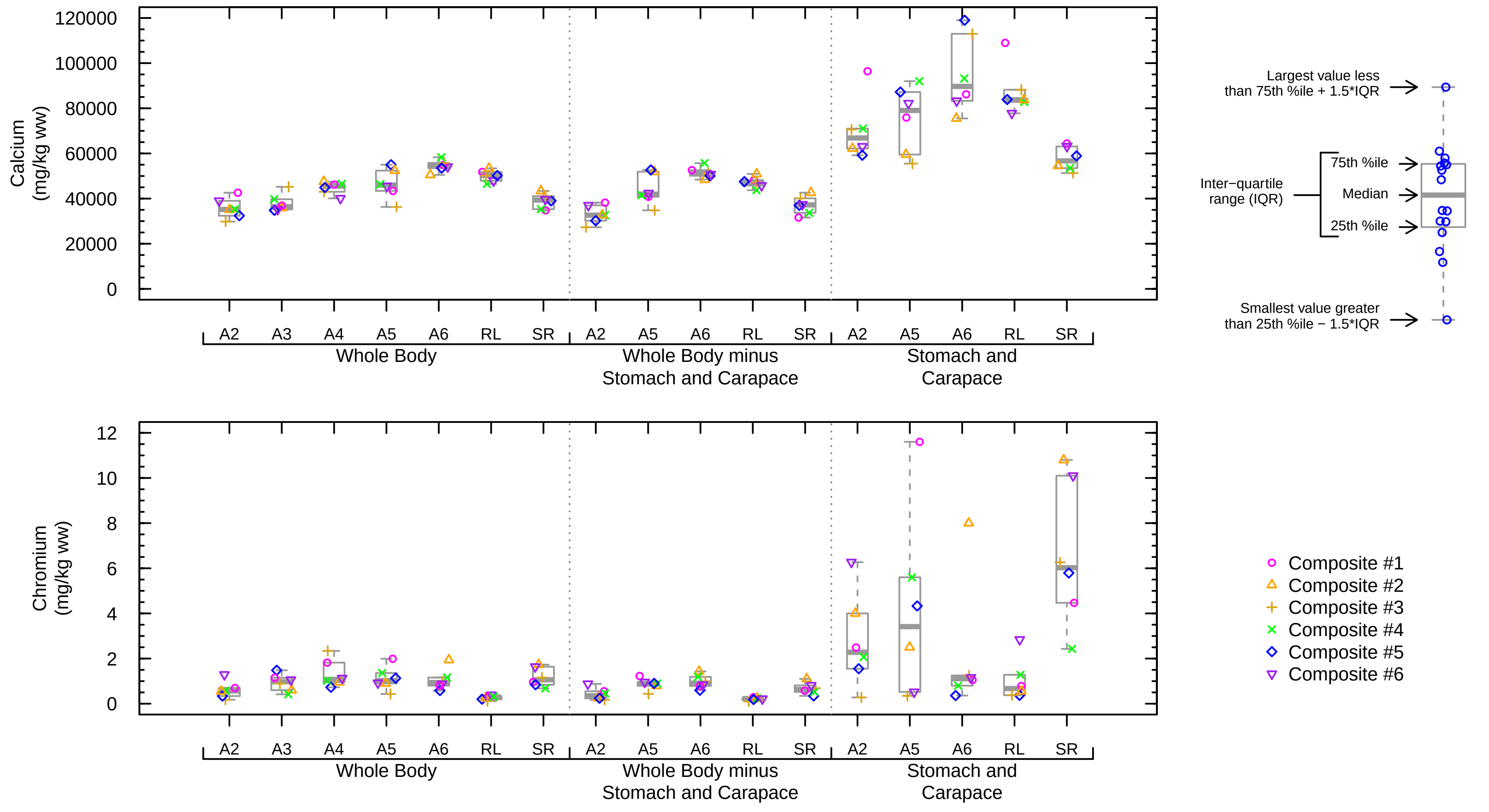
Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2c and 5−2d. Arsenic and Barium Concentrations in Crayfish by Area and Tissue Type



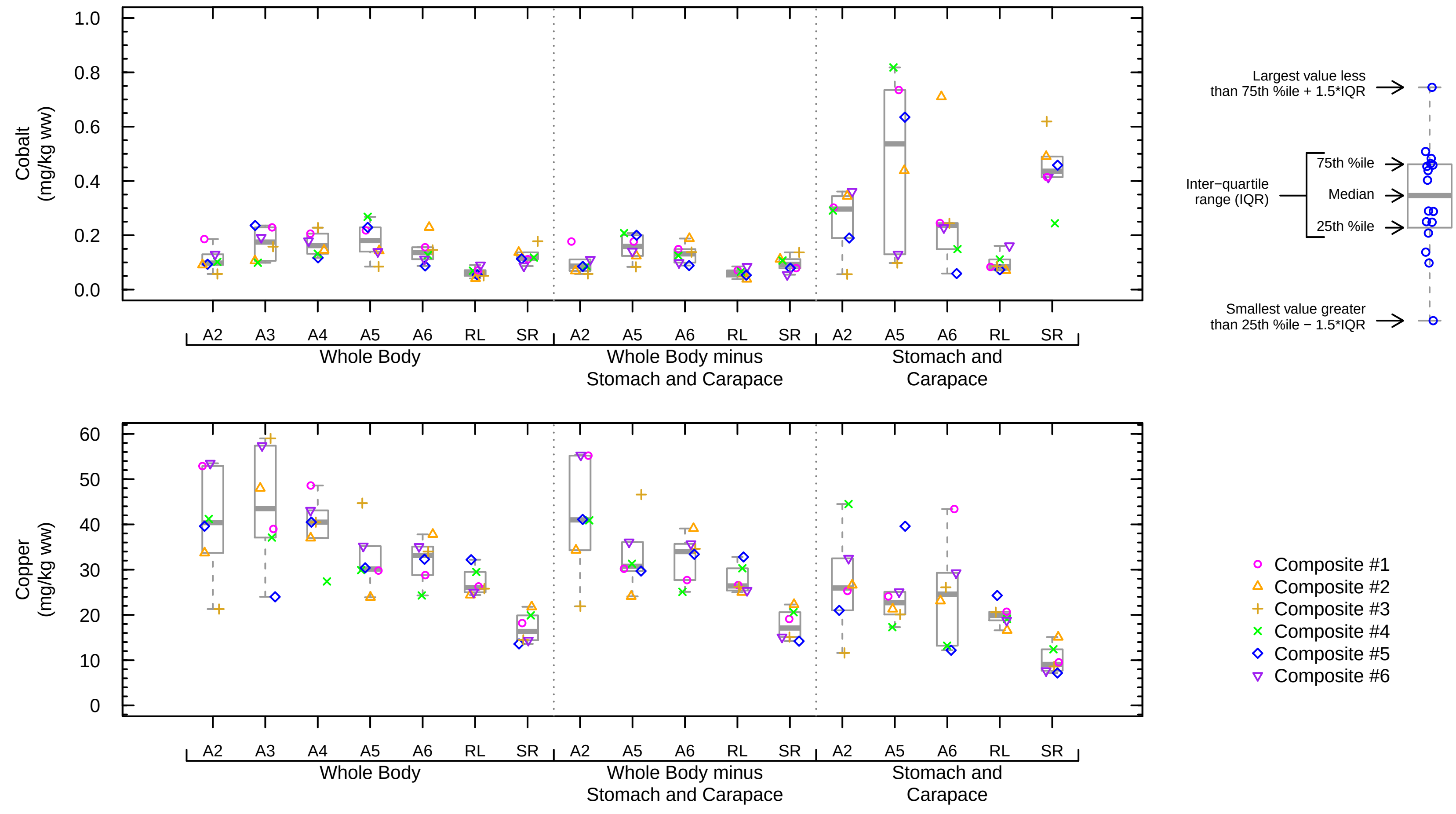
Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2e and 5−2f. Beryllium and Cadmium Concentrations in Crayfish by Area and Tissue Type



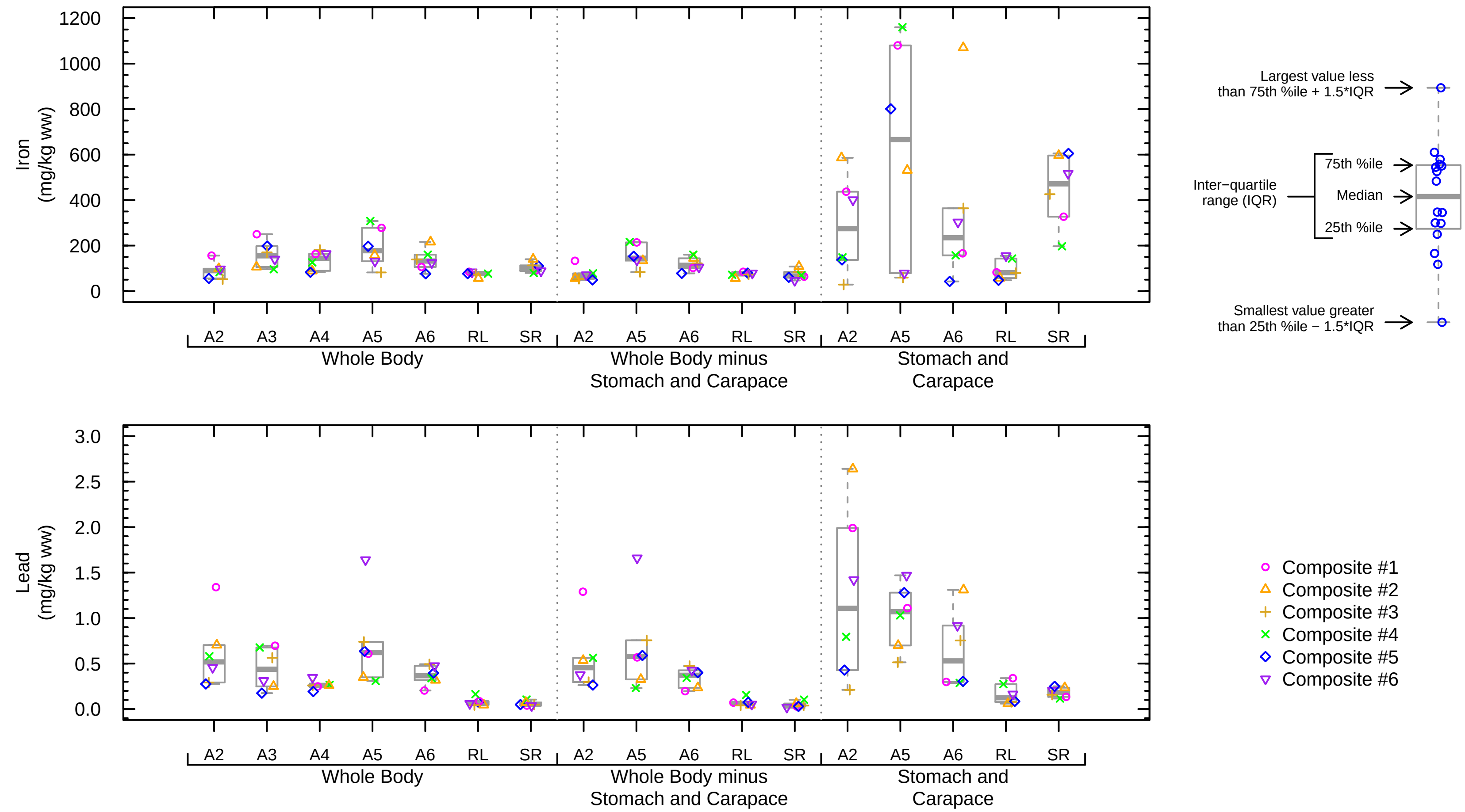
Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2g and 5−2h. Calcium and Chromium Concentrations in Crayfish by Area and Tissue Type



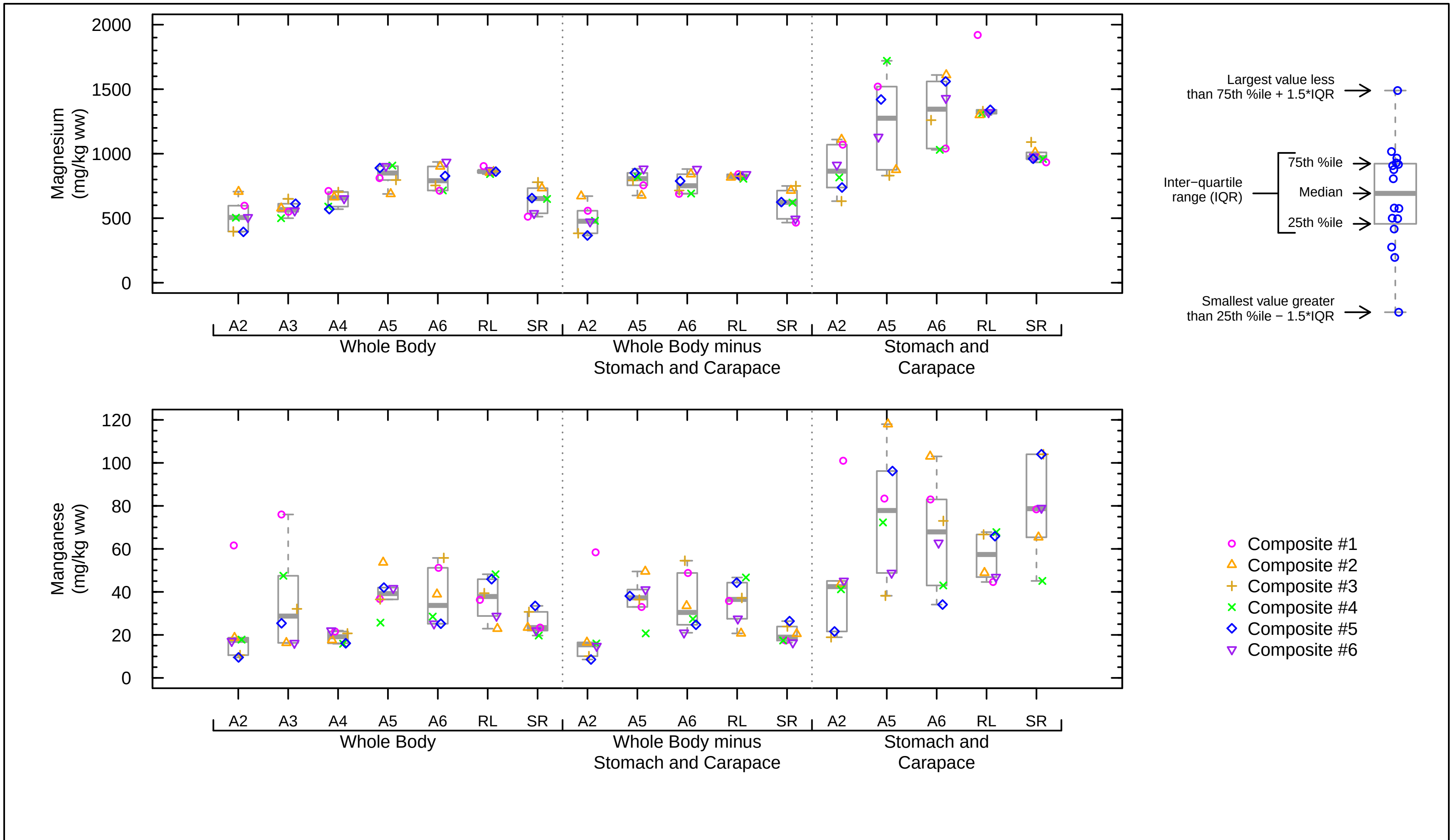
Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2i and 5−2j. Cobalt and Copper Concentrations in Crayfish by Area and Tissue Type



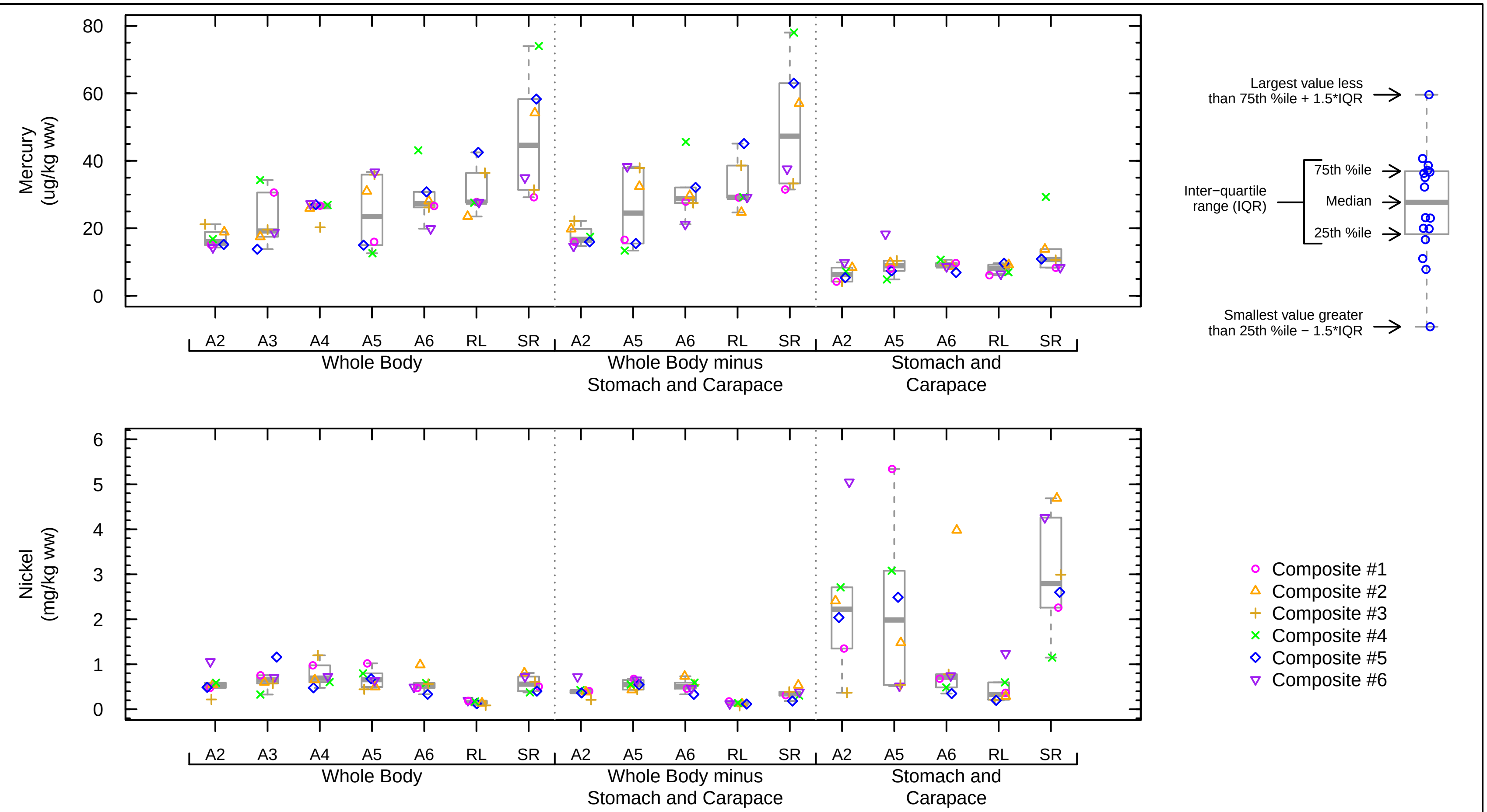
Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2k and 5−2l. Iron and Lead Concentrations in Crayfish by Area and Tissue Type



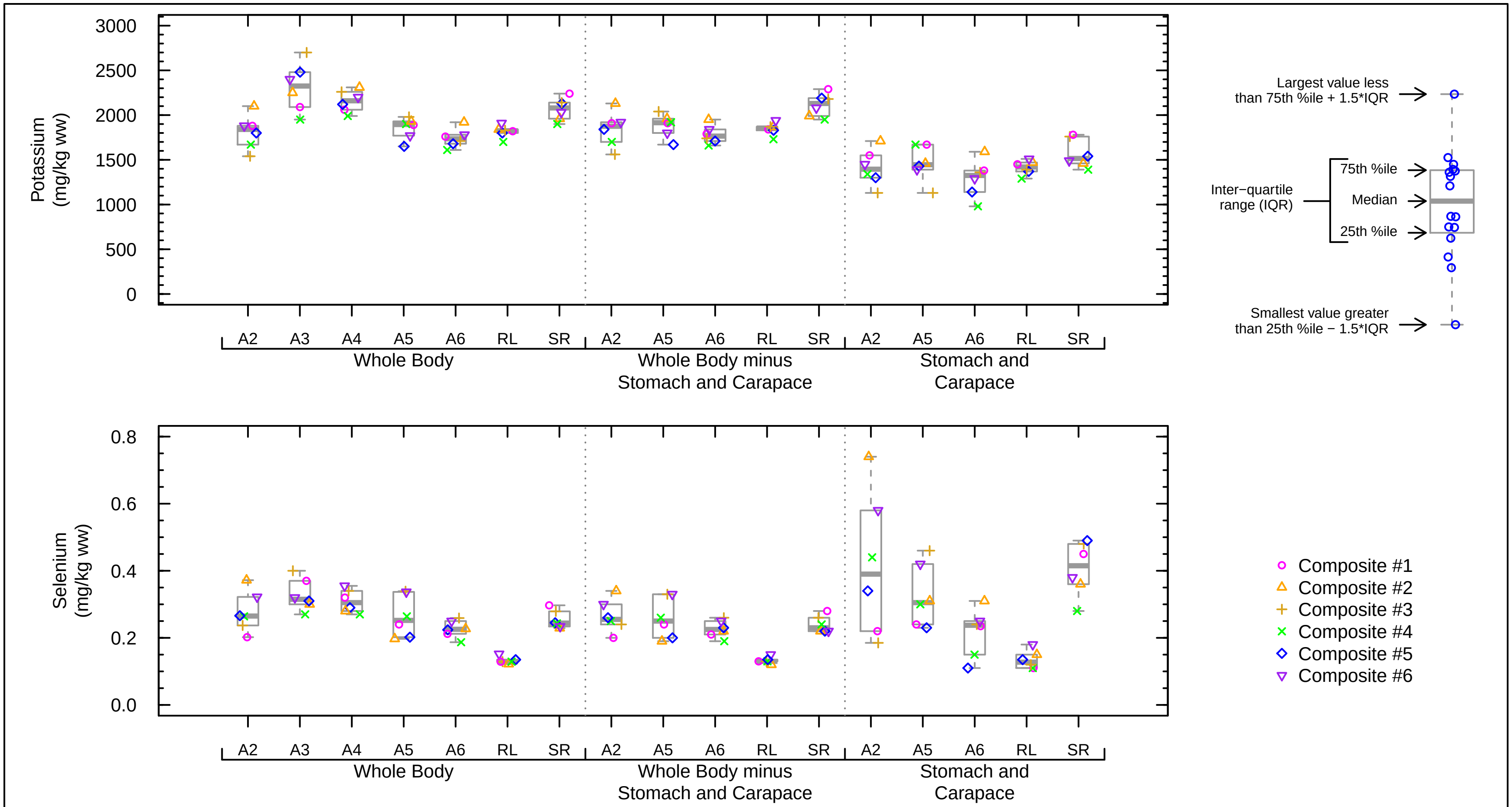
Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2m and 5−2n. Magnesium and Manganese Concentrations in Crayfish by Area and Tissue Type



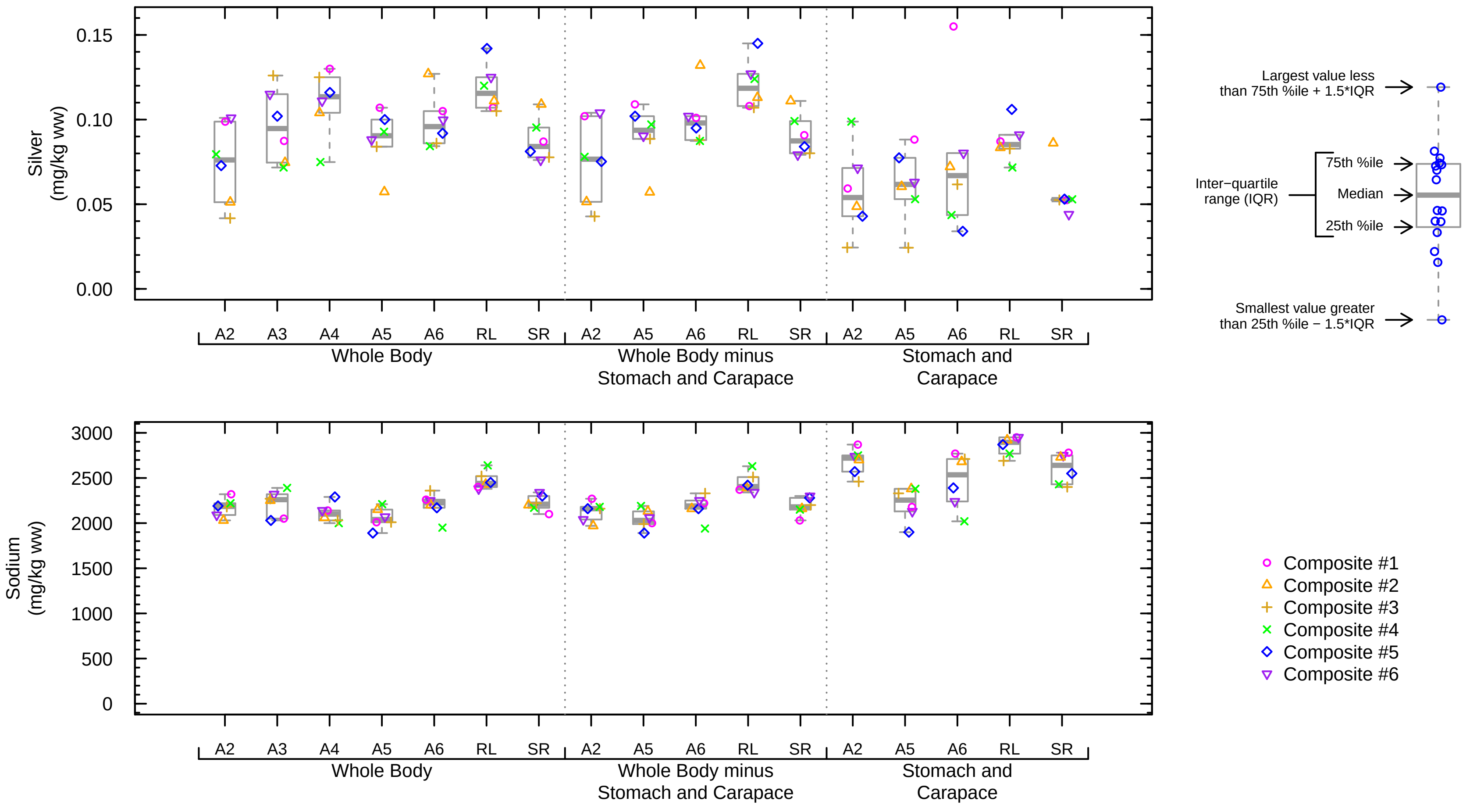
Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2o and 5−2p. Mercury and Nickel Concentrations in Crayfish by Area and Tissue Type



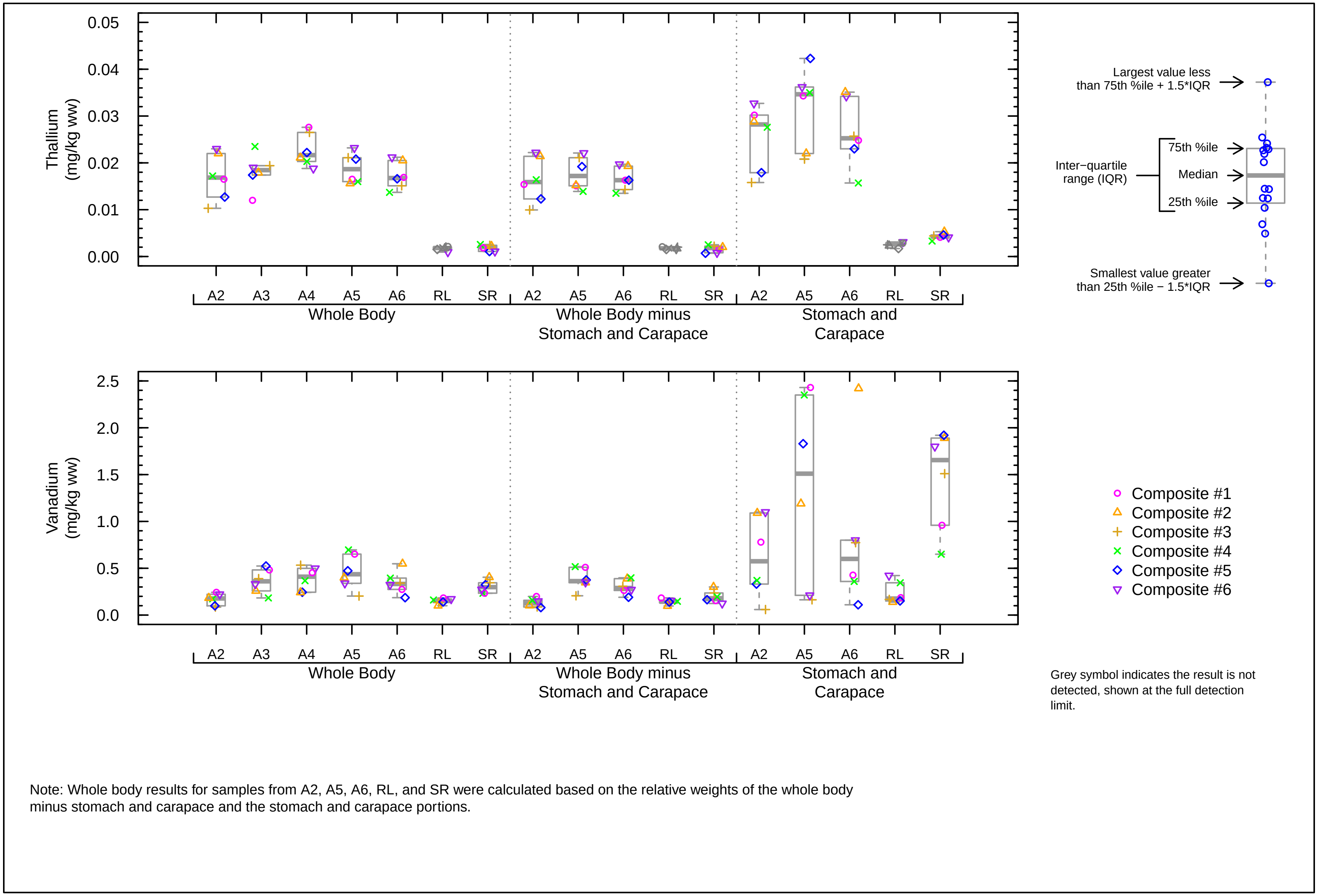
Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2q and 5−2r. Potassium and Selenium Concentrations in Crayfish by Area and Tissue Type

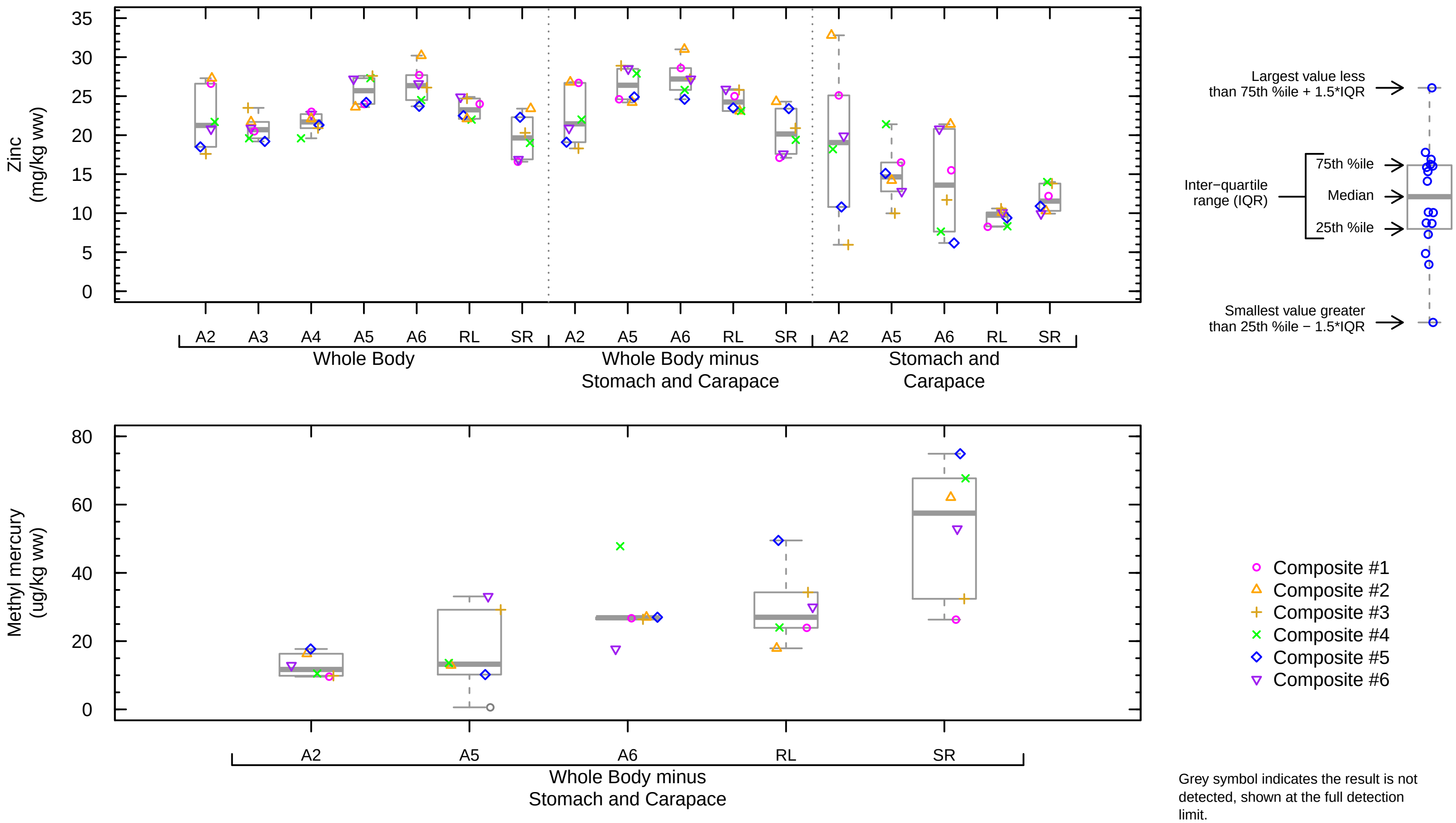


Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2s and 5−2t. Silver and Sodium Concentrations in Crayfish by Area and Tissue Type

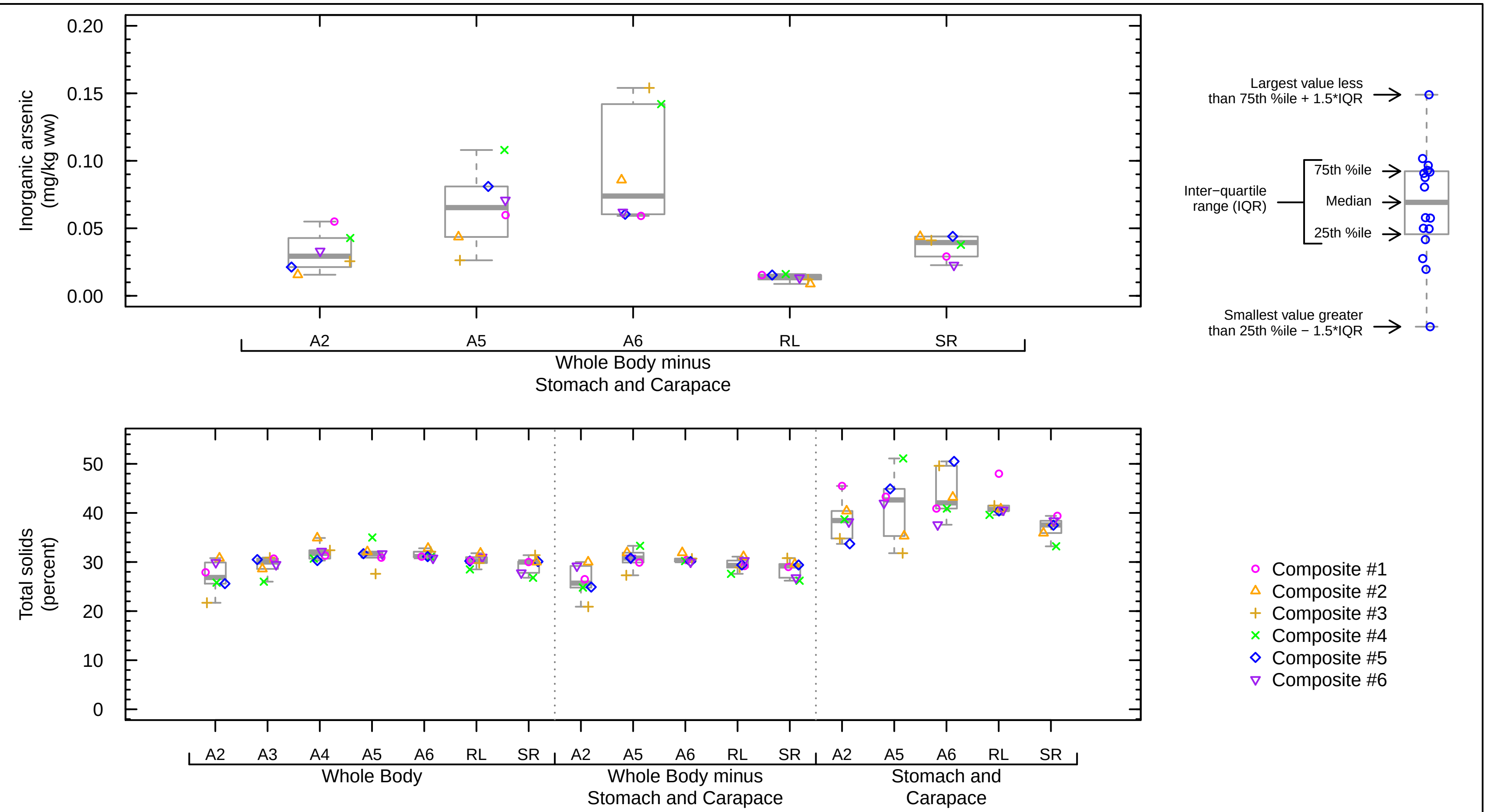


Figures 5−2u and 5−2v. Thallium and Vanadium Concentrations in Crayfish by Area and Tissue Type



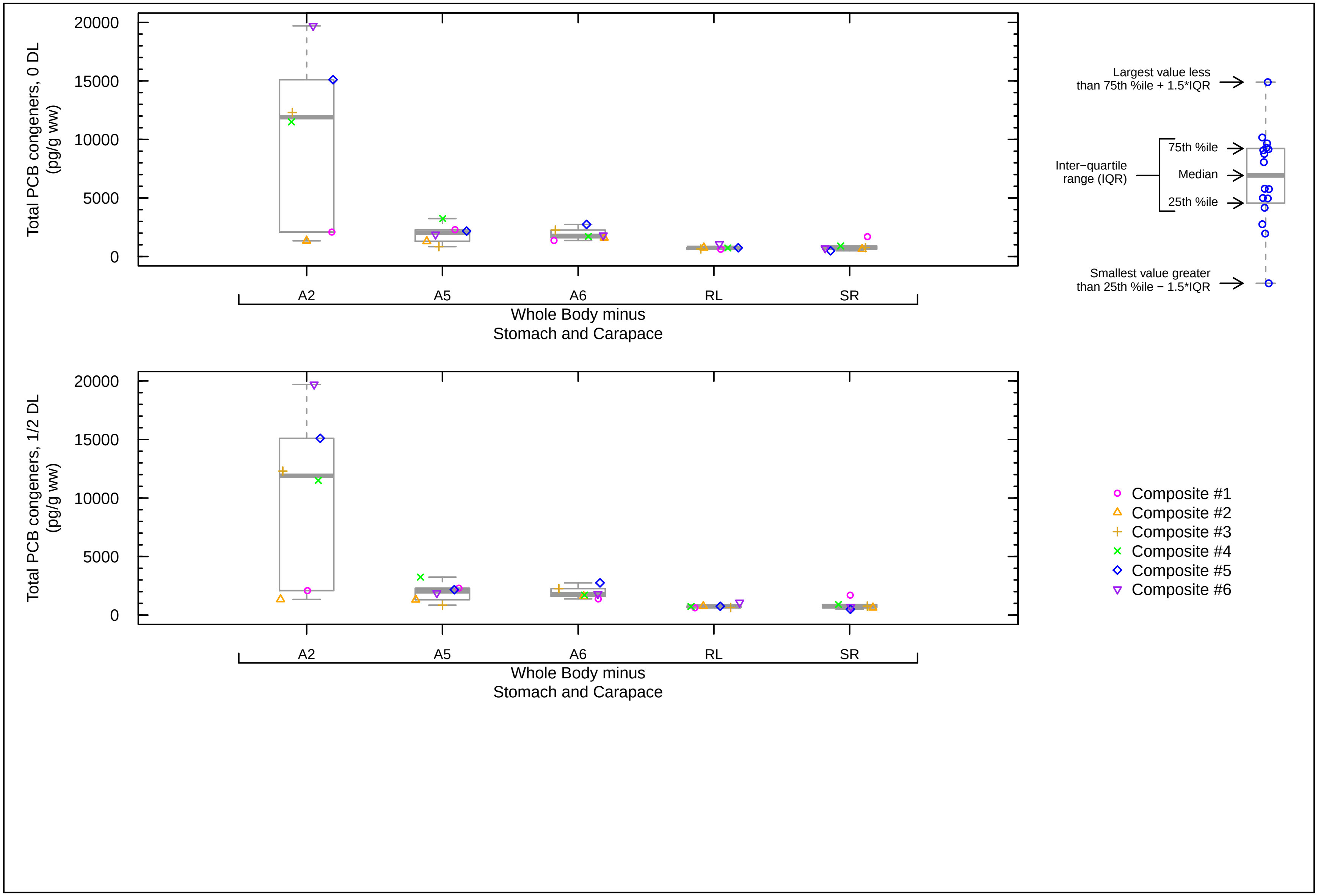
Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2w and 5−2x. Zinc and Methyl Mercury Concentrations in Crayfish by Area and Tissue Type

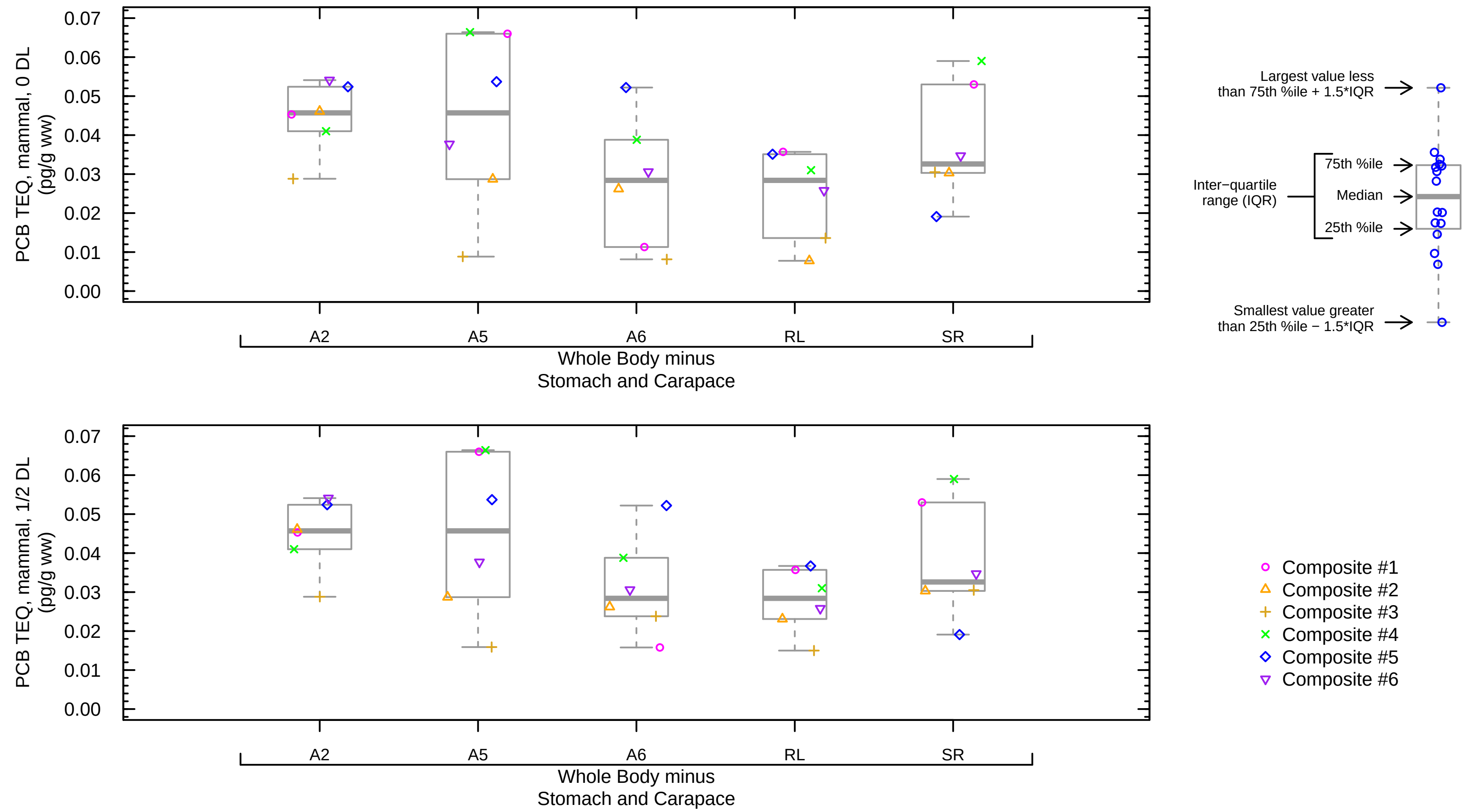


Note: Whole body results for samples from A2, A5, A6, RL, and SR were calculated based on the relative weights of the whole body minus stomach and carapace and the stomach and carapace portions.

Figures 5−2y and 5−2z. Inorganic Arsenic and Total Solids Concentrations in Crayfish by Area and Tissue Type

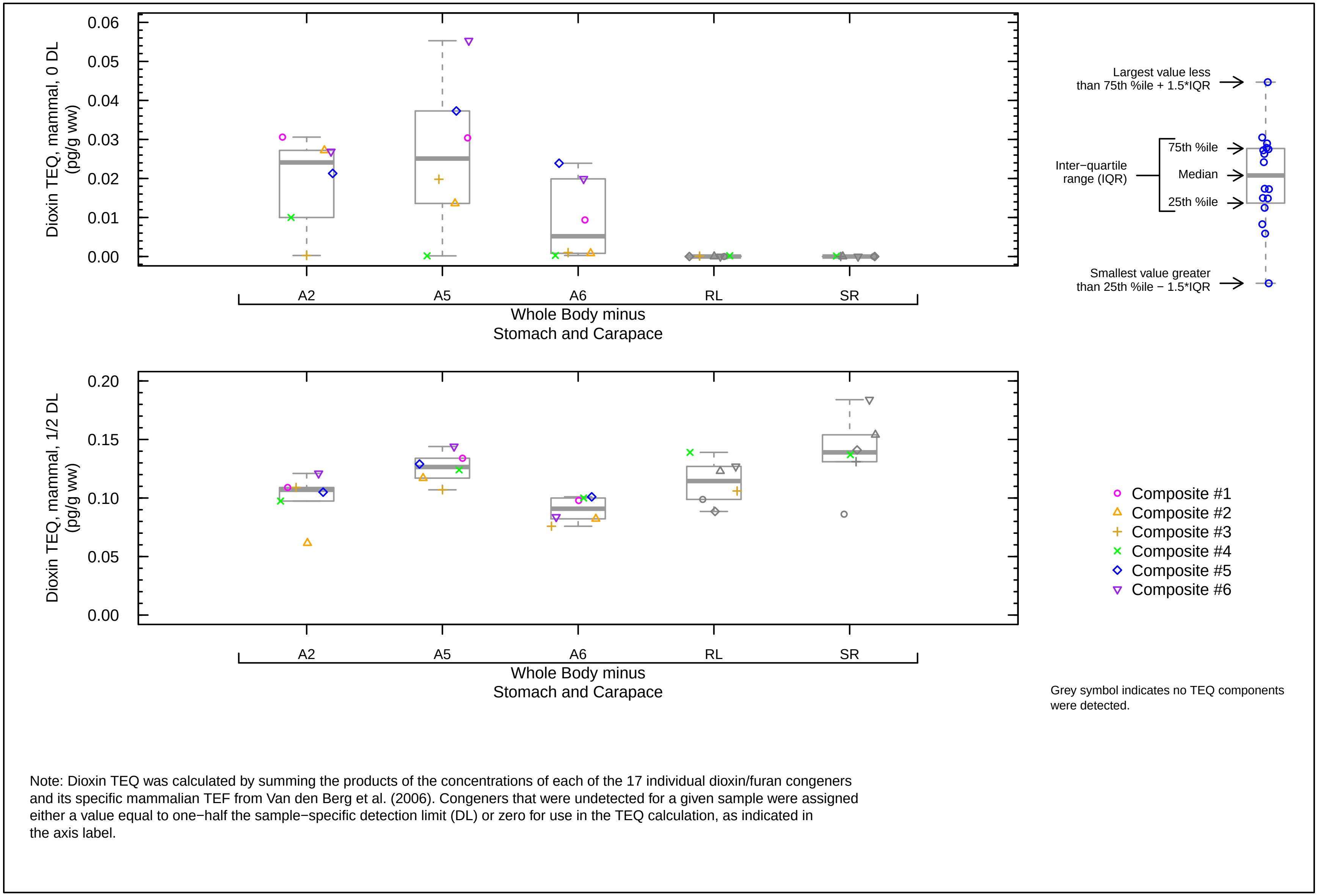


Figures 5−2aa and 5−2ab. Total PCB Congeners Concentrations in Crayfish by Area and Tissue Type

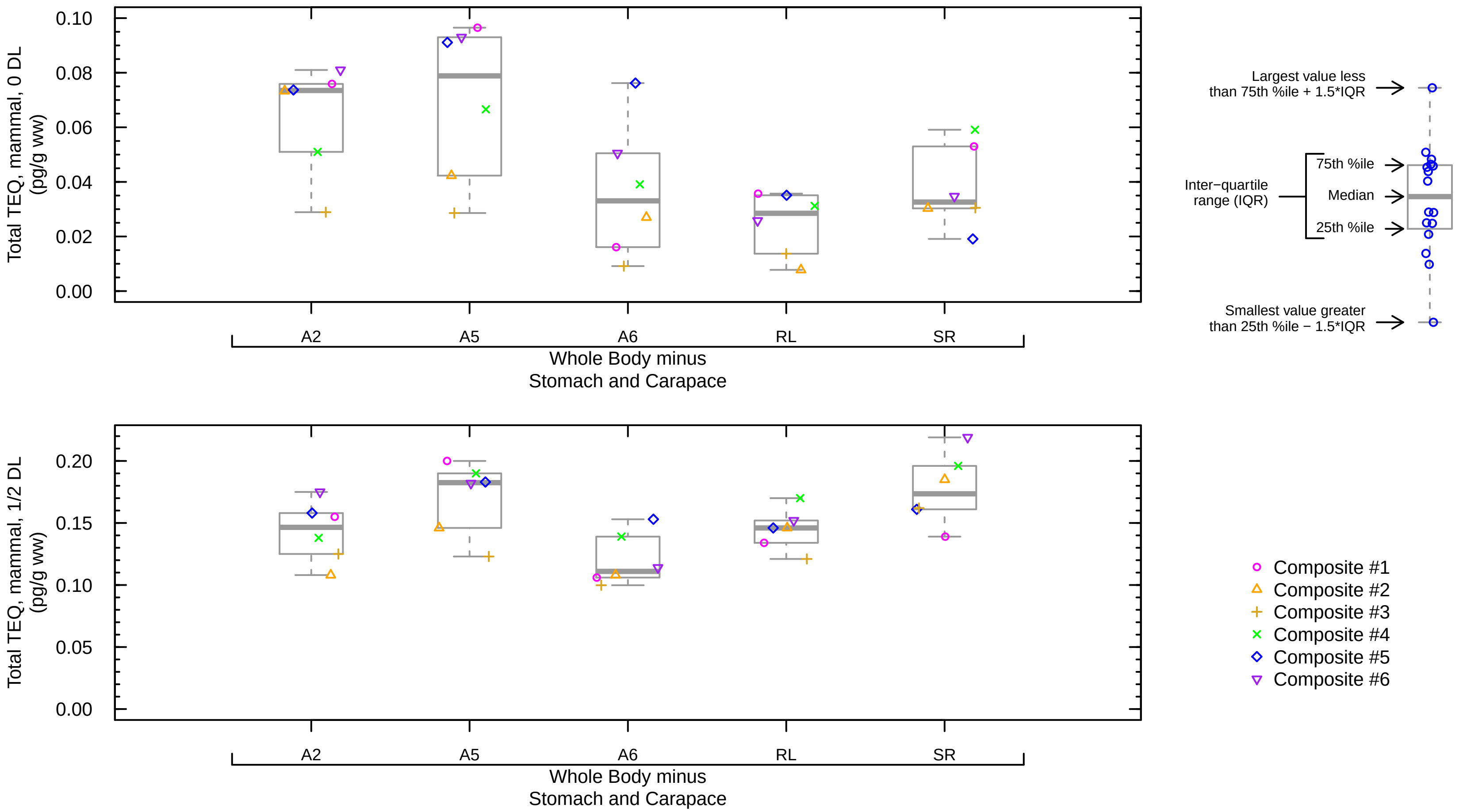


Note: PCB TEQ was calculated by summing the products of the concentrations of each of the 12 individual dioxin−like PCB congeners and its specific mammalian TEF from Van den Berg et al. (2006). Congeners that were undetected for a given sample were assigned either a value equal to one−half the sample−specific detection limit (DL) or zero for use in the TEQ calculation, as indicated in the axis label.

Figures 5−2ac and 5−2ad. PCB TEQ Concentrations in Crayfish by Area and Tissue Type

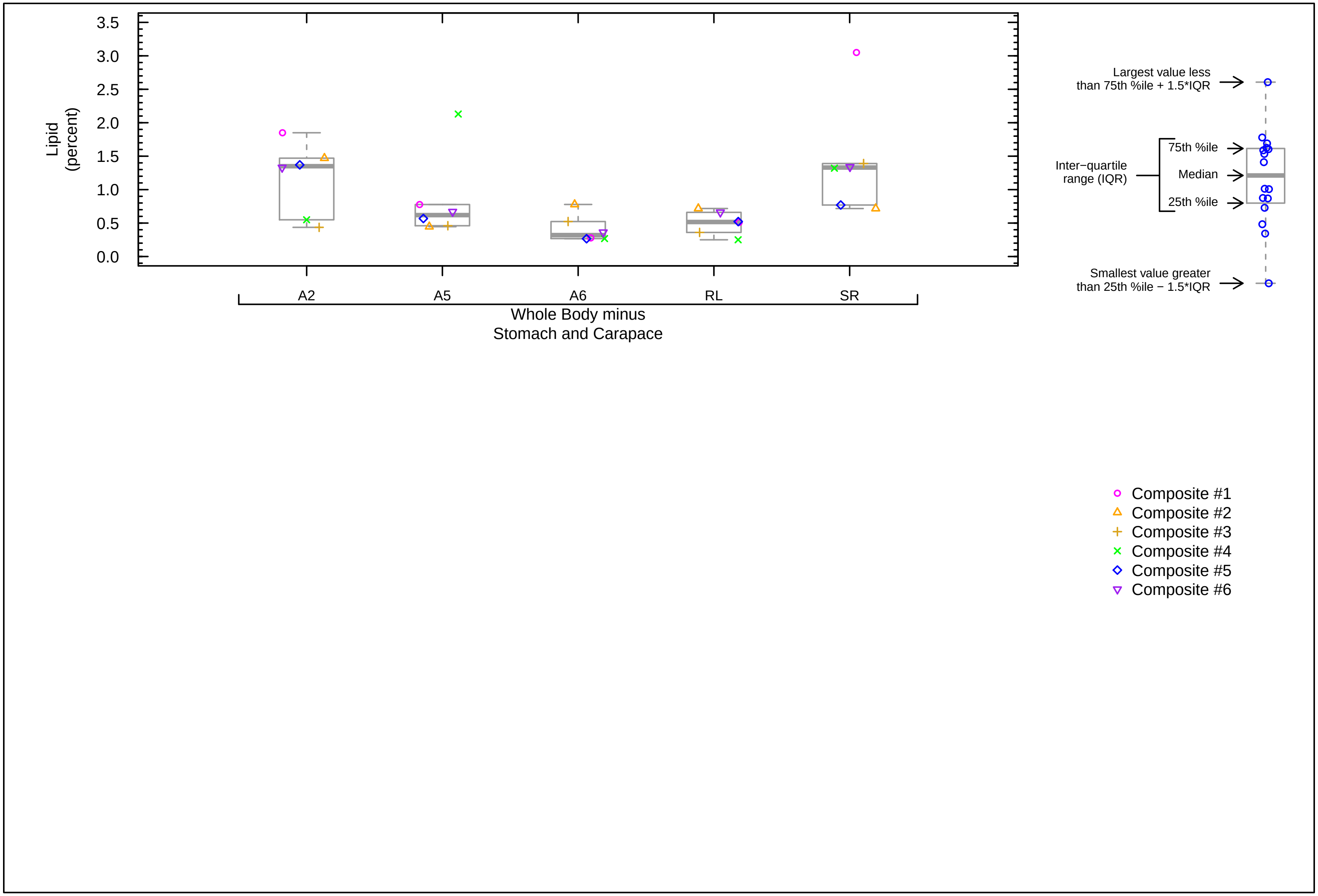


Figures 5−2ae and 5−2af. Dioxin TEQ Concentrations in Crayfish by Area and Tissue Type



Note: Total TEQ was calculated by summing the products of the concentrations of each of the 17 individual dioxin/furan congeners and the 12 individual dioxin−like PCB congeners and its specific mammalian TEF from Van den Berg et al. (2006). Congeners that were undetected for a given sample were assigned either a value equal to one−half the sample−specific detection limit (DL) or zero for use in the TEQ calculation, as indicated in the axis label.

Figures 5−2ag and 5−2ah. Total TEQ Concentrations in Crayfish by Area and Tissue Type



Figures 5−2ai. Lipid Concentrations in Crayfish by Area and Tissue Type

MAPS

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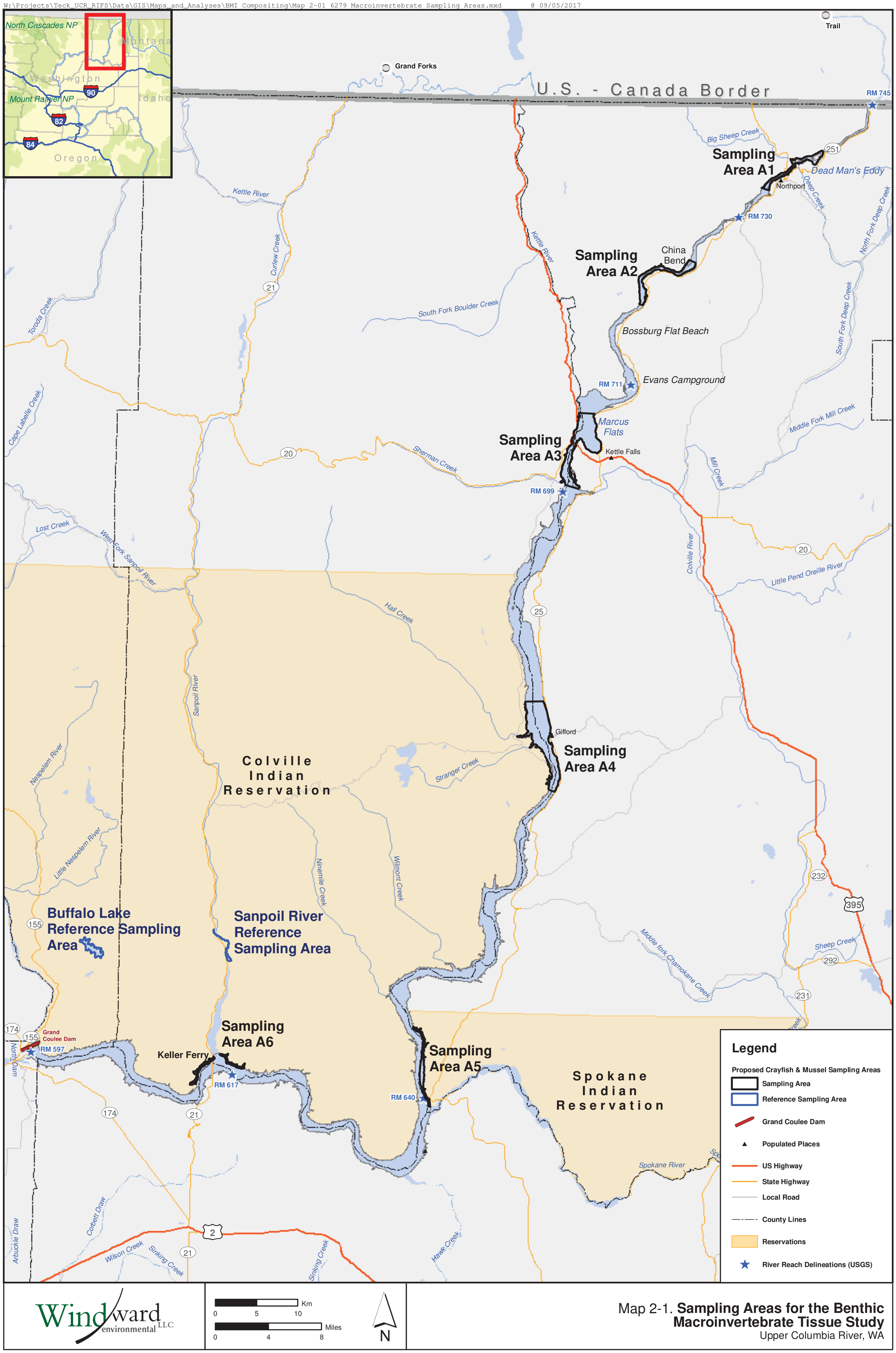

Map 2-1. **Sampling Areas for the Benthic Macroinvertebrate Tissue Study**
Upper Columbia River, WA

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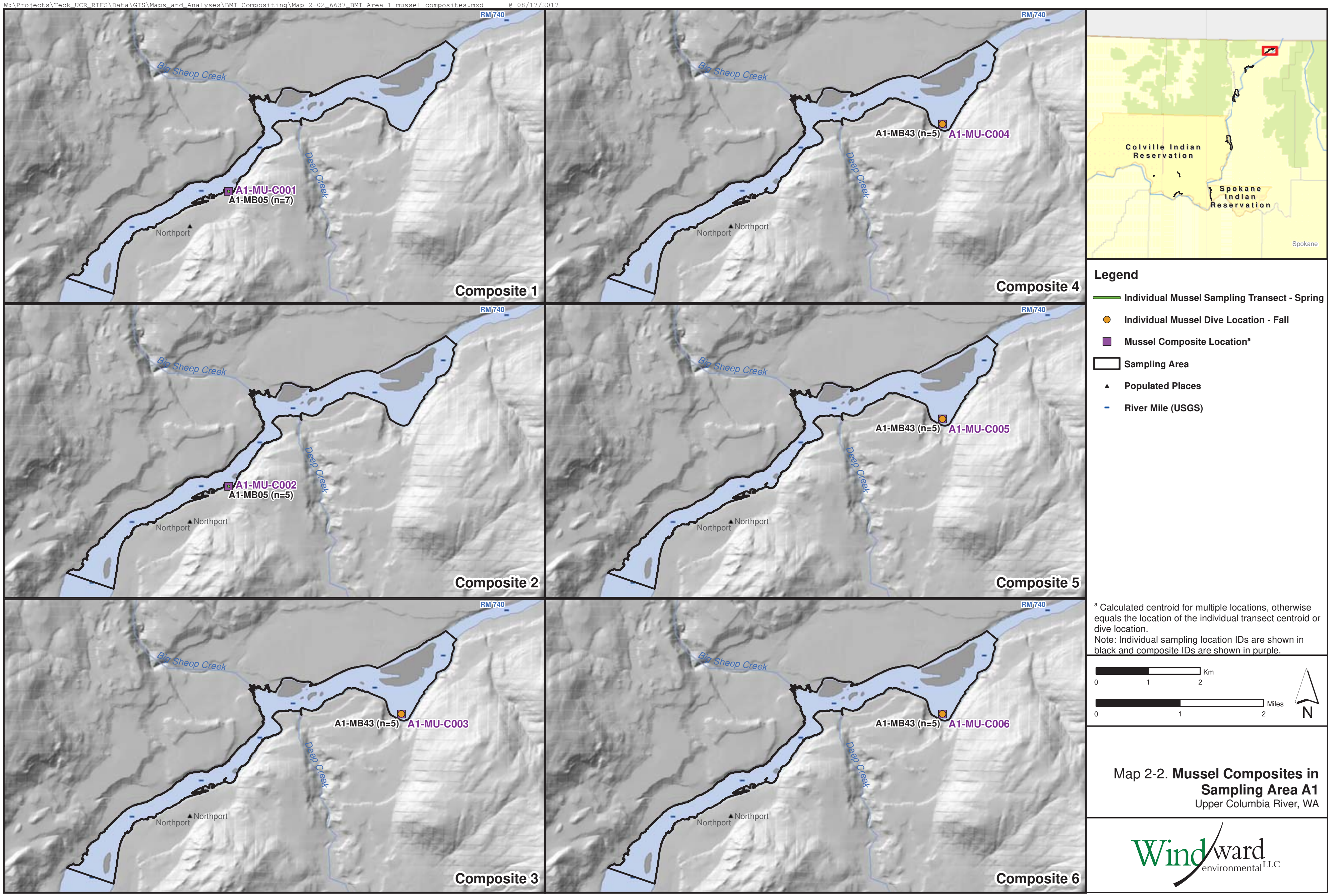

Map 2-2. **Mussel Composites in Sampling Area A1**
Upper Columbia River, WA

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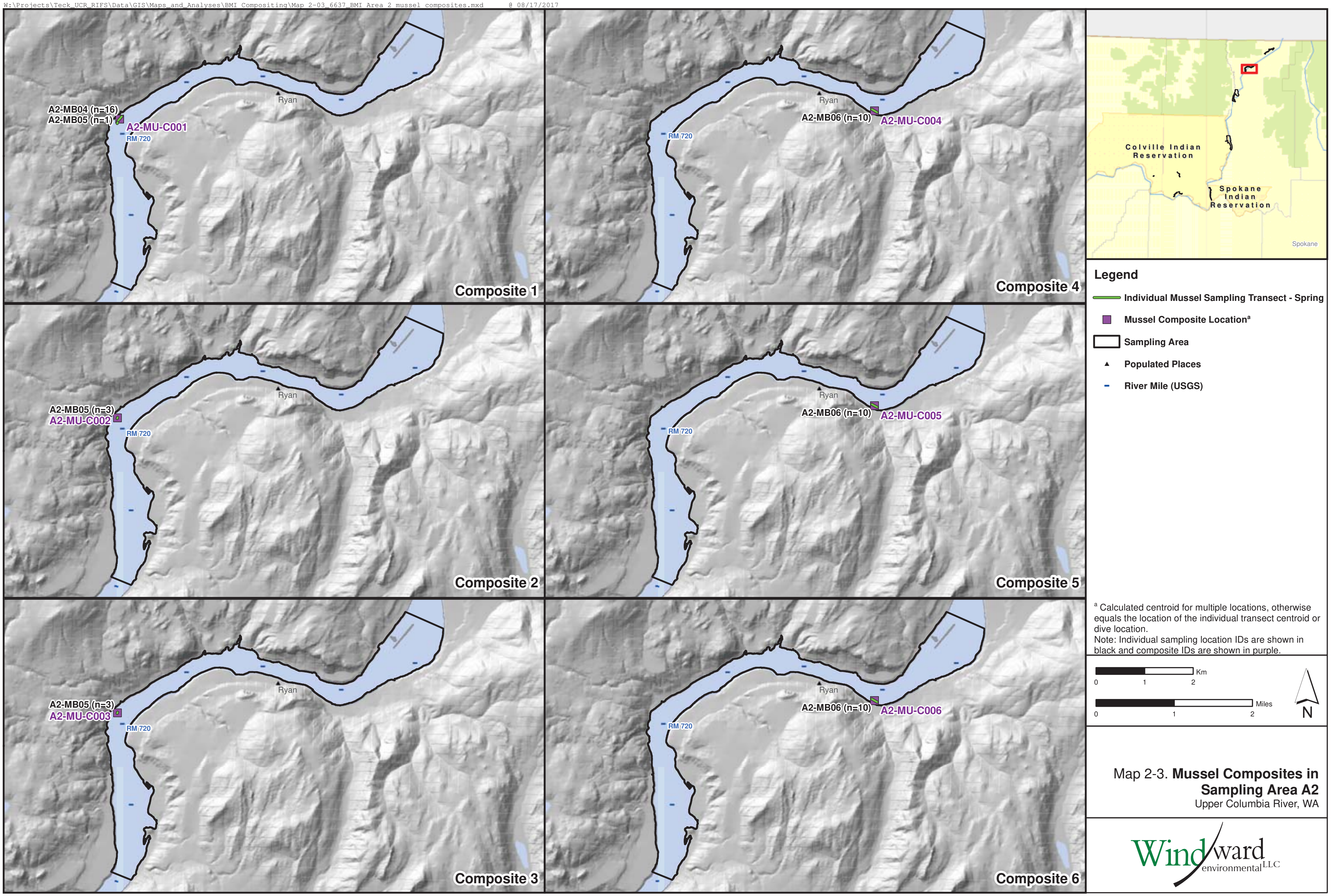

Map 2-3. **Mussel Composites in Sampling Area A2**
Upper Columbia River, WA

Windward environmental LLC

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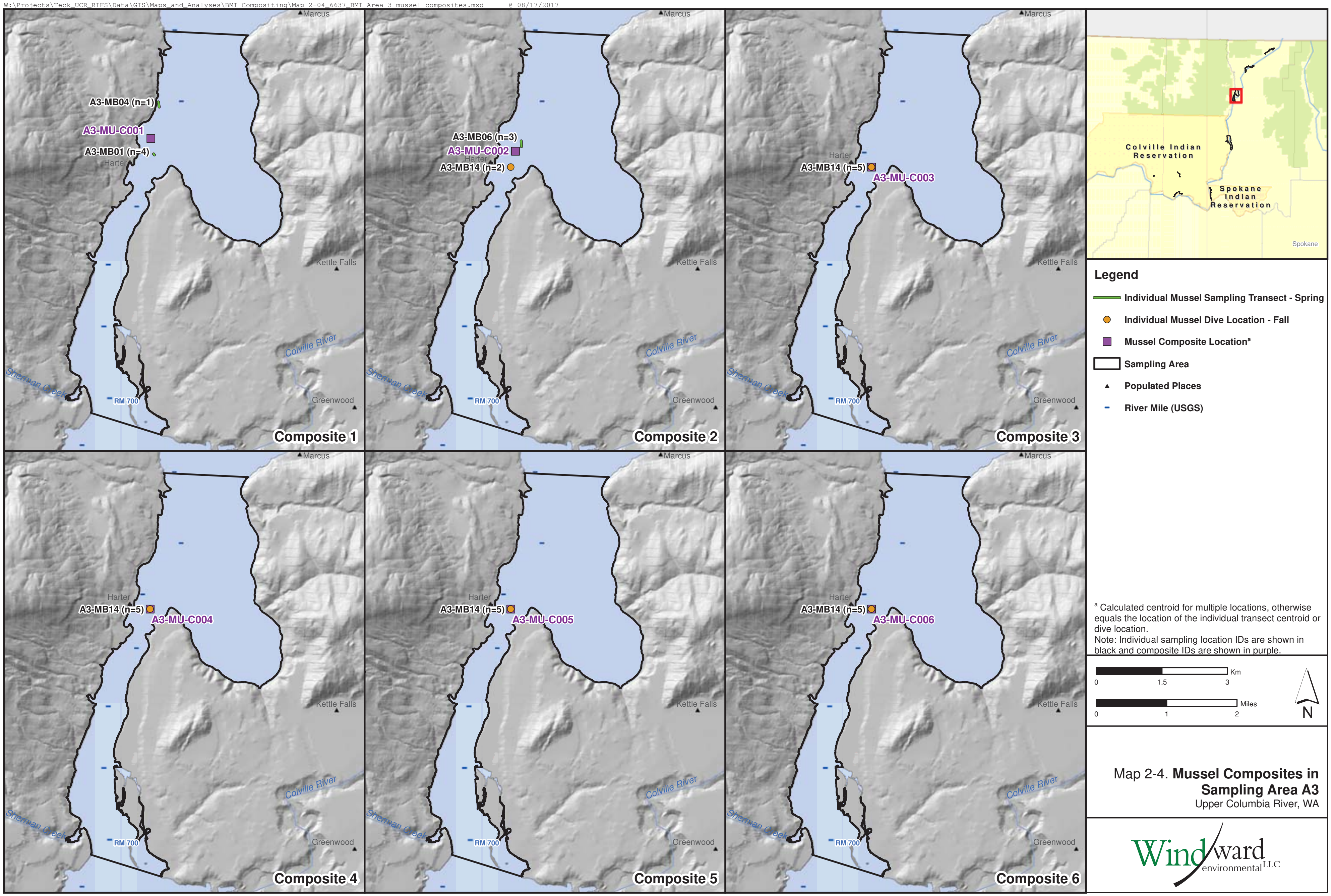

Map 2-4. **Mussel Composites in Sampling Area A3**
Upper Columbia River, WA

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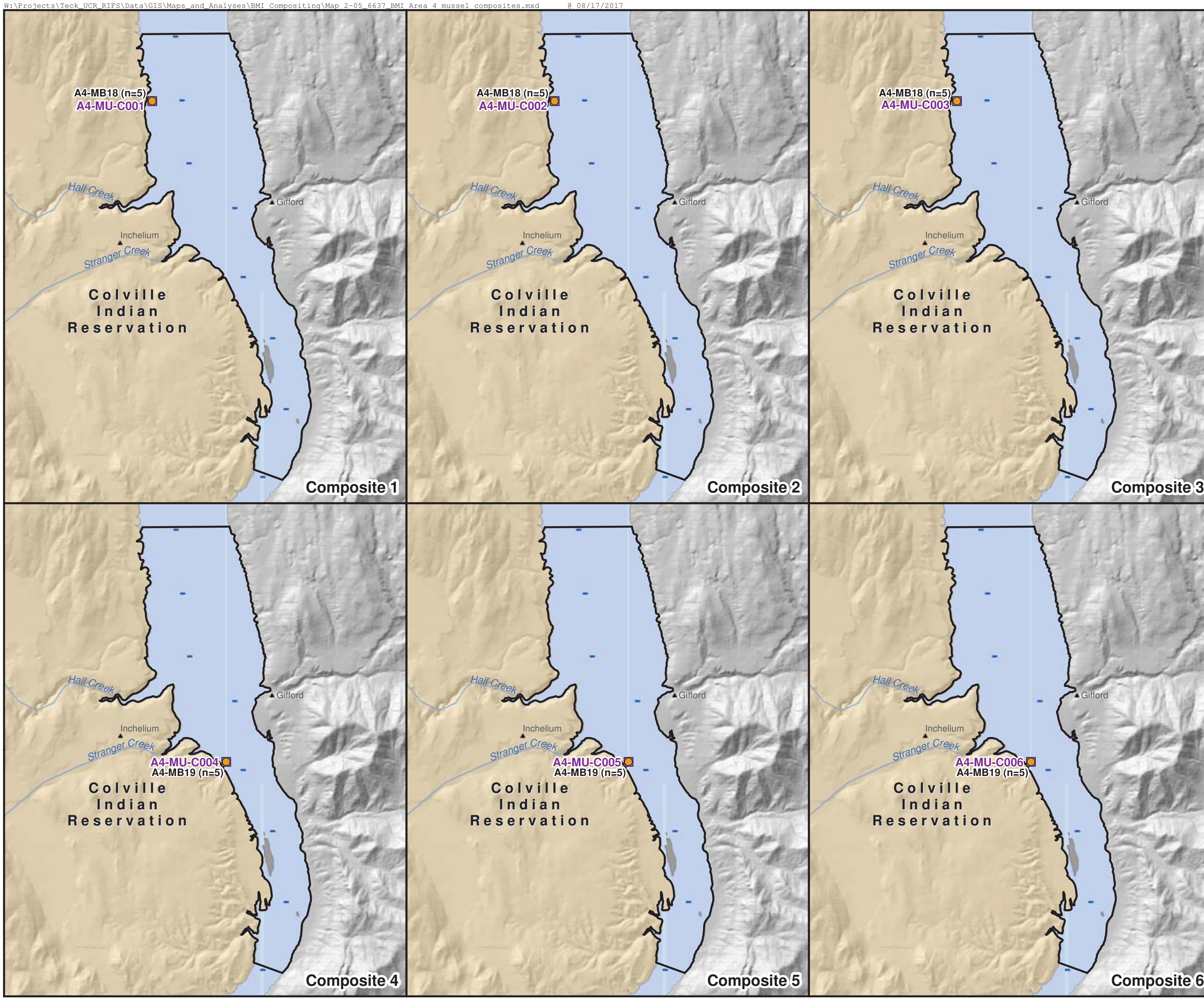
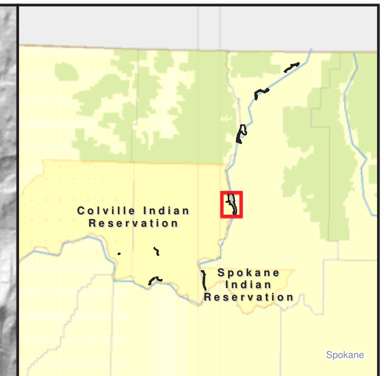




Legend

- Individual Mussel Dive Location - Fall
- Mussel Composite Location[a]
- Sampling Area
- Populated Places
- Reservations
- River Mile (USGS)

[a] Calculated centroid for multiple locations, otherwise equals the location of the individual transect centroid or dive location.
Note: Individual sampling location IDs are shown in black and composite IDs are shown in purple.

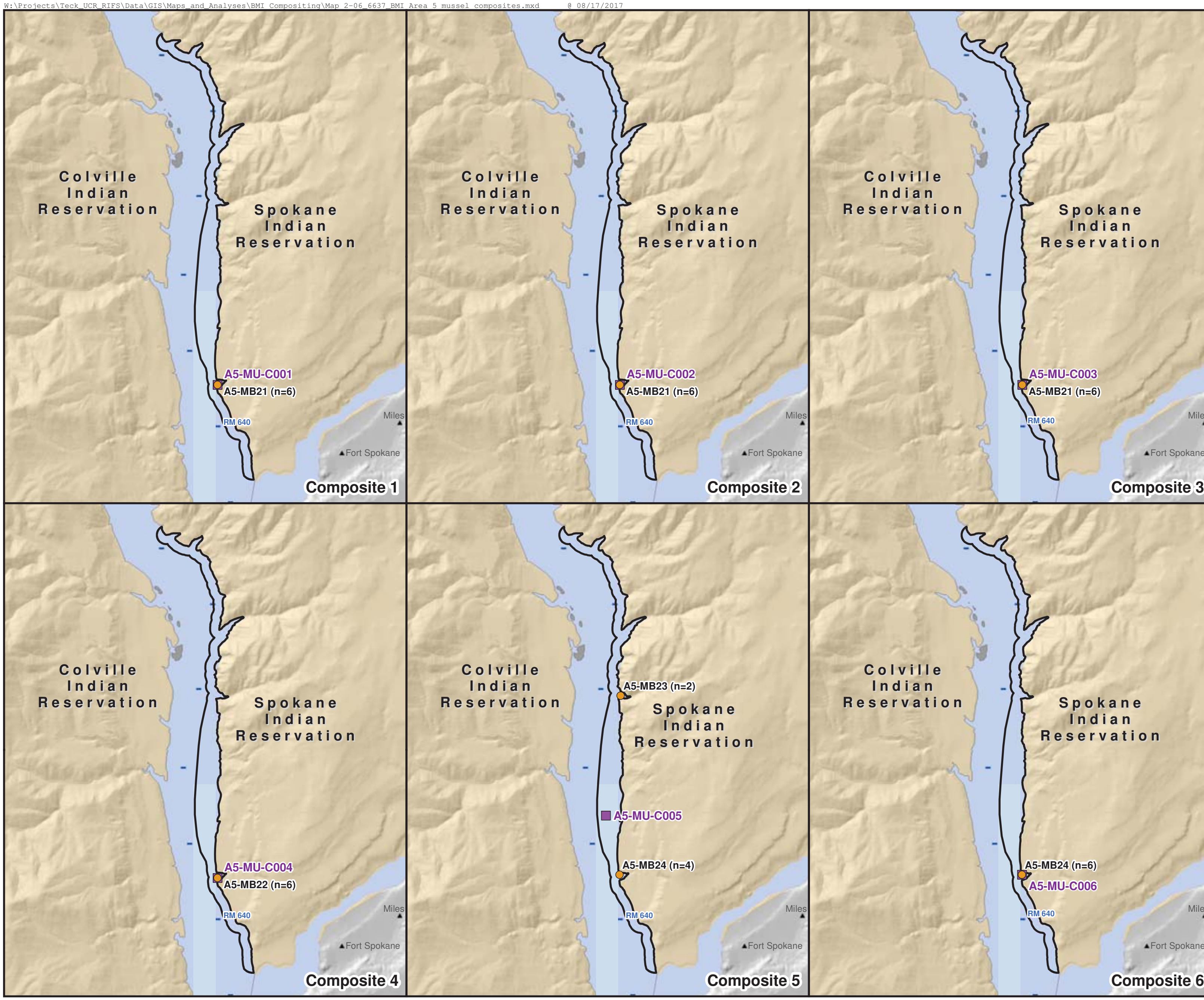
0 1.5 3 Km

0 1 2 Miles

N

Map 2-5. **Mussel Composites in Sampling Area A4**
Upper Columbia River, WA

Windward environmental LLC



Legend

- Individual Mussel Dive Location - Fall
- Mussel Composite Location[a]
- Sampling Area
- Populated Places
- Reservations
- River Mile (USGS)

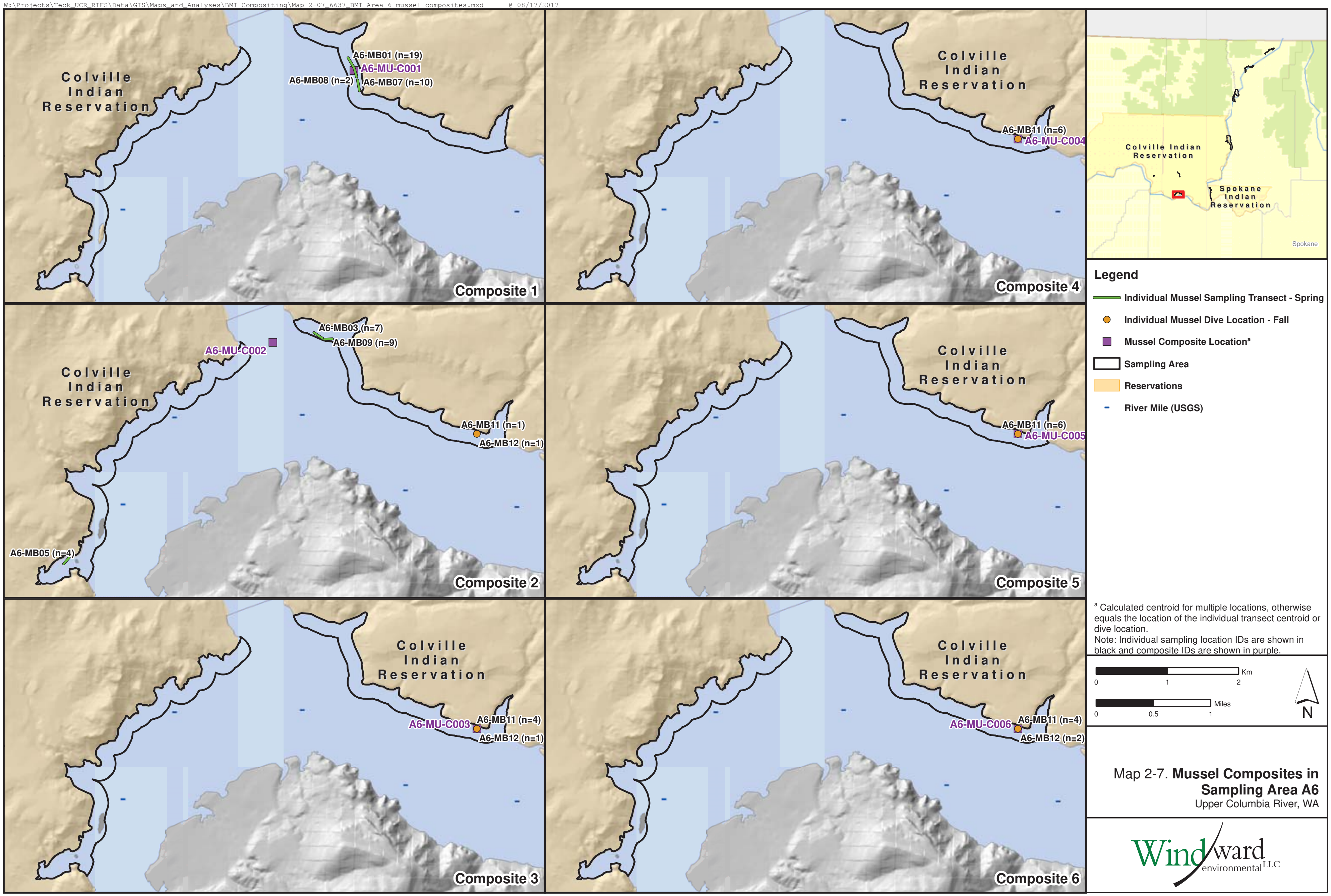
[a] Calculated centroid for multiple locations, otherwise equals the location of the individual transect centroid or dive location.
Note: Individual sampling location IDs are shown in black and composite IDs are shown in purple.

0 2 4 Km
0 1 2 Miles
N

Map 2-6. **Mussel Composites in Sampling Area A5**
Upper Columbia River, WA

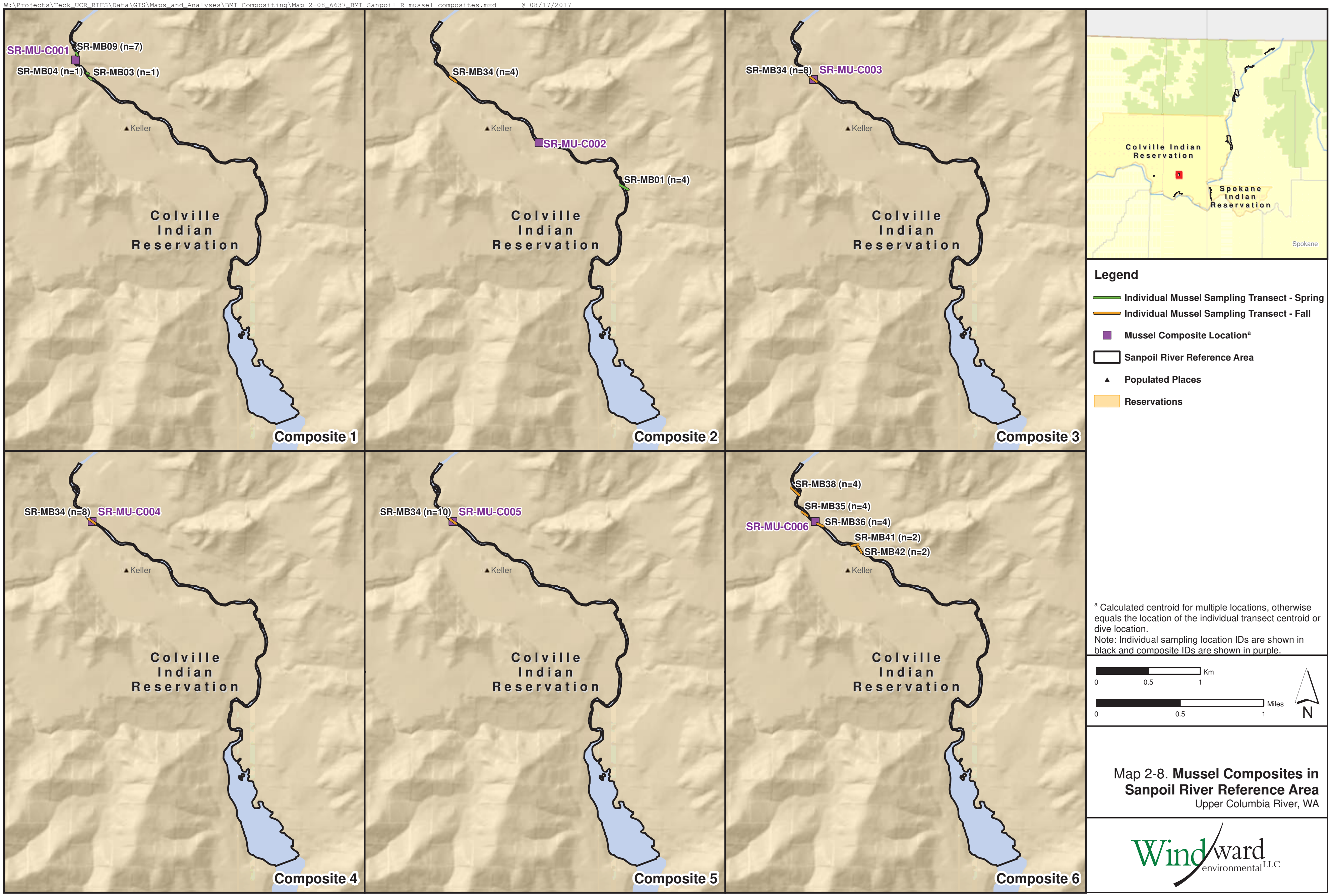
Windward environmental LLC

W:\Projects\Teck_UCR_RIFS\Data\GIS\Maps_and_Analyses\BMI Compositing\Map 2-07_6637_BMI Area 6 mussel composites.mxd @ 08/17/2017



Map 2-7. **Mussel Composites in Sampling Area A6**
Upper Columbia River, WA

W:\Projects\Teck_UCR_RIFS\Data\GIS\Maps_and_Analyses\BMI Compositing\Map 2-08_6637_BMI_Sanpoil_R_mussel_composites.mxd @ 08/17/2017



Map 2-8. **Mussel Composites in Sanpoil River Reference Area**
Upper Columbia River, WA

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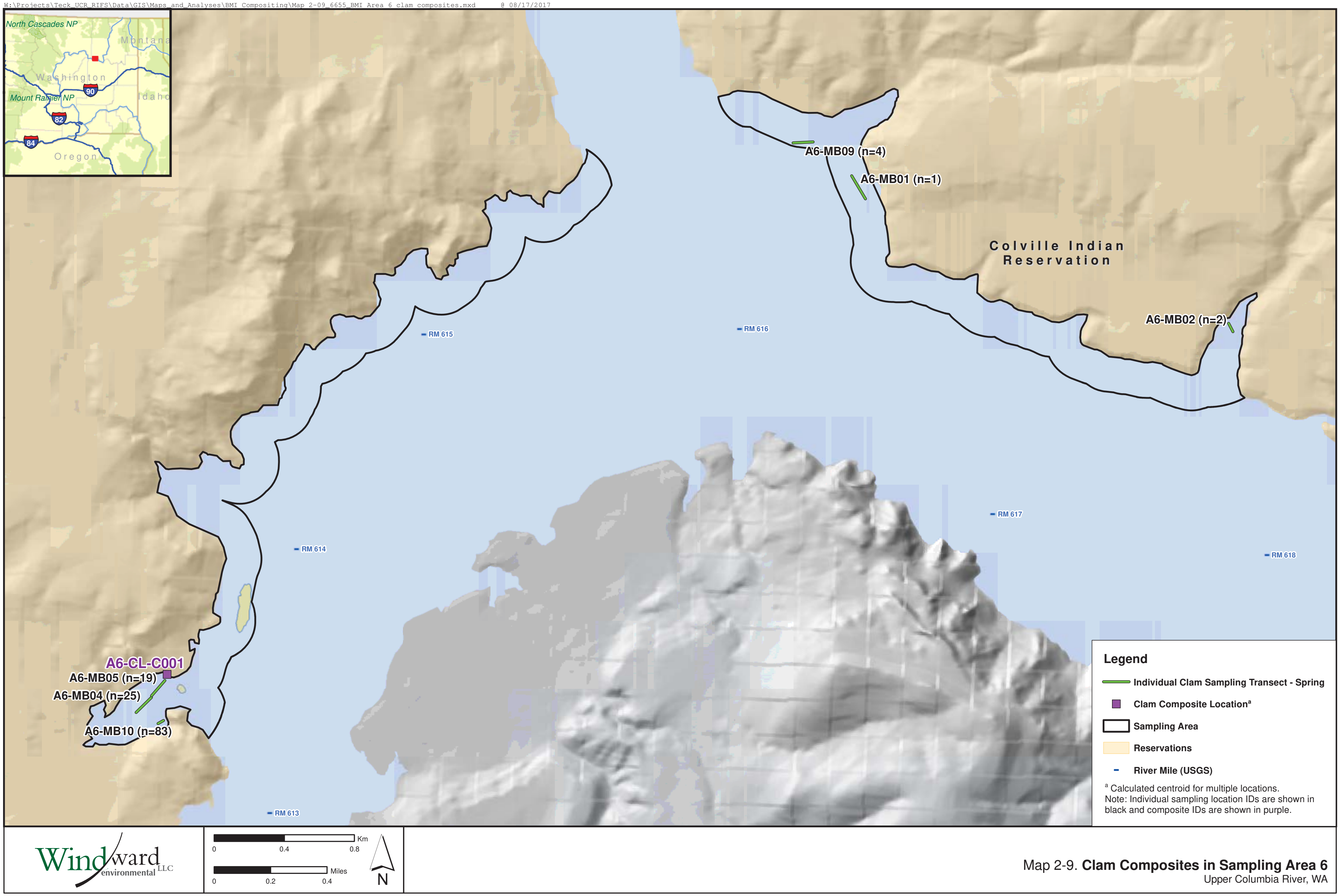
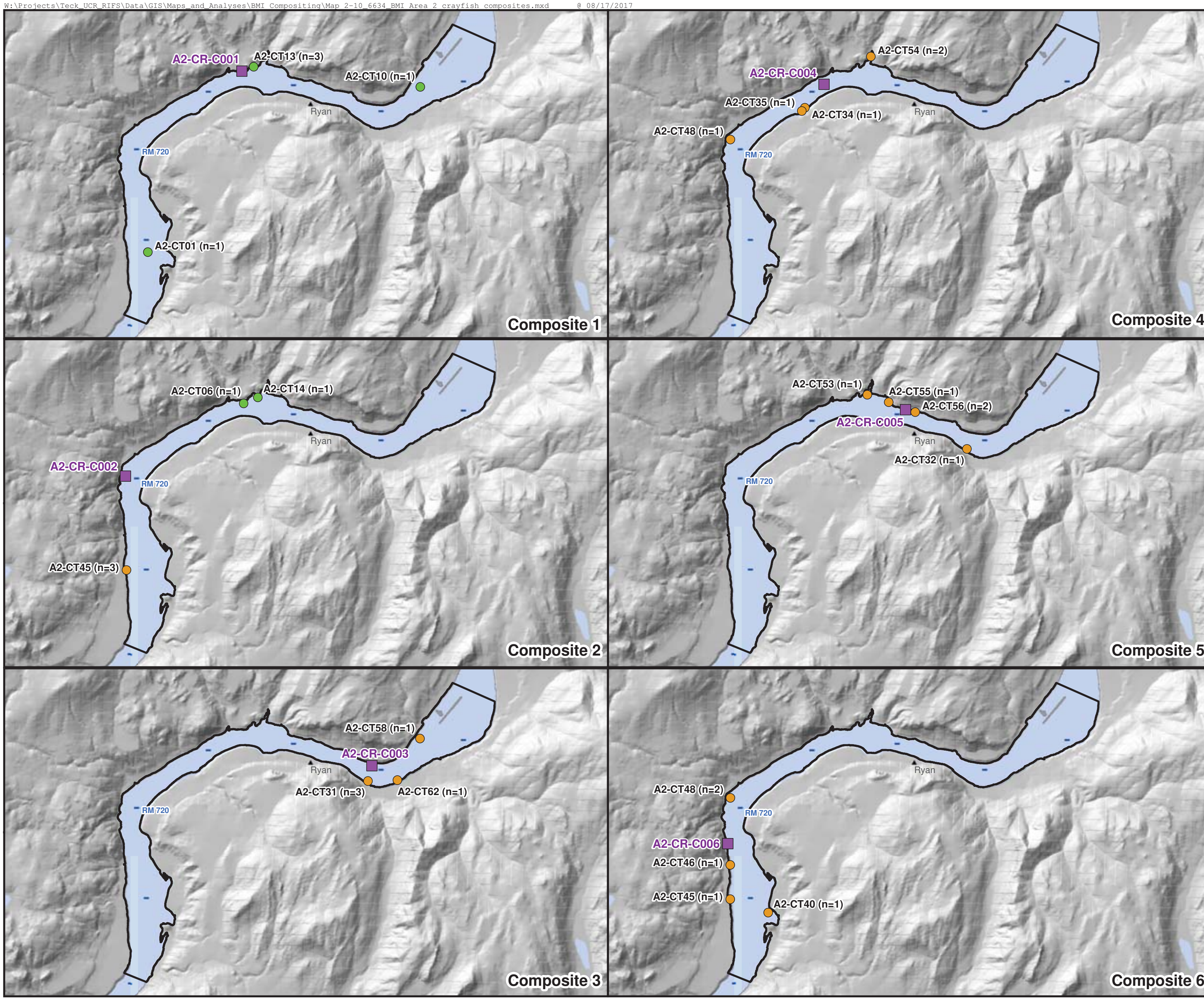
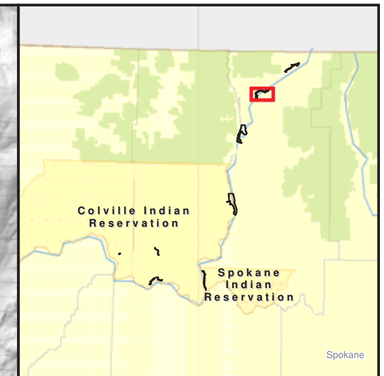


Windward environmental LLC

Map 2-9. **Clam Composites in Sampling Area 6**
Upper Columbia River, WA





Legend

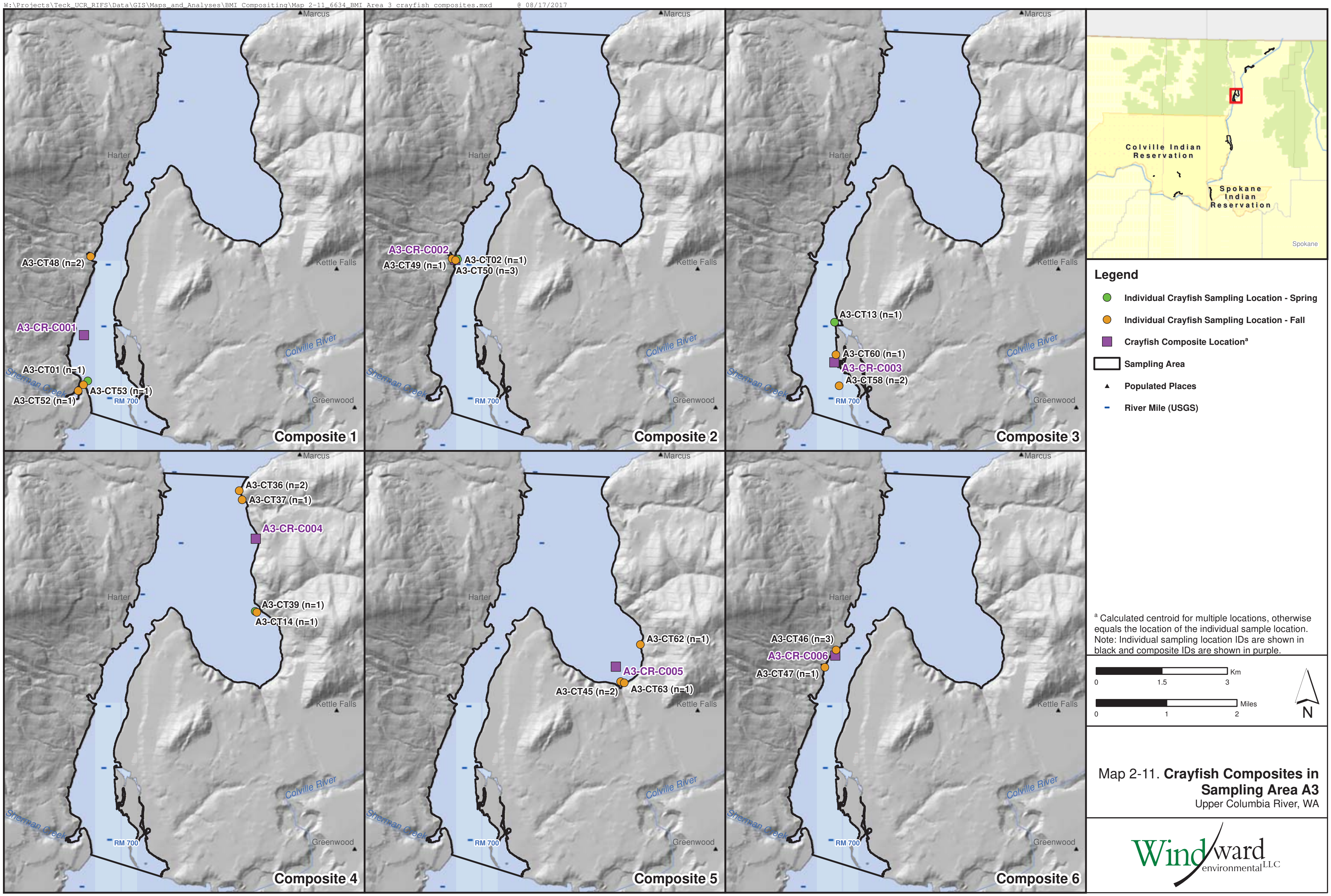
- Individual Crayfish Sampling Location - Spring
- Individual Crayfish Sampling Location - Fall
- Crayfish Composite Location[a]
- Sampling Area
- Populated Places
- River Mile (USGS)

[a] Calculated centroid for multiple locations, otherwise equals the location of the individual sample location.
Note: Individual sampling location IDs are shown in black and composite IDs are shown in purple.

Km: 0, 1.5, 3
Miles: 0, 1, 2
N

Map 2-10. **Crayfish Composites in Sampling Area A2**
Upper Columbia River, WA

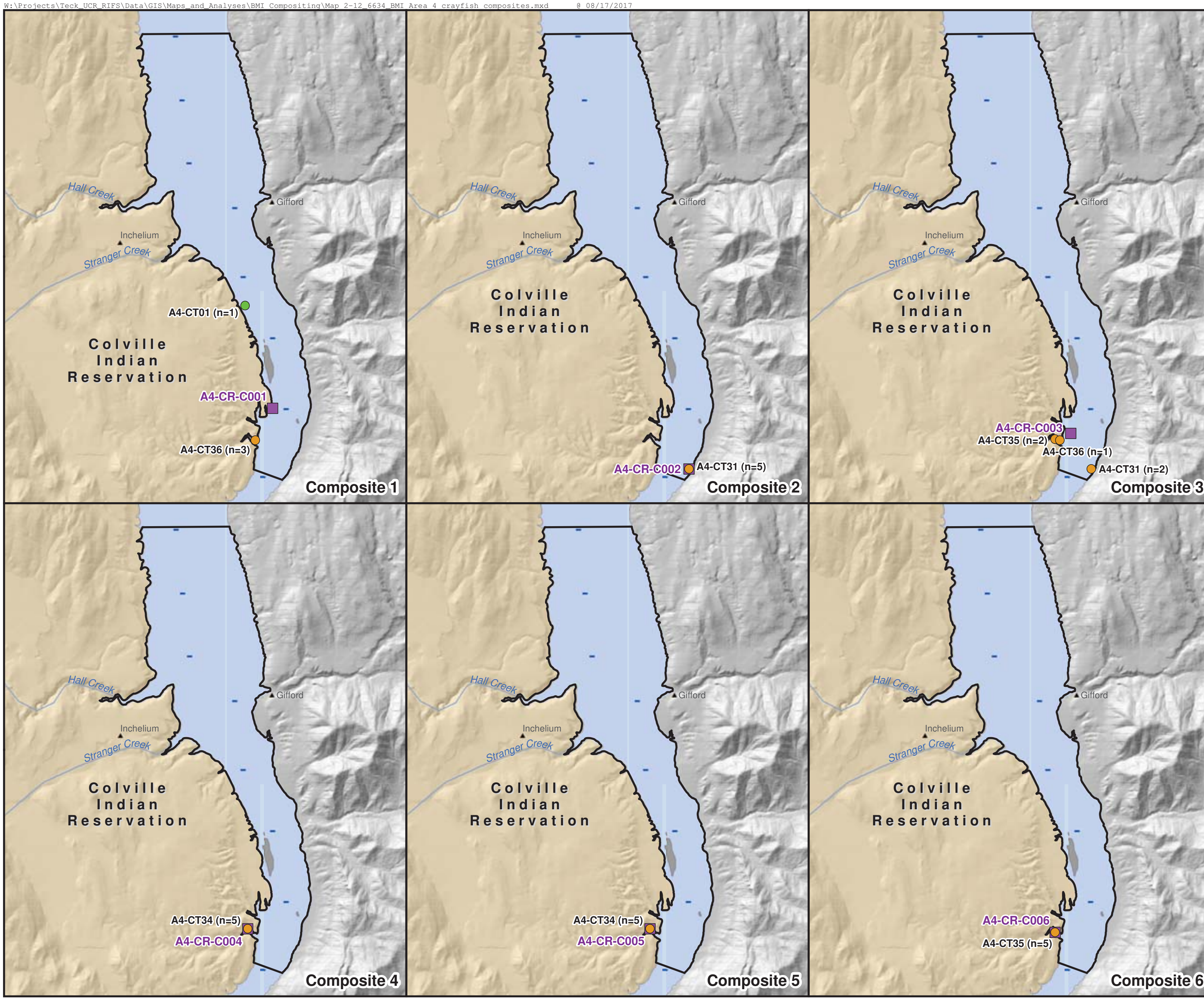
Windward environmental LLC



Map 2-11. **Crayfish Composites in Sampling Area A3**
Upper Columbia River, WA

Windward environmental LLC

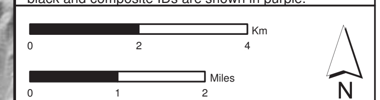
W:\Projects\Teck_UCR_RIFS\Data\GIS\Maps_and_Analyses\BMI_Compositing\Map 2-12_6634_BMI Area 4 crayfish composites.mxd @ 08/17/2017



Legend

- Individual Crayfish Sampling Location - Spring
- Individual Crayfish Sampling Location - Fall
- Crayfish Composite Location[a]
- Sampling Area
- Populated Places
- Reservations
- River Mile (USGS)

[a] Calculated centroid for multiple locations, otherwise equals the location of the individual sample location.
Note: Individual sampling location IDs are shown in black and composite IDs are shown in purple.



Map 2-12. **Crayfish Composites in Sampling Area A4**
Upper Columbia River, WA

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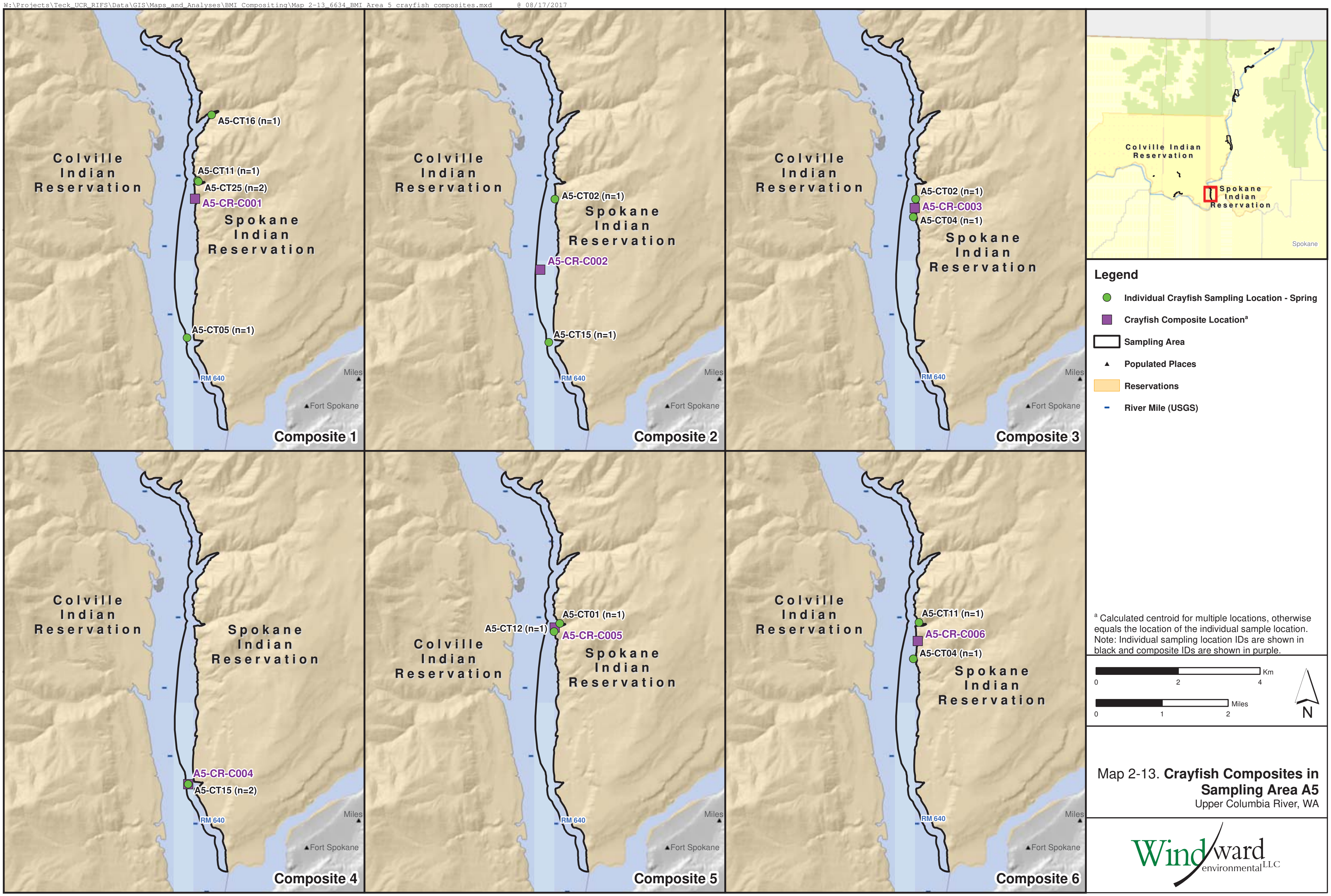
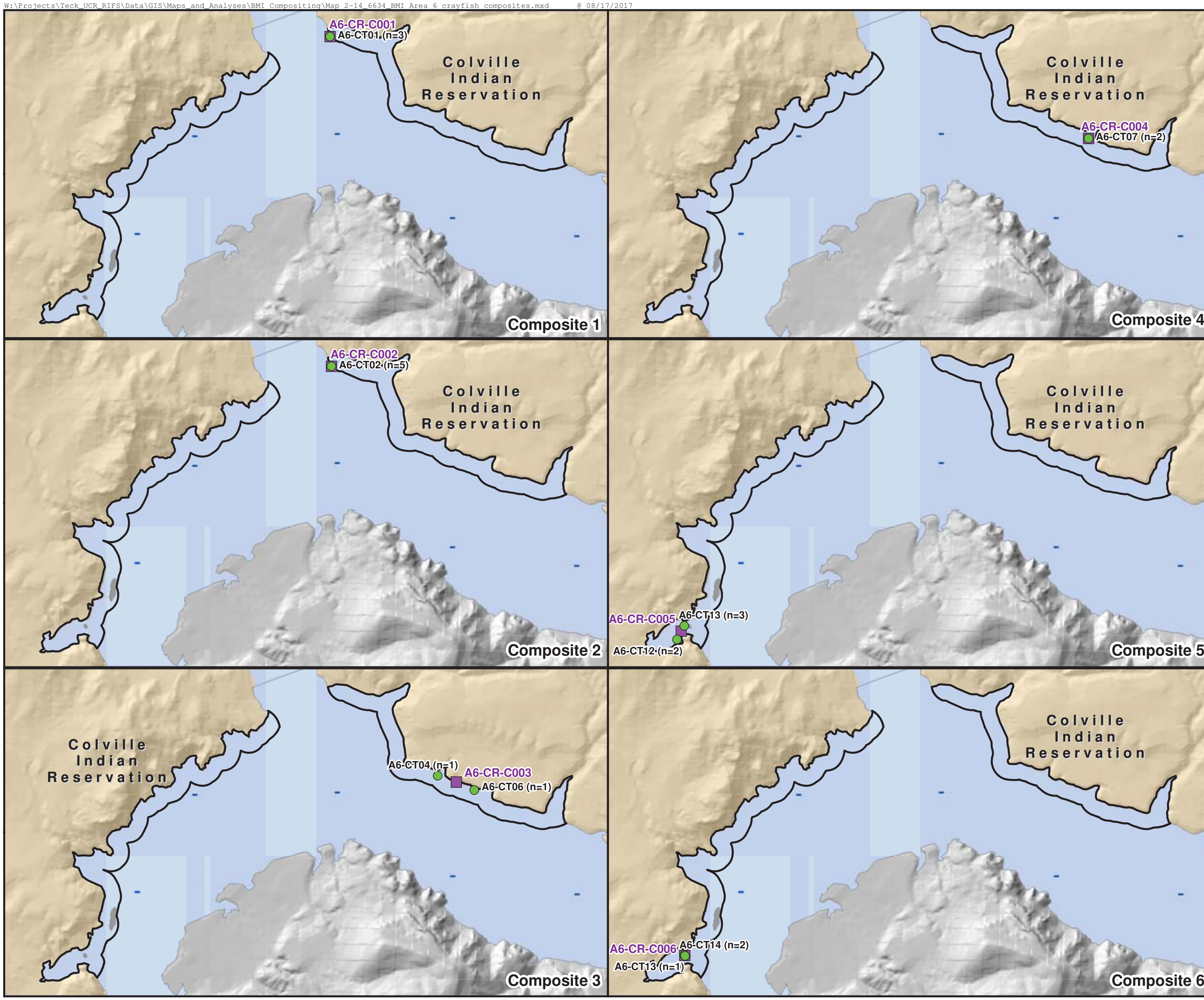
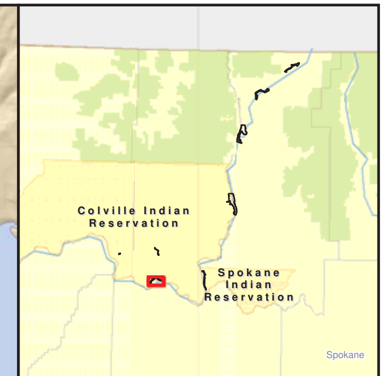
W:\Projects\Teck_UCR_RIFS\Data\GIS\Maps_and_Analyses\BMI Compositing\Map 2-13_6634_BMI Area 5 crayfish composites.mxd @ 08/17/2017



W:\Projects\Teck_UCR_RIFS\Data\GIS\Maps_and_Analyses\BMI Compositing\Map 2-14_6634_BMI Area 6 crayfish composites.mxd @ 08/17/2017





Legend

- Individual Crayfish Sampling Location - Spring
- Crayfish Composite Location[a]
- Sampling Area
- Reservations
- River Mile (USGS)

[a] Calculated centroid for multiple locations, otherwise equals the location of the individual sample location.
Note: Individual sampling location IDs are shown in black and composite IDs are shown in purple.

Km: 0 1 2
Miles: 0 0.5 1
N

Map 2-14. **Crayfish Composites in Sampling Area A6**
Upper Columbia River, WA

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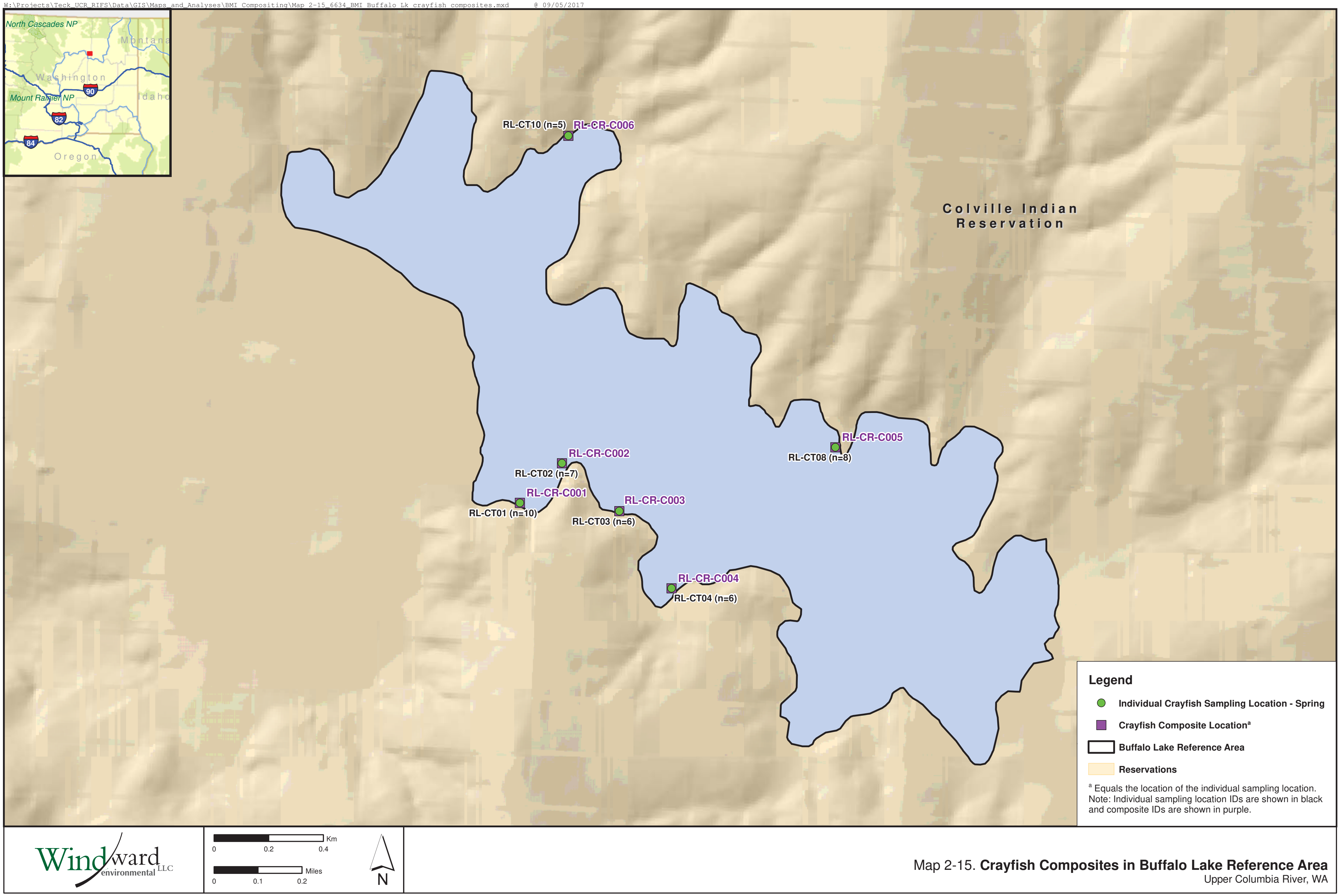
W:\Projects\Teck_UCR_RIFS\Data\GIS\Maps_and_Analyses\BMI Compositing\Map 2-15_6634_BMI Buffalo Lk crayfish composites.mxd @ 09/05/2017



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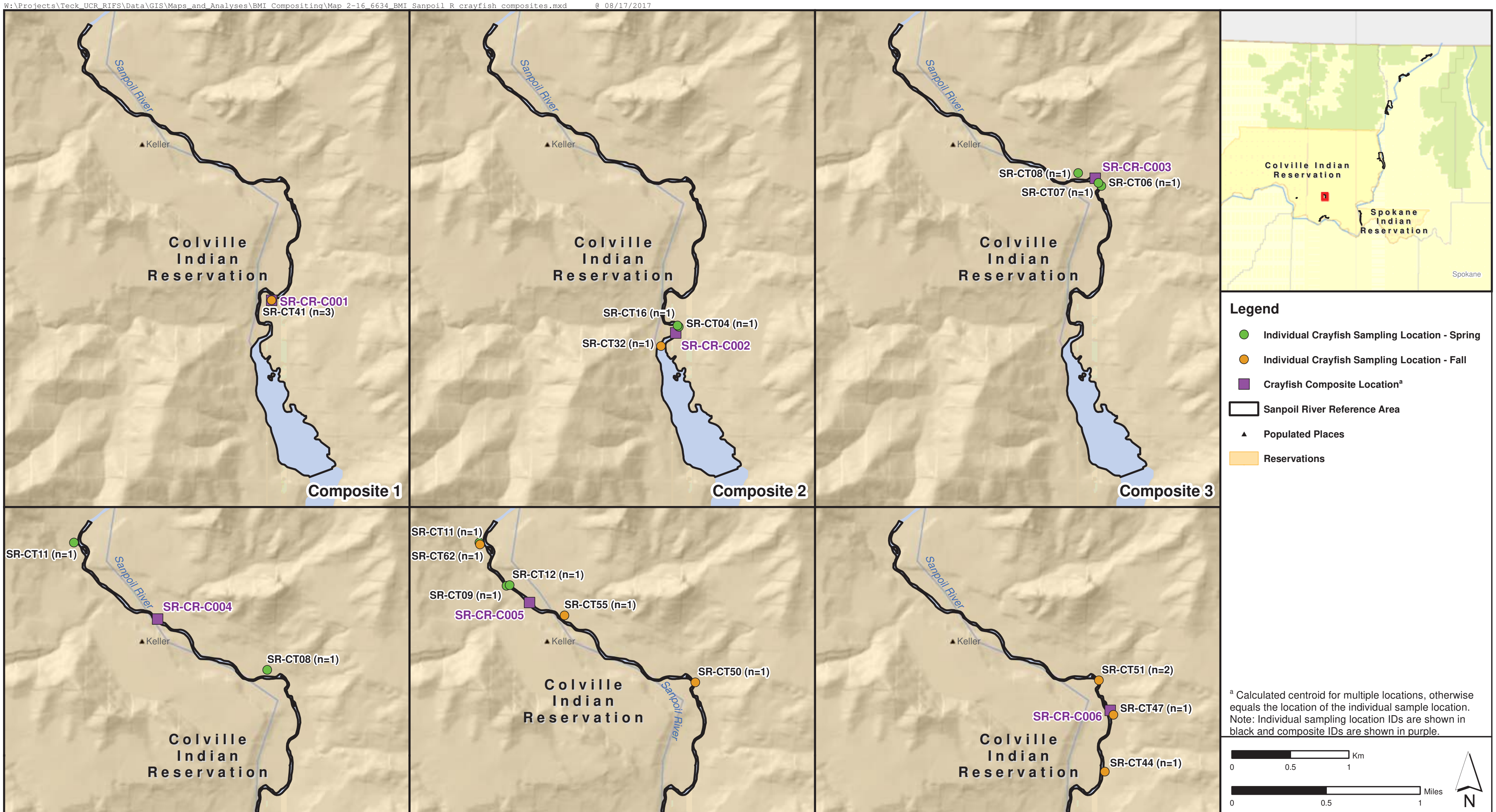
Map 2-15. **Crayfish Composites in Buffalo Lake Reference Area**
Upper Columbia River, WA

W:\Projects\Teck_UCR_RIFS\Data\GIS\Maps_and_Analyses\BMI Compositing\Map 2-16_6634_BMI Sanpoil R crayfish composites.mxd @ 08/17/2017



Map 2-16. **Crayfish Composites in Sanpoil River Reference Area**
Upper Columbia River, WA

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TABLES

Table 2-1 Number of Mussel and Crayfish Composite Samples

	Number of Mussel Composites				Number of Crayfish Composites			
Area	Collected Spring 2016	Collected Fall 2016	Collected in Spring and Fall 2016[a]	Total	Collected Spring 2016	Collected Fall 2016	Collected in Spring and Fall 2016[a]	Total
A1	2	4	0	6	0	0	0	0
A2	6	0	0	6	1	4	1	6[b]
A3	1	4	1	6	0	2	4	6
A4	0	6	0	6	0	5	1	6
A5	0	6	0	6	6	0	0	6[b]
A6	1	4	1	6	6	0	0	6[b]
Buffalo Lake	0	0	0	0	6	0	0	6[b]
Sanpoil River	1	4	1	6	2	2	2	6[b]
Total				**42**				**42**

Notes:

[a] Composites contain organisms collected during both sampling events.

[b] Crayfish composite samples from areas relevant to the HHRA (A2, A5, A6, Buffalo Lake, and the Sanpoil River) were split into two tissue types: 1) whole body minus carapace and stomach (the portion consumed by people), and 2) carapace and stomach. In these areas, whole body concentrations for use in the BERA will be calculated using on a weighted sum of the two different tissue types.

Table 2-2. Number Individual Mussel and Crayfish Collected

		Mussels				Crayfish			
	Composite	No. of Individuals				No. of Individuals			
Area	Number	Spring	Fall	Total	Species[a]	Spring	Fall	Total	Species
A1	1	7	0	7	*Anodonta*	0	0	0	NA
A1	2	5	0	5	*Anodonta*	0	0	0	NA
A1	3	0	5	5	*Anodonta*	0	0	0	NA
A1	4	0	5	5	*Anodonta*	0	0	0	NA
A1	5	0	5	5	*Anodonta*	0	0	0	NA
A1	6	0	5	5	*Anodonta*	0	0	0	NA
A2	1	17	0	17	*Anodonta*	5	0	5	northern
A2	2	3	0	3	*Anodonta*	2	3	5	signal
A2	3	3	0	3	*Anodonta*	0	5	5	northern
A2	4	10	0	10	*Anodonta*	0	5	5	northern
A2	5	10	0	10	*Anodonta*	0	5	5	northern
A2	6	10	0	10	*Anodonta*	0	5	5	northern
A3	1	5	0	5	*Anodonta*	1	4	5	northern
A3	2	3	2	5	*Anodonta*	1	4	5	northern
A3	3	0	5	5	*Anodonta*	1	3	4	northern
A3	4	0	5	5	*Anodonta*	1	4	5	northern
A3	5	0	5	5	*Anodonta*	0	4	4	northern
A3	6	0	5	5	*Anodonta*	0	4	4	northern
A4	1	0	5	5	*Anodonta*	1	3	4	northern
A4	2	0	5	5	*Anodonta*	0	5	5	northern
A4	3	0	5	5	*Anodonta*	0	5	5	northern
A4	4	0	5	5	*Anodonta*	0	5	5	northern
A4	5	0	5	5	*Anodonta*	0	5	5	northern
A4	6	0	5	5	*Anodonta*	0	5	5	northern
A5	1	0	6	6	*Anodonta*	5	0	5	northern
A5	2	0	6	6	*Anodonta*	2	0	2	northern
A5	3	0	6	6	*Anodonta*	2	0	2	signal
A5	4	0	6	6	*Anodonta*	2	0	2	northern
A5	5	0	6	6	*Anodonta*	2	0	2	northern
A5	6	0	6	6	*Anodonta*	2	0	2	northern, signal
A6	1	31	0	31	*Anodonta*	3	0	3	northern
A6	2	20	2	22	*Anodonta*	5	0	5	northern
A6	3	0	5	5	*Anodonta*	2	0	2	northern
A6	4	0	6	6	*Anodonta*	2	0	2	northern
A6	5	0	6	6	*Anodonta*	5	0	5	northern
A6	6	0	6	6	*Anodonta*	3	0	3	northern
Buffalo Lake	1	0	0	0	NA	10	0	10	northern
Buffalo Lake	2	0	0	0	NA	7	0	7	northern
Buffalo Lake	3	0	0	0	NA	6	0	6	northern
Buffalo Lake	4	0	0	0	NA	6	0	6	northern
Buffalo Lake	5	0	0	0	NA	8	0	8	northern
Buffalo Lake	6	0	0	0	NA	5	0	5	northern
Sanpoil	1	9	0	9	western pearlshell	0	3	3	northern
Sanpoil	2	4	2	6	western pearlshell	2	1	3	northern
Sanpoil	3	0	4	4	western pearlshell	3	0	3	northern
Sanpoil	4	0	4	4	western pearlshell	2	0	2	northern
Sanpoil	5	0	5	5	western pearlshell	3	3	6	signal
Sanpoil	6	0	8	8	western pearlshell	0	4	4	northern

Notes:

[a] Anodonta mussels could not be identified to the species level.

NA - not applicable

Table 2-3. Individual Organisms in Mussel Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species[a]	Wet Weight, including shell (g)[b]	Total Wet Weight, including shell (g)[b]	Composite ID
A1	S	A1-MB05-MU-01	5/3/2016	*Anodonta*	2.0	26.0	A1-MU-C001-ST and A1-MU-C001-ST-EPA
A1	S	A1-MB05-MU-02	5/3/2016	*Anodonta*	1.0		
A1	S	A1-MB05-MU-03	5/3/2016	*Anodonta*	2.0		
A1	S	A1-MB05-MU-04	5/3/2016	*Anodonta*	2.0		
A1	S	A1-MB05-MU-05	5/3/2016	*Anodonta*	2.0		
A1	S	A1-MB05-MU-06	5/3/2016	*Anodonta*	8.0		
A1	S	A1-MB05-MU-07	5/3/2016	*Anodonta*	9.0		
A1	S	A1-MB05-MU-08	5/3/2016	*Anodonta*	25.0	155.0	A1-MU-C002-ST
A1	S	A1-MB05-MU-09	5/3/2016	*Anodonta*	24.0		
A1	S	A1-MB05-MU-10	5/3/2016	*Anodonta*	30.0		
A1	S	A1-MB05-MU-11	5/3/2016	*Anodonta*	36.0		
A1	S	A1-MB05-MU-12	5/3/2016	*Anodonta*	40.0		
A1	F	A1-MB43-MU-01	9/28/2016	*Anodonta*	37.0	141.0	A1-MU-C003-ST
A1	F	A1-MB43-MU-02	9/28/2016	*Anodonta*	39.0		
A1	F	A1-MB43-MU-03	9/28/2016	*Anodonta*	34.0		
A1	F	A1-MB43-MU-18	9/28/2016	*Anodonta*	17.0		
A1	F	A1-MB43-MU-20	9/28/2016	*Anodonta*	14.0		
A1	F	A1-MB43-MU-04	9/28/2016	*Anodonta*	42.0	155.0	A1-MU-C004-ST
A1	F	A1-MB43-MU-06	9/28/2016	*Anodonta*	33.0		
A1	F	A1-MB43-MU-07	9/28/2016	*Anodonta*	37.0		
A1	F	A1-MB43-MU-09	9/28/2016	*Anodonta*	28.0		
A1	F	A1-MB43-MU-15	9/28/2016	*Anodonta*	15.0		
A1	F	A1-MB43-MU-10	9/28/2016	*Anodonta*	30.0	143.0	A1-MU-C005-ST
A1	F	A1-MB43-MU-11	9/28/2016	*Anodonta*	42.0		
A1	F	A1-MB43-MU-12	9/28/2016	*Anodonta*	33.0		
A1	F	A1-MB43-MU-13	9/28/2016	*Anodonta*	24.0		
A1	F	A1-MB43-MU-19	9/28/2016	*Anodonta*	14.0		
A1	F	A1-MB43-MU-05	9/28/2016	*Anodonta*	33.0	154.0	A1-MU-C006-ST
A1	F	A1-MB43-MU-08	9/28/2016	*Anodonta*	36.0		
A1	F	A1-MB43-MU-14	9/28/2016	*Anodonta*	30.0		
A1	F	A1-MB43-MU-16	9/28/2016	*Anodonta*	27.0		
A1	F	A1-MB43-MU-17	9/28/2016	*Anodonta*	28.0		

Table 2-3. Individual Organisms in Mussel Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species[a]	Wet Weight, including shell (g)[b]	Total Wet Weight, including shell (g)[b]	Composite ID
A2	S	A2-MB04-MU-04	4/28/2016	*Anodonta*	2.6	70.6	A2-MU-C001-ST
A2	S	A2-MB04-MU-05	4/28/2016	*Anodonta*	4.3		
A2	S	A2-MB04-MU-06	4/28/2016	*Anodonta*	4.2		
A2	S	A2-MB04-MU-07	4/28/2016	*Anodonta*	3.5		
A2	S	A2-MB04-MU-08	4/28/2016	*Anodonta*	3.9		
A2	S	A2-MB04-MU-09	4/28/2016	*Anodonta*	2.3		
A2	S	A2-MB04-MU-10	4/28/2016	*Anodonta*	2.2		
A2	S	A2-MB04-MU-11	4/28/2016	*Anodonta*	2.5		
A2	S	A2-MB04-MU-12	4/28/2016	*Anodonta*	3.5		
A2	S	A2-MB04-MU-13	4/28/2016	*Anodonta*	2.5		
A2	S	A2-MB04-MU-14	4/28/2016	*Anodonta*	1.3		
A2	S	A2-MB04-MU-15	4/28/2016	*Anodonta*	1.6		
A2	S	A2-MB04-MU-17	4/28/2016	*Anodonta*	3.3		
A2	S	A2-MB04-MU-19	4/28/2016	*Anodonta*	3.2		
A2	S	A2-MB04-MU-21	4/28/2016	*Anodonta*	4.0		
A2	S	A2-MB04-MU-22	4/28/2016	*Anodonta*	2.7		
A2	S	A2-MB05-MU-05	4/28/2016	*Anodonta*	23.0		
A2	S	A2-MB05-MU-01	4/28/2016	*Anodonta*	48.0	130.0	A2-MU-C002-ST and A2-MU-C002-ST-EPA
A2	S	A2-MB05-MU-04	4/28/2016	*Anodonta*	40.0		
A2	S	A2-MB05-MU-07	4/28/2016	*Anodonta*	42.0		
A2	S	A2-MB05-MU-02	4/28/2016	*Anodonta*	33.0	83.0	A2-MU-C003-ST
A2	S	A2-MB05-MU-03	4/28/2016	*Anodonta*	24.0		
A2	S	A2-MB05-MU-06	4/28/2016	*Anodonta*	26.0		
A2	S	A2-MB06-MU-07	4/29/2016	*Anodonta*	27.0	238.0	A2-MU-C004-ST and A2-MU-C004-ST-SP
A2	S	A2-MB06-MU-10	4/29/2016	*Anodonta*	28.0		
A2	S	A2-MB06-MU-11	4/29/2016	*Anodonta*	25.0		
A2	S	A2-MB06-MU-12	4/29/2016	*Anodonta*	27.0		
A2	S	A2-MB06-MU-13	4/29/2016	*Anodonta*	23.0		
A2	S	A2-MB06-MU-14	4/29/2016	*Anodonta*	18.0		
A2	S	A2-MB06-MU-15	4/29/2016	*Anodonta*	20.0		
A2	S	A2-MB06-MU-24	4/29/2016	*Anodonta*	23.0		
A2	S	A2-MB06-MU-25	4/29/2016	*Anodonta*	20.0		
A2	S	A2-MB06-MU-27	4/29/2016	*Anodonta*	27.0		

Table 2-3. Individual Organisms in Mussel Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species[a]	Wet Weight, including shell (g)[b]	Total Wet Weight, including shell (g)[b]	Composite ID
A2	S	A2-MB06-MU-05	4/29/2016	*Anodonta*	44.0	374.0	A2-MU-C005-ST
A2	S	A2-MB06-MU-08	4/29/2016	*Anodonta*	42.0		
A2	S	A2-MB06-MU-09	4/29/2016	*Anodonta*	32.0		
A2	S	A2-MB06-MU-17	4/29/2016	*Anodonta*	34.0		
A2	S	A2-MB06-MU-18	4/29/2016	*Anodonta*	40.0		
A2	S	A2-MB06-MU-19	4/29/2016	*Anodonta*	40.0		
A2	S	A2-MB06-MU-20	4/29/2016	*Anodonta*	41.0		
A2	S	A2-MB06-MU-21	4/29/2016	*Anodonta*	28.0		
A2	S	A2-MB06-MU-28	4/29/2016	*Anodonta*	41.0		
A2	S	A2-MB06-MU-29	4/29/2016	*Anodonta*	32.0		
A2	S	A2-MB06-MU-01	4/29/2016	*Anodonta*	51.0	435.0	A2-MU-C006-ST
A2	S	A2-MB06-MU-02	4/29/2016	*Anodonta*	43.0		
A2	S	A2-MB06-MU-03	4/29/2016	*Anodonta*	50.0		
A2	S	A2-MB06-MU-04	4/29/2016	*Anodonta*	50.0		
A2	S	A2-MB06-MU-06	4/29/2016	*Anodonta*	47.0		
A2	S	A2-MB06-MU-16	4/29/2016	*Anodonta*	29.0		
A2	S	A2-MB06-MU-22	4/29/2016	*Anodonta*	51.0		
A2	S	A2-MB06-MU-23	4/29/2016	*Anodonta*	29.0		
A2	S	A2-MB06-MU-26	4/29/2016	*Anodonta*	28.0		
A2	S	A2-MB06-MU-30	4/29/2016	*Anodonta*	57.0		
A3	S	A3-MB01-MU-01	4/26/2016	*Anodonta*	4.0	84.5	A3-MU-C001-ST and A3-MU-C001-ST-EPA
A3	S	A3-MB01-MU-03	4/26/2016	*Anodonta*	3.0		
A3	S	A3-MB01-MU-04	4/26/2016	*Anodonta*	4.0		
A3	S	A3-MB01-MU-02	4/26/2016	*Anodonta*	70.0		
A3	S	A3-MB04-MU-01	5/5/2016	*Anodonta*	3.5		
A3	S	A3-MB06-MU-05	5/5/2016	*Anodonta*	14.0	52.3	A3-MU-C002-ST
A3	S	A3-MB06-MU-03	5/5/2016	*Anodonta*	1.9		
A3	S	A3-MB06-MU-04	5/5/2016	*Anodonta*	3.4		
A3	F	A3-MB14-MU-01	9/29/2016	*Anodonta*	14.0		
A3	F	A3-MB14-MU-02	9/29/2016	*Anodonta*	19.0		
A3	F	A3-MB14-MU-03	9/29/2016	*Anodonta*	19.0	132.0	A3-MU-C003-ST
A3	F	A3-MB14-MU-04	9/29/2016	*Anodonta*	14.0		
A3	F	A3-MB14-MU-05	9/29/2016	*Anodonta*	19.0		
A3	F	A3-MB14-MU-14	9/29/2016	*Anodonta*	48.0		
A3	F	A3-MB14-MU-17	9/29/2016	*Anodonta*	32.0		

Table 2-3. Individual Organisms in Mussel Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species[a]	Wet Weight, including shell (g)[b]	Total Wet Weight, including shell (g)[b]	Composite ID
A3	F	A3-MB14-MU-15	9/29/2016	*Anodonta*	44.0	134.0	A3-MU-C004-ST
A3	F	A3-MB14-MU-06	9/29/2016	*Anodonta*	9.0		
A3	F	A3-MB14-MU-07	9/29/2016	*Anodonta*	9.0		
A3	F	A3-MB14-MU-08	9/29/2016	*Anodonta*	12.0		
A3	F	A3-MB14-MU-16	9/29/2016	*Anodonta*	60.0		
A3	F	A3-MB14-MU-09	9/29/2016	*Anodonta*	15.0	131.0	A3-MU-C005-ST
A3	F	A3-MB14-MU-10	9/29/2016	*Anodonta*	12.0		
A3	F	A3-MB14-MU-11	9/29/2016	*Anodonta*	15.0		
A3	F	A3-MB14-MU-18	9/29/2016	*Anodonta*	24.0		
A3	F	A3-MB14-MU-19	9/29/2016	*Anodonta*	65.0		
A3	F	A3-MB14-MU-12	9/29/2016	*Anodonta*	13.0	124.0	A3-MU-C006-ST
A3	F	A3-MB14-MU-13	9/29/2016	*Anodonta*	41.0		
A3	F	A3-MB14-MU-20	9/29/2016	*Anodonta*	25.0		
A3	F	A3-MB14-MU-21	9/29/2016	*Anodonta*	26.0		
A3	F	A3-MB14-MU-22	9/29/2016	*Anodonta*	19.0		
A4	F	A4-MB18-MU-01	9/30/2016	*Anodonta*	35.0	212.0	A4-MU-C001-ST
A4	F	A4-MB18-MU-02	9/30/2016	*Anodonta*	42.0		
A4	F	A4-MB18-MU-03	9/30/2016	*Anodonta*	58.0		
A4	F	A4-MB18-MU-04	9/30/2016	*Anodonta*	42.0		
A4	F	A4-MB18-MU-05	9/30/2016	*Anodonta*	35.0		
A4	F	A4-MB18-MU-06	9/30/2016	*Anodonta*	44.0	226.0	A4-MU-C002-ST and A4-MU-C002-ST-EPA
A4	F	A4-MB18-MU-07	9/30/2016	*Anodonta*	45.0		
A4	F	A4-MB18-MU-08	9/30/2016	*Anodonta*	50.0		
A4	F	A4-MB18-MU-09	9/30/2016	*Anodonta*	46.0		
A4	F	A4-MB18-MU-10	9/30/2016	*Anodonta*	41.0		
A4	F	A4-MB18-MU-11	9/30/2016	*Anodonta*	44.0	202.0	A4-MU-C003-ST
A4	F	A4-MB18-MU-12	9/30/2016	*Anodonta*	39.0		
A4	F	A4-MB18-MU-13	9/30/2016	*Anodonta*	33.0		
A4	F	A4-MB18-MU-14	9/30/2016	*Anodonta*	48.0		
A4	F	A4-MB18-MU-15	9/30/2016	*Anodonta*	38.0		
A4	F	A4-MB19-MU-01	9/30/2016	*Anodonta*	36.0	171.0	A4-MU-C004-ST
A4	F	A4-MB19-MU-02	9/30/2016	*Anodonta*	46.0		
A4	F	A4-MB19-MU-05	9/30/2016	*Anodonta*	39.0		
A4	F	A4-MB19-MU-12	9/30/2016	*Anodonta*	23.0		
A4	F	A4-MB19-MU-15	9/30/2016	*Anodonta*	27.0		

Table 2-3. Individual Organisms in Mussel Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species[a]	Wet Weight, including shell (g)[b]	Total Wet Weight, including shell (g)[b]	Composite ID
A4	F	A4-MB19-MU-06	9/30/2016	*Anodonta*	36.0	173.0	A4-MU-C005-ST
A4	F	A4-MB19-MU-07	9/30/2016	*Anodonta*	35.0		
A4	F	A4-MB19-MU-08	9/30/2016	*Anodonta*	32.0		
A4	F	A4-MB19-MU-09	9/30/2016	*Anodonta*	34.0		
A4	F	A4-MB19-MU-10	9/30/2016	*Anodonta*	36.0		
A4	F	A4-MB19-MU-04	9/30/2016	*Anodonta*	55.0	183.0	A4-MU-C006-ST
A4	F	A4-MB19-MU-03	9/30/2016	*Anodonta*	34.0		
A4	F	A4-MB19-MU-11	9/30/2016	*Anodonta*	32.0		
A4	F	A4-MB19-MU-13	9/30/2016	*Anodonta*	33.0		
A4	F	A4-MB19-MU-14	9/30/2016	*Anodonta*	29.0		
A5	F	A5-MB21-MU-01	10/2/2016	*Anodonta*	22.0	130.0	A5-MU-C001-ST
A5	F	A5-MB21-MU-02	10/2/2016	*Anodonta*	25.0		
A5	F	A5-MB21-MU-05	10/2/2016	*Anodonta*	22.0		
A5	F	A5-MB21-MU-06	10/2/2016	*Anodonta*	17.0		
A5	F	A5-MB21-MU-10	10/2/2016	*Anodonta*	19.0		
A5	F	A5-MB21-MU-04	10/2/2016	*Anodonta*	25.0		
A5	F	A5-MB21-MU-11	10/2/2016	*Anodonta*	15.0	130.0	A5-MU-C002-ST
A5	F	A5-MB21-MU-03	10/2/2016	*Anodonta*	33.0		
A5	F	A5-MB21-MU-07	10/2/2016	*Anodonta*	20.0		
A5	F	A5-MB21-MU-08	10/2/2016	*Anodonta*	21.0		
A5	F	A5-MB21-MU-09	10/2/2016	*Anodonta*	22.0		
A5	F	A5-MB21-MU-12	10/2/2016	*Anodonta*	19.0		
A5	F	A5-MB21-MU-13	10/2/2016	*Anodonta*	15.0	129.0	A5-MU-C003-ST
A5	F	A5-MB21-MU-14	10/2/2016	*Anodonta*	20.0		
A5	F	A5-MB21-MU-15	10/2/2016	*Anodonta*	9.0		
A5	F	A5-MB21-MU-16	10/2/2016	*Anodonta*	19.0		
A5	F	A5-MB21-MU-17	10/2/2016	*Anodonta*	33.0		
A5	F	A5-MB21-MU-18	10/2/2016	*Anodonta*	33.0		
A5	F	A5-MB22-MU-01	10/2/2016	*Anodonta*	22.0	190.0	A5-MU-C004-ST and A5-MU-C004-ST-SP
A5	F	A5-MB22-MU-02	10/2/2016	*Anodonta*	22.0		
A5	F	A5-MB22-MU-03	10/2/2016	*Anodonta*	32.0		
A5	F	A5-MB22-MU-04	10/2/2016	*Anodonta*	31.0		
A5	F	A5-MB22-MU-05	10/2/2016	*Anodonta*	45.0		
A5	F	A5-MB22-MU-06	10/2/2016	*Anodonta*	38.0		

Table 2-3. Individual Organisms in Mussel Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species[a]	Wet Weight, including shell (g)[b]	Total Wet Weight, including shell (g)[b]	Composite ID
A5	F	A5-MB23-MU-01	10/2/2016	*Anodonta*	6.0	100.0	A5-MU-C005-ST and A5-MU-C005-ST-EPA
A5	F	A5-MB23-MU-02	10/2/2016	*Anodonta*	5.0		
A5	F	A5-MB24-MU-03	10/2/2016	*Anodonta*	22.0		
A5	F	A5-MB24-MU-04	10/2/2016	*Anodonta*	15.0		
A5	F	A5-MB24-MU-09	10/2/2016	*Anodonta*	27.0		
A5	F	A5-MB24-MU-10	10/2/2016	*Anodonta*	25.0		
A5	F	A5-MB24-MU-01	10/2/2016	*Anodonta*	15.0	95.0	A5-MU-C006-ST
A5	F	A5-MB24-MU-02	10/2/2016	*Anodonta*	15.0		
A5	F	A5-MB24-MU-05	10/2/2016	*Anodonta*	16.0		
A5	F	A5-MB24-MU-06	10/2/2016	*Anodonta*	18.0		
A5	F	A5-MB24-MU-07	10/2/2016	*Anodonta*	14.0		
A5	F	A5-MB24-MU-08	10/2/2016	*Anodonta*	17.0		
A6	S	A6-MB01-MU-01	4/29/2016	*Anodonta*	3.0	64.9	A6-MU-C001-ST
A6	S	A6-MB01-MU-02	4/27/2016	*Anodonta*	2.0		
A6	S	A6-MB01-MU-04	4/27/2016	*Anodonta*	2.0		
A6	S	A6-MB01-MU-06	4/27/2016	*Anodonta*	1.0		
A6	S	A6-MB01-MU-07	4/30/2016	*Anodonta*	3.4		
A6	S	A6-MB01-MU-08	4/30/2016	*Anodonta*	1.5		
A6	S	A6-MB01-MU-09	4/30/2016	*Anodonta*	2.2		
A6	S	A6-MB01-MU-10	4/30/2016	*Anodonta*	1.1		
A6	S	A6-MB01-MU-11	4/30/2016	*Anodonta*	1.8		
A6	S	A6-MB01-MU-12	4/30/2016	*Anodonta*	1.6		
A6	S	A6-MB01-MU-13	4/30/2016	*Anodonta*	1.4		
A6	S	A6-MB01-MU-14	4/30/2016	*Anodonta*	1.5		
A6	S	A6-MB01-MU-15	4/30/2016	*Anodonta*	1.7		
A6	S	A6-MB01-MU-17	4/30/2016	*Anodonta*	2.1		
A6	S	A6-MB01-MU-18	4/30/2016	*Anodonta*	2.0		
A6	S	A6-MB01-MU-19	4/30/2016	*Anodonta*	1.8		
A6	S	A6-MB01-MU-20	4/30/2016	*Anodonta*	2.7		
A6	S	A6-MB01-MU-21	4/30/2016	*Anodonta*	1.2		
A6	S	A6-MB01-MU-23	4/30/2016	*Anodonta*	2.3		
A6	S	A6-MB07-MU-01	4/29/2016	*Anodonta*	1.6		
A6	S	A6-MB07-MU-02	4/29/2016	*Anodonta*	1.5		
A6	S	A6-MB07-MU-03	4/29/2016	*Anodonta*	2.4		
A6	S	A6-MB07-MU-04	4/29/2016	*Anodonta*	3.3		
A6	S	A6-MB07-MU-05	4/29/2016	*Anodonta*	3.0		

Table 2-3. Individual Organisms in Mussel Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species[a]	Wet Weight, including shell (g)[b]	Total Wet Weight, including shell (g)[b]	Composite ID
A6	S	A6-MB07-MU-06	4/29/2016	*Anodonta*	3.6	64.9	A6-MU-C001-ST (continued)
A6	S	A6-MB07-MU-07	4/29/2016	*Anodonta*	2.7		
A6	S	A6-MB07-MU-08	4/29/2016	*Anodonta*	3.1		
A6	S	A6-MB07-MU-09	4/29/2016	*Anodonta*	3.2		
A6	S	A6-MB07-MU-10	4/29/2016	*Anodonta*	1.3		
A6	S	A6-MB08-MU-04	4/29/2016	*Anodonta*	1.9		
A6	S	A6-MB08-MU-05	4/29/2016	*Anodonta*	1.0		
A6	S	A6-MB03-MU-01	4/27/2016	*Anodonta*	2.0	83.9	A6-MU-C002-ST
A6	S	A6-MB03-MU-02	4/27/2016	*Anodonta*	3.0		
A6	S	A6-MB03-MU-03	4/27/2016	*Anodonta*	3.0		
A6	S	A6-MB03-MU-04	4/27/2016	*Anodonta*	3.0		
A6	S	A6-MB03-MU-05	4/27/2016	*Anodonta*	4.0		
A6	S	A6-MB03-MU-06	4/27/2016	*Anodonta*	2.0		
A6	S	A6-MB03-MU-07	4/27/2016	*Anodonta*	2.0		
A6	S	A6-MB05-MU-01	4/28/2016	*Anodonta*	2.4		
A6	S	A6-MB05-MU-02	4/28/2016	*Anodonta*	2.0		
A6	S	A6-MB05-MU-03	4/28/2016	*Anodonta*	0.9		
A6	S	A6-MB05-MU-04	4/28/2016	*Anodonta*	2.2		
A6	S	A6-MB09-MU-01	4/29/2016	*Anodonta*	2.0		
A6	S	A6-MB09-MU-02	4/29/2016	*Anodonta*	3.0		
A6	S	A6-MB09-MU-03	4/29/2016	*Anodonta*	3.0		
A6	S	A6-MB09-MU-04	4/29/2016	*Anodonta*	2.3		
A6	S	A6-MB09-MU-05	4/29/2016	*Anodonta*	2.5		
A6	S	A6-MB09-MU-06	4/29/2016	*Anodonta*	2.1		
A6	S	A6-MB09-MU-07	4/29/2016	*Anodonta*	2.0		
A6	S	A6-MB09-MU-09	4/29/2016	*Anodonta*	0.5		
A6	S	A6-MB09-MU-10	4/29/2016	*Anodonta*	1.0		
A6	F	A6-MB11-MU-01	10/1/2016	*Anodonta*	23.0		
A6	F	A6-MB12-MU-04	10/1/2016	*Anodonta*	16.0		
A6	F	A6-MB11-MU-02	10/1/2016	*Anodonta*	20.0	84.0	A6-MU-C003-ST
A6	F	A6-MB11-MU-06	10/1/2016	*Anodonta*	17.0		
A6	F	A6-MB11-MU-11	10/1/2016	*Anodonta*	13.0		
A6	F	A6-MB11-MU-13	10/1/2016	*Anodonta*	12.0		
A6	F	A6-MB12-MU-01	10/1/2016	*Anodonta*	22.0		

Table 2-3. Individual Organisms in Mussel Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species[a]	Wet Weight, including shell (g)[b]	Total Wet Weight, including shell (g)[b]	Composite ID
A6	F	A6-MB11-MU-05	10/1/2016	*Anodonta*	21.0	90.0	A6-MU-C004-ST and A6-MU-C004-ST-EPA
A6	F	A6-MB11-MU-07	10/1/2016	*Anodonta*	7.0		
A6	F	A6-MB11-MU-08	10/1/2016	*Anodonta*	17.0		
A6	F	A6-MB11-MU-09	10/1/2016	*Anodonta*	16.0		
A6	F	A6-MB11-MU-10	10/1/2016	*Anodonta*	15.0		
A6	F	A6-MB11-MU-12	10/1/2016	*Anodonta*	14.0		
A6	F	A6-MB11-MU-03	10/1/2016	*Anodonta*	19.0	87.0	A6-MU-C005-ST
A6	F	A6-MB11-MU-14	10/1/2016	*Anodonta*	13.0		
A6	F	A6-MB11-MU-15	10/1/2016	*Anodonta*	13.0		
A6	F	A6-MB11-MU-16	10/1/2016	*Anodonta*	20.0		
A6	F	A6-MB11-MU-17	10/1/2016	*Anodonta*	11.0		
A6	F	A6-MB11-MU-18	10/1/2016	*Anodonta*	11.0		
A6	F	A6-MB11-MU-04	10/1/2016	*Anodonta*	13.0	91.0	A6-MU-C006-ST
A6	F	A6-MB11-MU-19	10/1/2016	*Anodonta*	17.0		
A6	F	A6-MB11-MU-20	10/1/2016	*Anodonta*	9.0		
A6	F	A6-MB11-MU-21	10/1/2016	*Anodonta*	9.0		
A6	F	A6-MB12-MU-02	10/1/2016	*Anodonta*	22.0		
A6	F	A6-MB12-MU-03	10/1/2016	*Anodonta*	21.0		
SR	S	SR-MB03-MU-01	5/17/2016	western pearlshell	32.0	82.7	SR-MU-C001-ST
SR	S	SR-MB04-MU-01	5/16/2016	western pearlshell	10.1		
SR	S	SR-MB09-MU-01	5/17/2016	western pearlshell	1.3		
SR	S	SR-MB09-MU-02	5/18/2016	western pearlshell	1.4		
SR	S	SR-MB09-MU-03	5/18/2016	western pearlshell	2.3		
SR	S	SR-MB09-MU-04	5/18/2016	western pearlshell	2.1		
SR	S	SR-MB09-MU-05	5/18/2016	western pearlshell	8.5		
SR	S	SR-MB09-MU-06	5/18/2016	western pearlshell	10.0		
SR	S	SR-MB09-MU-07	5/18/2016	western pearlshell	15.0		
SR	S	SR-MB01-MU-01	5/16/2016	western pearlshell	1.1	75.2	SR-MU-C002-ST
SR	S	SR-MB01-MU-02	5/16/2016	western pearlshell	2.5		
SR	S	SR-MB01-MU-03	5/16/2016	western pearlshell	8.4		
SR	S	SR-MB01-MU-04	5/16/2016	western pearlshell	10.2		
SR	F	SR-MB34-MU-01	9/18/2016	western pearlshell	14.0		
SR	F	SR-MB34-MU-07	9/20/2016	western pearlshell	39.0		

Table 2-3. Individual Organisms in Mussel Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species[a]	Wet Weight, including shell (g)[b]	Total Wet Weight, including shell (g)[b]	Composite ID
SR	F	SR-MB34-MU-05	9/20/2016	western pearlshell	28.0	125.0	SR-MU-C003-ST and SR-MU-C003-ST-EPA
SR	F	SR-MB34-MU-14	9/20/2016	western pearlshell	42.0		
SR	F	SR-MB34-MU-03	9/20/2016	western pearlshell	16.0		
SR	F	SR-MB34-MU-08	9/20/2016	western pearlshell	39.0		
SR	F	SR-MB34-MU-11	9/20/2016	western pearlshell	20.0	111.0	SR-MU-C004-ST and SR-MU-C004-ST-SP
SR	F	SR-MB34-MU-12	9/20/2016	western pearlshell	20.0		
SR	F	SR-MB34-MU-13	9/20/2016	western pearlshell	27.0		
SR	F	SR-MB34-MU-15	9/20/2016	western pearlshell	44.0		
SR	F	SR-MB34-MU-02	9/20/2016	western pearlshell	8.5	123.5	SR-MU-C005-ST
SR	F	SR-MB34-MU-04	9/20/2016	western pearlshell	22.0		
SR	F	SR-MB34-MU-06	9/20/2016	western pearlshell	40.0		
SR	F	SR-MB34-MU-09	9/20/2016	western pearlshell	40.0		
SR	F	SR-MB34-MU-10	9/20/2016	western pearlshell	13.0		
SR	F	SR-MB35-MU-01	9/18/2016	western pearlshell	8.0	77.5	SR-MU-C006-ST
SR	F	SR-MB35-MU-02	9/18/2016	western pearlshell	6.0		
SR	F	SR-MB36-MU-01	9/18/2016	western pearlshell	6.0		
SR	F	SR-MB36-MU-02	9/18/2016	western pearlshell	32.0		
SR	F	SR-MB38-MU-01	9/19/2016	western pearlshell	4.0		
SR	F	SR-MB38-MU-02	9/19/2016	western pearlshell	11.0		
SR	F	SR-MB41-MU-01	9/19/2016	western pearlshell	8.0		
SR	F	SR-MB42-MU-01	9/19/2016	western pearlshell	2.5		

Notes:

[a] Anodonta mussels could not be identified to the species level.

[b] Total weight based on field-collected weights prior to laboratory processing.

F - fall

S - spring

SR - Sanpoil River reference area

Table 2-4. Individual Organisms in Crayfish Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species	Total Length (mm)	Wet Weight (g)[a]	Total Wet Weight (g)[a]	Composite IDs
A2	S	A2-CT01-CR-01	4/30/2016	northern	51.0	4.0	65.0	A2-CR-C001-PB and A2-CR-C001-CS
A2	S	A2-CT10-CR-01	4/28/2016	northern	63.0	7.0		
A2	S	A2-CT13-CR-01	4/30/2016	northern	69.0	10.0		
A2	S	A2-CT13-CR-02	4/30/2016	northern	58.0	5.0		
A2	S	A2-CT13-CR-03	5/1/2016	northern	105.0	39.0		
A2	S	A2-CT06-CR-01	4/29/2016	signal	115.0	60.0	229.0	A2-CR-C002-PB and A2-CR-C002-CS
A2	S	A2-CT14-CR-01	5/1/2016	signal	115.0	54.0		
A2	F	A2-CT45-CR-02	10/5/2016	signal	114.0	40.0		
A2	F	A2-CT45-CR-03	10/5/2016	signal	111.0	39.0		
A2	F	A2-CT45-CR-04	10/5/2016	signal	106.0	36.0		
A2	F	A2-CT31-CR-01	10/5/2016	northern	89.0	20.0	182.0	A2-CR-C003-PB, A2-CR-C003-CS, A2-CR-C003-PB-SP, and A2-CR-C003-CS-SP
A2	F	A2-CT31-CR-02	10/5/2016	northern	97.0	32.0		
A2	F	A2-CT31-CR-03	10/5/2016	northern	66.0	7.0		
A2	F	A2-CT58-CR-01	10/5/2016	northern	129.0	89.0		
A2	F	A2-CT62-CR-01	10/5/2016	northern	104.0	34.0		
A2	F	A2-CT34-CR-01	10/5/2016	northern	95.0	28.0	178.0	A2-CR-C004-PB and A2-CR-C004-CS
A2	F	A2-CT35-CR-01	10/5/2016	northern	101.0	39.0		
A2	F	A2-CT48-CR-03	10/5/2016	northern	90.0	31.0		
A2	F	A2-CT54-CR-01	10/5/2016	northern	103.0	42.0		
A2	F	A2-CT54-CR-02	10/5/2016	northern	107.0	38.0		
A2	F	A2-CT32-CR-01	10/5/2016	northern	75.0	12.0	158.0	A2-CR-C005-PB, A2-CR-C005-PB-EPA, A2-CR-C005-CS, and A2-CR-C005-CS-EPA
A2	F	A2-CT53-CR-01	10/5/2016	northern	107.0	47.0		
A2	F	A2-CT55-CR-01	10/5/2016	northern	111.0	42.0		
A2	F	A2-CT56-CR-01	10/5/2016	northern	98.0	26.0		
A2	F	A2-CT56-CR-02	10/5/2016	northern	95.0	31.0		
A2	F	A2-CT40-CR-01	10/5/2016	northern	77.0	11.0	141.0	A2-CR-C006-PB and A2-CR-C006-CS
A2	F	A2-CT45-CR-01	10/5/2016	northern	100.0	31.0		
A2	F	A2-CT46-CR-01	10/5/2016	northern	91.0	36.0		
A2	F	A2-CT48-CR-01	10/5/2016	northern	102.0	34.0		
A2	F	A2-CT48-CR-02	10/5/2016	northern	95.0	29.0		
A3	S	A3-CT01-CR-01	5/6/2016	northern	99.5	28.0	97.0	A3-CR-C001-WB and A3-CR-C001-WB-EPA
A3	F	A3-CT53-CR-01	9/12/2016	northern	49.0	3.0		
A3	F	A3-CT48-CR-01	9/12/2016	northern	84.0	19.0		
A3	F	A3-CT48-CR-02	9/12/2016	northern	34.0	1.0		
A3	F	A3-CT52-CR-01	9/11/2016	northern	111.0	46.0		

Table 2-4. Individual Organisms in Crayfish Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species	Total Length (mm)	Wet Weight (g)[a]	Total Wet Weight (g)[a]	Composite IDs
A3	S	A3-CT02-CR-01	5/7/2016	northern	57.1	3.9	85.9	A3-CR-C002-WB
A3	F	A3-CT50-CR-01	9/11/2016	northern	84.0	20.0		
A3	F	A3-CT50-CR-02	9/11/2016	northern	92.0	29.0		
A3	F	A3-CT50-CR-03	9/11/2016	northern	88.0	28.0		
A3	F	A3-CT49-CR-01	9/12/2016	northern	56.0	5.0		
A3	S	A3-CT13-CR-01	5/6/2016	northern	87.9	23.0	54.0	A3-CR-C003-WB
A3	F	A3-CT58-CR-01	9/11/2016	northern	76.0	15.0		
A3	F	A3-CT58-CR-02	9/11/2016	northern	65.0	7.0		
A3	F	A3-CT60-CR-01	9/11/2016	northern	66.0	9.0		
A3	S	A3-CT14-CR-01	5/7/2016	northern	99.3	21.0	139.0	A3-CR-C004-WB
A3	F	A3-CT36-CR-01	9/11/2016	northern	121.0	55.0		
A3	F	A3-CT36-CR-02	9/11/2016	northern	104.0	40.0		
A3	F	A3-CT37-CR-01	9/12/2016	northern	56.0	4.0		
A3	F	A3-CT39-CR-01	9/11/2016	northern	74.0	19.0		
A3	F	A3-CT62-CR-01	9/12/2016	northern	101.0	30.0	47.0	A3-CR-C005-WB
A3	F	A3-CT63-CR-01	9/12/2016	northern	56.0	4.0		
A3	F	A3-CT45-CR-01	9/12/2016	northern	67.0	8.0		
A3	F	A3-CT45-CR-02	9/12/2016	northern	55.0	5.0		
A3	F	A3-CT47-CR-01	9/11/2016	northern	41.0	2.0	72.0	A3-CR-C006-WB
A3	F	A3-CT46-CR-01	9/11/2016	northern	83.0	23.0		
A3	F	A3-CT46-CR-02	9/12/2016	northern	94.0	24.0		
A3	F	A3-CT46-CR-03	9/12/2016	northern	93.0	23.0		
A4	S	A4-CT01-CR-01	5/6/2016	northern	48.0	3.1	84.1	A4-CR-C001-WB
A4	F	A4-CT36-CR-02	9/8/2016	northern	90.0	23.0		
A4	F	A4-CT36-CR-03	9/8/2016	northern	91.0	32.0		
A4	F	A4-CT36-CR-04	9/8/2016	northern	91.0	26.0		
A4	F	A4-CT31-CR-01	9/8/2016	northern	87.0	25.0	128.0	A4-CR-C002-WB
A4	F	A4-CT31-CR-02	9/8/2016	northern	83.0	20.0		
A4	F	A4-CT31-CR-03	9/8/2016	northern	104.0	35.0		
A4	F	A4-CT31-CR-04	9/8/2016	northern	84.0	23.0		
A4	F	A4-CT31-CR-05	9/8/2016	northern	84.0	25.0		
A4	F	A4-CT31-CR-06	9/8/2016	northern	83.0	20.0	122.0	A4-CR-C003-WB
A4	F	A4-CT31-CR-07	9/8/2016	northern	84.0	25.0		
A4	F	A4-CT35-CR-06	9/8/2016	northern	87.0	21.0		
A4	F	A4-CT35-CR-07	9/8/2016	northern	91.0	30.0		
A4	F	A4-CT36-CR-01	9/8/2016	northern	88.0	26.0		

Table 2-4. Individual Organisms in Crayfish Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species	Total Length (mm)	Wet Weight (g)[a]	Total Wet Weight (g)[a]	Composite IDs
A4	F	A4-CT34-CR-01	9/8/2016	northern	94.0	26.0	154.0	A4-CR-C004-WB
A4	F	A4-CT34-CR-02	9/8/2016	northern	94.0	27.0		
A4	F	A4-CT34-CR-09	9/8/2016	northern	104.0	47.0		
A4	F	A4-CT34-CR-03	9/8/2016	northern	94.0	24.0		
A4	F	A4-CT34-CR-06	9/8/2016	northern	94.0	30.0		
A4	F	A4-CT34-CR-04	9/8/2016	northern	107.0	45.0	162.0	A4-CR-C005-WB and A4-CR-C005-WB-EPA
A4	F	A4-CT34-CR-05	9/8/2016	northern	94.0	25.0		
A4	F	A4-CT34-CR-07	9/8/2016	northern	94.0	25.0		
A4	F	A4-CT34-CR-08	9/8/2016	northern	83.0	26.0		
A4	F	A4-CT34-CR-10	9/8/2016	northern	94.0	41.0		
A4	F	A4-CT35-CR-01	9/8/2016	northern	73.0	15.0	174.0	A4-CR-C006-WB and A4-CR-C006-WB-SP
A4	F	A4-CT35-CR-02	9/8/2016	northern	104.0	42.0		
A4	F	A4-CT35-CR-03	9/8/2016	northern	105.0	52.0		
A4	F	A4-CT35-CR-04	9/8/2016	northern	94.0	27.0		
A4	F	A4-CT35-CR-05	9/8/2016	northern	94.0	38.0		
A5	S	A5-CT05-CR-01	5/1/2016	northern	87.0	27.0	60.2	A5-CR-C001-PB and A5-CR-C001-CS
A5	S	A5-CT11-CR-02	5/4/2016	northern	36.0	1.2		
A5	S	A5-CT16-CR-01	5/4/2016	northern	76.0	20.0		
A5	S	A5-CT25-CR-01	5/9/2016	northern	71.0	11.0		
A5	S	A5-CT25-CR-02	5/9/2016	northern	35.0	1.0		
A5	S	A5-CT02-CR-01	5/1/2016	northern	114.0	61.0	66.0	A5-CR-C002-PB and A5-CR-C002-CS
A5	S	A5-CT15-CR-03	5/4/2016	northern	54.0	5.0		
A5	S	A5-CT02-CR-02	5/1/2016	signal	106.0	47.0	122.0	A5-CR-C003-PB, A5-CR-C003-PB-EPA, A5-CR-C003-CS, A5-CR-C003-CS-EPA, A5-CR-C003-PB-SP, and A5-CR-C003-CS-SP
A5	S	A5-CT04-CR-01	5/4/2016	signal	114.0	75.0		
A5	S	A5-CT15-CR-01	5/3/2016	northern	106.0	48.0	75.0	A5-CR-C004-PB and A5-CR-C004-CS
A5	S	A5-CT15-CR-02	5/3/2016	northern	91.0	27.0		
A5	S	A5-CT01-CR-01	5/3/2016	northern	105.0	50.0	101.0	A5-CR-C005-PB and A5-CR-C005-CS
A5	S	A5-CT12-CR-01	5/3/2016	northern	109.0	51.0		
A5	S	A5-CT04-CR-02	5/4/2016	signal	122.0	69.0	121.0	A5-CR-C006-PB and A5-CR-C006-CS
A5	S	A5-CT11-CR-01	5/3/2016	northern	102.0	52.0		
A6	S	A6-CT01-CR-01	4/28/2016	northern	98.0	43.0	125.0	A6-CR-C001-PB, A6-CR-C001-CS, A6-CR-C001-PB-SP, and A6-CR-C001-CS-SP
A6	S	A6-CT01-CR-02	4/30/2016	northern	106.0	62.0		
A6	S	A6-CT01-CR-03	4/30/2016	northern	79.0	20.0		

Table 2-4. Individual Organisms in Crayfish Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species	Total Length (mm)	Wet Weight (g)[a]	Total Wet Weight (g)[a]	Composite IDs
A6	S	A6-CT02-CR-01	4/28/2016	northern	79.0	20.0	178.0	A6-CR-C002-PB, A6-CR-C002-PB-EPA, A6-CR-C002-CS, and A6-CR-C002-CS-EPA
A6	S	A6-CT02-CR-02	4/30/2016	northern	103.0	51.0		
A6	S	A6-CT02-CR-03	4/30/2016	northern	83.0	23.0		
A6	S	A6-CT02-CR-04	4/30/2016	northern	98.0	44.0		
A6	S	A6-CT02-CR-05	4/30/2016	northern	92.0	40.0		
A6	S	A6-CT04-CR-01	4/28/2016	northern	96.0	42.0	69.0	A6-CR-C003-PB and A6-CR-C003-CS
A6	S	A6-CT06-CR-01	4/28/2016	northern	86.0	27.0		
A6	S	A6-CT07-CR-01	4/28/2016	northern	100.0	45.0	89.0	A6-CR-C004-PB and A6-CR-C004-CS
A6	S	A6-CT07-CR-02	4/28/2016	northern	100.0	44.0		
A6	S	A6-CT12-CR-01	4/29/2016	northern	98.0	39.0	146.0	A6-CR-C005-PB and A6-CR-C005-CS
A6	S	A6-CT12-CR-02	4/29/2016	northern	44.0	9.0		
A6	S	A6-CT13-CR-01	4/30/2016	northern	99.0	39.0		
A6	S	A6-CT13-CR-03	4/30/2016	northern	86.0	28.0		
A6	S	A6-CT13-CR-04	4/30/2016	northern	87.0	31.0		
A6	S	A6-CT13-CR-02	4/30/2016	northern	86.0	25.0	69.0	A6-CR-C006-PB and A6-CR-C006-CS
A6	S	A6-CT14-CR-01	4/30/2016	northern	82.0	20.0		
A6	S	A6-CT14-CR-02	4/30/2016	northern	81.0	24.0		
RL	S	RL-CT01-CR-03	5/13/2016	northern	120.0	57.0	334.9	RL-CR-C001-PB and RL-CR-C001-CS
RL	S	RL-CT01-CR-04	5/13/2016	northern	101.0	42.0		
RL	S	RL-CT01-CR-05	5/13/2016	northern	96.0	41.0		
RL	S	RL-CT01-CR-06	5/13/2016	northern	101.0	38.0		
RL	S	RL-CT01-CR-07	5/13/2016	northern	105.0	46.0		
RL	S	RL-CT01-CR-08	5/13/2016	northern	99.0	36.0		
RL	S	RL-CT01-CR-09	5/14/2016	northern	81.0	18.0		
RL	S	RL-CT01-CR-10	5/14/2016	northern	87.0	28.0		
RL	S	RL-CT01-CR-11	5/14/2016	northern	83.0	23.0		
RL	S	RL-CT01-CR-12	5/14/2016	northern	62.0	5.9		
RL	S	RL-CT02-CR-03	5/12/2016	northern	103.0	43.0	206.0	RL-CR-C002-PB and RL-CR-C002-CS
RL	S	RL-CT02-CR-04	5/12/2016	northern	103.0	45.0		
RL	S	RL-CT02-CR-05	5/13/2016	northern	105.0	44.0		
RL	S	RL-CT02-CR-06	5/13/2016	northern	86.0	24.0		
RL	S	RL-CT02-CR-07	5/13/2016	northern	88.0	26.0		
RL	S	RL-CT02-CR-08	5/13/2016	northern	83.0	21.0		
RL	S	RL-CT02-CR-09	5/14/2016	northern	47.0	3.0		
RL	S	RL-CT03-CR-01	5/12/2016	northern	93.0	27.0	139.9	RL-CR-C003-PB and RL-CR-C003-CS
RL	S	RL-CT03-CR-02	5/13/2016	northern	88.0	28.0		
RL	S	RL-CT03-CR-03	5/13/2016	northern	97.0	47.0		
RL	S	RL-CT03-CR-04	5/13/2016	northern	51.0	3.8		
RL	S	RL-CT03-CR-05	5/13/2016	northern	53.0	4.1		
RL	S	RL-CT03-CR-06	5/13/2016	northern	90.0	30.0		

Table 2-4. Individual Organisms in Crayfish Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species	Total Length (mm)	Wet Weight (g)[a]	Total Wet Weight (g)[a]	Composite IDs
RL	S	RL-CT04-CR-01	5/13/2016	northern	100.0	33.0	176.0	RL-CR-C004-PB, RL-CR-C004-PB-EPA, RL-CR-C004-CS, and RL-CR-C004-CS-EPA
RL	S	RL-CT04-CR-02	5/13/2016	northern	68.0	11.0		
RL	S	RL-CT04-CR-03	5/13/2016	northern	96.0	40.0		
RL	S	RL-CT04-CR-04	5/13/2016	northern	103.0	48.0		
RL	S	RL-CT04-CR-05	5/13/2016	northern	88.0	25.0		
RL	S	RL-CT04-CR-06	5/14/2016	northern	82.0	19.0		
RL	S	RL-CT08-CR-01	5/13/2016	northern	91.0	26.0	241.9	RL-CR-C005-PB, RL-CR-C005-CS, RL-CR-C005-PB-SP, and RL-CR-C005-CS-SP
RL	S	RL-CT08-CR-02	5/13/2016	northern	103.0	53.0		
RL	S	RL-CT08-CR-03	5/13/2016	northern	97.0	33.0		
RL	S	RL-CT08-CR-04	5/13/2016	northern	93.0	27.0		
RL	S	RL-CT08-CR-05	5/13/2016	northern	103.0	40.0		
RL	S	RL-CT08-CR-06	5/13/2016	northern	90.0	36.0		
RL	S	RL-CT08-CR-07	5/13/2016	northern	83.0	21.0		
RL	S	RL-CT08-CR-08	5/13/2016	northern	60.0	5.9		
RL	S	RL-CT10-CR-01	5/13/2016	northern	53.0	4.1	129.3	RL-CR-C006-PB and RL-CR-C006-CS
RL	S	RL-CT10-CR-02	5/13/2016	northern	107.0	52.0		
RL	S	RL-CT10-CR-03	5/13/2016	northern	101.0	46.0		
RL	S	RL-CT10-CR-04	5/14/2016	northern	55.0	4.2		
RL	S	RL-CT10-CR-05	5/14/2016	northern	83.0	23.0		
SR	F	SR-CT41-CR-02	9/19/2016	northern	90.0	22.0	74.0	SR-CR-C001-PB and SR-CR-C001-CS
SR	F	SR-CT41-CR-01	9/19/2016	northern	110.0	42.0		
SR	F	SR-CT41-CR-03	9/19/2016	northern	72.0	10.0		
SR	F	SR-CT32-CR-01	9/19/2016	northern	85.0	23.0	112.0	SR-CR-C002-PB and SR-CR-C002-CS
SR	S	SR-CT04-CR-01	5/18/2016	northern	118.0	71.0		
SR	S	SR-CT16-CR-01	5/18/2016	northern	83.2	18.0		
SR	S	SR-CT06-CR-01	5/18/2016	northern	64.0	6.5	63.5	SR-CR-C003-PB and SR-CR-C003-CS
SR	S	SR-CT07-CR-01	5/19/2016	northern	99.7	28.0		
SR	S	SR-CT08-CR-01	5/19/2016	northern	86.5	29.0		
SR	S	SR-CT08-CR-02	5/19/2016	northern	104.8	50.0	74.0	SR-CR-C004-PB and SR-CR-C004-CS
SR	S	SR-CT11-CR-01	5/19/2016	northern	91.9	24.0		
SR	S	SR-CT09-CR-01	5/18/2016	signal	75.0	20.0	122.0	SR-CR-C005-PB and SR-CR-C005-CS
SR	S	SR-CT11-CR-02	5/19/2016	signal	76.4	25.0		
SR	S	SR-CT12-CR-01	5/17/2016	signal	63.0	12.0		
SR	F	SR-CT50-CR-01	9/19/2016	signal	71.0	18.0		
SR	F	SR-CT62-CR-01	9/19/2016	signal	83.0	29.0		
SR	F	SR-CT55-CR-01	9/20/2016	signal	73.0	18.0		

Table 2-4. Individual Organisms in Crayfish Composites

Area	Spring or Fall Collection	Organism ID	Sampling Date	Species	Total Length (mm)	Wet Weight (g)[a]	Total Wet Weight (g)[a]	Composite IDs
SR	F	SR-CT44-CR-01	9/19/2016	northern	114.0	53.0	195.0	SR-CR-C006-PB, SR-CR-C006-PB-EPA, SR-CR-C006-CS, and SR-CR-C006-CS-EPA
SR	F	SR-CT47-CR-01	9/19/2016	northern	102.0	46.0		
SR	F	SR-CT51-CR-01	9/19/2016	northern	110.0	56.0		
SR	F	SR-CT51-CR-02	9/19/2016	northern	104.0	40.0		

Notes:

[a] Total weight based on field-collected weights prior to laboratory processing

F - fall

S - spring

SR - Sanpoil River reference area

Table 2-5. Chemicals Analyzed for Each Composite

Area	Composite ID	Number of Organisms Composited	TAL Metals	Percent Moisture	Methyl Mercury	Inorganic Arsenic	PCB Congeners	Dioxins and Furans	Lipids	Field Split	EPA Split
Mussels											
A1	A1-MU-C001-ST	7	X	X							X
A1	A1-MU-C002-ST	5	X	X							
A1	A1-MU-C003-ST	5	X	X							
A1	A1-MU-C004-ST	5	X	X							
A1	A1-MU-C005-ST	5	X	X							
A1	A1-MU-C006-ST	5	X	X							
A2	A2-MU-C001-ST	17	X	X	X	X					
A2	A2-MU-C002-ST	3	X	X	X	X	X	X	X		X
A2	A2-MU-C003-ST	3	X	X	X	X	X	X	X		
A2	A2-MU-C004-ST	10	X	X	X	X	X	X	X	X	
A2	A2-MU-C005-ST	10	X	X	X	X	X	X	X		
A2	A2-MU-C006-ST	10	X	X	X	X	X	X	X		
A3	A3-MU-C001-ST	5	X	X							X
A3	A3-MU-C002-ST	5	X	X							
A3	A3-MU-C003-ST	5	X	X							
A3	A3-MU-C004-ST	5	X	X							
A3	A3-MU-C005-ST	5	X	X							
A3	A3-MU-C006-ST	5	X	X							
A4	A4-MU-C001-ST	5	X	X							
A4	A4-MU-C002-ST	5	X	X							X
A4	A4-MU-C003-ST	5	X	X							
A4	A4-MU-C004-ST	5	X	X							
A4	A4-MU-C005-ST	5	X	X							
A4	A4-MU-C006-ST	5	X	X							
A5	A5-MU-C001-ST	6	X	X	X	X	X	X	X		
A5	A5-MU-C002-ST	6	X	X	X	X	X	X	X		
A5	A5-MU-C003-ST	6	X	X	X	X	X	X	X		
A5	A5-MU-C004-ST	6	X	X	X	X	X	X	X	X	
A5	A5-MU-C005-ST	6	X	X	X	X	X	X	X		X
A5	A5-MU-C006-ST	6	X	X	X	X	X	X	X		
A6	A6-MU-C001-ST	31	X	X	X	X					
A6	A6-MU-C002-ST	22	X	X	X	X	X	X	X		
A6	A6-MU-C003-ST	5	X	X	X	X	X	X	X		
A6	A6-MU-C004-ST	6	X	X	X	X	X	X	X		X
A6	A6-MU-C005-ST	6	X	X	X	X	X	X	X		
A6	A6-MU-C006-ST	6	X	X	X	X	X		X		

Table 2-5. Chemicals Analyzed for Each Composite

Area	Composite ID	Number of Organisms Composited	TAL Metals	Percent Moisture	Methyl Mercury	Inorganic Arsenic	PCB Congeners	Dioxins and Furans	Lipids	Field Split	EPA Split
Mussels (continued)											
SR	SR-MU-C001-ST	9	X	X	X	X	X	X	X		
SR	SR-MU-C002-ST	6	X	X	X	X	X	X	X		
SR	SR-MU-C003-ST	4	X	X	X	X	X	X	X		X
SR	SR-MU-C004-ST	4	X	X	X	X	X	X	X	X	
SR	SR-MU-C005-ST	5	X	X	X	X	X	X	X		
SR	SR-MU-C006-ST	8	X	X	X	X	X		X		
Crayfish											
A2	A2-CR-C001-PB	5	X	X	X	X	X	X	X		
A2	A2-CR-C001-CS	5	X	X							
A2	A2-CR-C002-PB	5	X	X	X	X	X	X	X		
A2	A2-CR-C002-CS	5	X	X							
A2	A2-CR-C003-PB	5	X	X	X	X	X	X	X	X	
A2	A2-CR-C003-CS	5	X	X						X	
A2	A2-CR-C004-PB	5	X	X	X	X	X	X	X		
A2	A2-CR-C004-CS	5	X	X							
A2	A2-CR-C005-PB	5	X	X	X	X	X	X	X		X
A2	A2-CR-C005-CS	5	X	X							X
A2	A2-CR-C006-PB	5	X	X	X	X	X	X	X		
A2	A2-CR-C006-CS	5	X	X							
A3	A3-CR-C001-WB	5	X	X							X
A3	A3-CR-C002-WB	5	X	X							
A3	A3-CR-C003-WB	4	X	X							
A3	A3-CR-C004-WB	5	X	X							
A3	A3-CR-C005-WB	4	X	X							
A3	A3-CR-C006-WB	4	X	X							
A4	A4-CR-C001-WB	4	X	X							
A4	A4-CR-C002-WB	5	X	X							
A4	A4-CR-C003-WB	5	X	X							
A4	A4-CR-C004-WB	5	X	X							
A4	A4-CR-C005-WB	5	X	X							X
A4	A4-CR-C006-WB	5	X	X						X	

Table 2-5. Chemicals Analyzed for Each Composite

Area	Composite ID	Number of Organisms Composited	TAL Metals	Percent Moisture	Methyl Mercury	Inorganic Arsenic	PCB Congeners	Dioxins and Furans	Lipids	Field Split	EPA Split
Crayfish (continued)											
A5	A5-CR-C001-PB	5	X	X	X	X	X	X	X		
A5	A5-CR-C001-CS	5	X	X							
A5	A5-CR-C002-PB	2	X	X	X	X	X	X	X		
A5	A5-CR-C002-CS	2	X	X							
A5	A5-CR-C003-PB	2	X	X	X	X	X	X	X	X	X
A5	A5-CR-C003-CS	2	X	X						X	X
A5	A5-CR-C004-PB	2	X	X	X	X	X	X	X		
A5	A5-CR-C004-CS	2	X	X							
A5	A5-CR-C005-PB	2	X	X	X	X	X	X	X		
A5	A5-CR-C005-CS	2	X	X							
A5	A5-CR-C006-PB	2	X	X	X	X	X	X	X		
A5	A5-CR-C006-CS	2	X	X							
A6	A6-CR-C001-PB	3	X	X	X	X	X	X	X	X	
A6	A6-CR-C001-CS	3	X	X						X	
A6	A6-CR-C002-PB	5	X	X	X	X	X	X	X		X
A6	A6-CR-C002-CS	5	X	X							X
A6	A6-CR-C003-PB	2	X	X	X	X	X	X	X		
A6	A6-CR-C003-CS	2	X	X							
A6	A6-CR-C004-PB	2	X	X	X	X	X	X	X		
A6	A6-CR-C004-CS	2	X	X							
A6	A6-CR-C005-PB	5	X	X	X	X	X	X	X		
A6	A6-CR-C005-CS	5	X	X							
A6	A6-CR-C006-PB	3	X	X	X	X	X	X	X		
A6	A6-CR-C006-CS	3	X	X							
RL	RL-CR-C001-PB	10	X	X	X	X	X	X	X		
RL	RL-CR-C001-CS	10	X	X							
RL	RL-CR-C002-PB	7	X	X	X	X	X	X	X		
RL	RL-CR-C002-CS	7	X	X							
RL	RL-CR-C003-PB	6	X	X	X	X	X	X	X		
RL	RL-CR-C003-CS	6	X	X							
RL	RL-CR-C004-PB	6	X	X	X	X	X	X	X		X
RL	RL-CR-C004-CS	6	X	X							X
RL	RL-CR-C005-PB	8	X	X	X	X	X	X	X	X	
RL	RL-CR-C005-CS	8	X	X						X	
RL	RL-CR-C006-PB	5	X	X	X	X	X	X	X		
RL	RL-CR-C006-CS	5	X	X							

Table 2-5. Chemicals Analyzed for Each Composite

Area	Composite ID	Number of Organisms Composited	TAL Metals	Percent Moisture	Methyl Mercury	Inorganic Arsenic	PCB Congeners	Dioxins and Furans	Lipids	Field Split	EPA Split
Crayfish (continued)											
SR	SR-CR-C001-PB	3	X	X	X	X	X	X	X		
SR	SR-CR-C001-CS	3	X	X							
SR	SR-CR-C002-PB	3	X	X	X	X	X	X	X		
SR	SR-CR-C002-CS	3	X	X							
SR	SR-CR-C003-PB	3	X	X	X	X	X	X	X		
SR	SR-CR-C003-CS	3	X	X							
SR	SR-CR-C004-PB	2	X	X	X	X	X	X	X		
SR	SR-CR-C004-CS	2	X	X							
SR	SR-CR-C005-PB	6	X	X	X	X	X	X	X		
SR	SR-CR-C005-CS	6	X	X							
SR	SR-CR-C006-PB	4	X	X	X	X	X	X	X		X
SR	SR-CR-C006-CS	4	X	X							X
Clams											
A6	A6-CL-C001-ST	125	X	X	X	X	X	X	X		

Notes:

RL - Rebecca Lake reference area (samples collected at Buffalo Lake reference area)

SR - Sanpoil River reference area

TAL - target analyte list: aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc

Table 2-6. Analytical Methods, Target Sample Mass, and Analysis Priority

	Sample Preparation		Quantitative Analysis			Target Sample Mass[b] (g)		Analysis Priority	
Analyte	Protocol	Procedure	Protocol	Procedure	Holding Time[a]	BERA[c]	BERA and HHRA[d]	BERA[c]	BERA and HHRA[d]
TAL metals[e]	ALS SOP MET-TDIG (PSEP)	Acid digestion	EPA 6010C, EPA 6020A	ICP-MS, ICP-AES	1 year at -20°C	2	2	1	1
Total mercury	ALS SOP MET 1631	Method (acid) digestion	EPA 1631E	CVAFS		1.5	1.5	2	2
Methyl mercury	ALS SOP MET 1630T	Method (alcohol) digestion	EPA 1630M			NA	1.5	NA	3
Arsenic - inorganic	ALS SOP MET 1632	Method (acid) digestion	EPA 1632A	HG-QFAAS		NA	3	NA	4
PCB congeners	EPA 1668A	Method extraction	EPA 1668A	HRGC/HRMS		NA	10	NA	5
Dioxins/furans	EPA 1613B	Method extraction	EPA 1613B			NA	10	NA	6
Percent moisture	ALS SOP MET-TISP	Freeze-dry/ gravimetric	ALS SOP MET-TISP	Freeze-dry/ gravimetric		NA[f]	NA[f]	1	1
Percent lipids	EPA 1668A		EPA 1668A			NA	NA[g]	NA	5

Notes:

Sample masses do not include additional mass for field splits or laboratory duplicates.

[a] Holding times are the same as those in the QAPP (Exponent et al. 2016) except for TAL metals, which was changed from 6 months to 1 year as described in Section 3.2 of this data summary report.

[b] Based on wet weight. The target sample size listed achieves the reporting limits and lowest quantitation limits listed in the QAPP (Exponent et al. 2016).

[c] Crayfish and mussels collected at locations for baseline ecological risk assessment (BERA).

[d] Crayfish and mussels collected at locations for BERA and human health risk assessment (HHRA).

[e] Except mercury

[f] Percent moisture was analyzed with TAL metals; no additional sample mass was required.

[g] Percent lipids was analyzed with PCB congeners; no additional sample mass was required.

ALS - ALS Environmental
CVAFS - cold vapor atomic fluorescence spectrometry
HG-QFAAS - hydride generation - quartz furnace atomic adsorption spectrometry
HRGC/HRMS - high resolution gas chromatography/high resolution mass spectrometry
ICP-AES - inductively-coupled plasma - atomic emission spectrometry
ICP-MS - inductively-coupled plasma - mass spectrometry
NA - not applicable
PSEP - Puget Sound Estuary Program
SOP - standard operating procedure
TAL - target analyte list

Table 2-7. TAL and ACGs

Analyte	Risk Based Concentrations (RBCs) Human Health[a,b]	Wildlife[c]	Wildlife RBC/5[b]	Laboratory MRL[d]	MDL[d]	ACG[b]
Conventional Parameters						
Percent moisture	na	na	na	na	na	na
Percent lipids	na	na	na	na	na	na
Metals/Metalloids (mg/kg-ww)						
Aluminum	17	11.5	2.3	0.4	0.04	2.3
Antimony	0.0069	0.35	0.070	0.01	0.0004	0.01
Arsenic - total	0.0024	2.8	0.56	0.02	0.004	0.02
Arsenic - inorganic	0.0024	na	na	0.004	0.0014	0.004
Barium	3.4	259	52	0.01	0.001	3.4
Beryllium	0.034	3.2	0.63	0.004	0.0006	0.034
Cadmium	0.017	1.8	0.37	0.004	0.0004	0.017
Calcium	NA	na	na	0.8	0.4	0.8
Chromium	26	3.3	0.66	0.04	0.004	0.66
Cobalt	0.0051	9.5	1.9	0.004	0.0006	0.0051
Copper	0.69	5.0	1.0	0.02	0.004	0.69
Iron	12	na	na	0.4	0.2	12
Lead	NA	2.0	0.41	0.004	0.0001	0.41
Magnesium	NA	na	na	0.4	0.12	0.4
Manganese	2.4	222	44	0.01	0.0016	2.4
Mercury	NA	na	na	0.0002	0.000016	0.0002
Methyl mercury	0.0017	0.010	0.0020	0.002	0.0006	0.002
Nickel	0.34	8.3	1.7	0.04	0.004	0.34
Potassium	NA	na	na	4	1.8	4
Selenium	0.086	0.36	0.072	0.2	0.04	0.2
Silver	0.086	2.5	0.50	0.004	0.0012	0.086
Sodium	NA	na	na	4	0.4	4
Thallium	0.00017	0.044	0.009	0.004	0.00018	0.004
Vanadium	0.086	0.43	0.085	0.04	0.002	0.085
Zinc	5.1	82	16	0.1	0.02	5.1
PCBs (µg/kg-ww)[e]						
PCB TEQ	2.4E-06[f]	NA	NA	1.5E-08 - 5.0E-05[g]	EDL[h]	MRL
Total PCBs[i]	NA	NA	NA	0.0005-0.002	EDL[h]	MRL
Dioxins/Furans (ng/kg-ww)[e]						
Dioxin/furan TEQ	0.0024[j]	NA	NA	0.0015 - 2.5[k]	EDL[h]	MRL

Notes:

[a] Lowest fish risk-based concentrations (RBCs) for human health are based on exposure assumptions provided by EPA in the HHRA work plan (SRC 2009, Table 5-11). RBCs assume an adult shellfish ingestion rate of 175 g/day and the child shellfish ingestion rate is assumed to be half adult rate (i.e. 87.5 g/day) per EPA (SRC 2009, Table 5-11, note 7). Toxicity values reflect 2016 EPA Regional Screening Level values.

[b] Analytical concentration goals (ACGs) represent the lowest RBC value for human health or 1/5th of the wildlife RBC. If the lowest RBC is lower than the MRL, the MRL will be used as the ACG. The lowest RBC is shaded.

[c] Wildlife RBCs were derived from the exposure factors and toxicity reference values (TRVs) provided in the SLERA (TAI 2010). TRVs for aluminum and thallium were obtained from Sample et al. (1996). The no observed adverse effect level (NOAEL) was used as the TRV and the body weight (BW) and food ingestion rate (FIR) for the most sensitive mammalian (i.e., mink) or avian (i.e., spotted sandpiper) receptor were used to calculate the RBC, according to the following equation:

Wildlife RBC (mg/kg-wet weight) = (TRV x BW) / (FIR)

Where: TRV - Toxicity reference value (mg/kg-day)
BW - Body weight (kg)
FIR - Food ingestion rate (kg/d-wet)

[d] Method reporting limits (MRLs) and method detection limits (MDLs) for metals were obtained from ALS. MRLs for PCBs and dioxins/furans were obtained from Vista Analytical. All MRLs and MDLs are based on wet weight (ww).

[e] Values in the MRL column represent the range for quantitation limits (QL) based on analysis of 10 grams ww of sample. QLs by congener are listed in Table A7-5 of the QAPP (Exponent et al. 2016). Data were reported to the sample-specific estimated detection limit (EDL), which is typically 2 to 5 times lower than the QL.

[f] Polychlorinated biphenyl (PCB) toxic equivalent (TEQ) calculated as the sum of dioxin-like PCB congeners adjusted using mammalian toxic equivalency factors (TEFs) (Van den Berg et al. 2006).

[g] PCB TEQ MRLs represent the range of QLs for dioxin-like PCB congeners adjusted using mammalian TEFs (Van den Berg et al. 2006)

[h] The EDL is sample-specific and calculated at the time of analysis.

[i] Total PCBs were calculated as the sum of 209 congeners, including non-detected values at one-half the detection limit (DL). If no constituents are detected, the total concentration will be flagged as non-detected and represented by the highest DL.

[j] Dioxin/furan TEQ is calculated as the sum of congeners adjusted using mammalian TEFs (Van den Berg et al. 2006). TEQs were calculated using the sum of the weighted detects and the weighted non-detects at one-half the DL.

[k] Dioxin/furan TEQ MRLs represent the range of QLs for congeners adjusted using mammalian TEFs (Van den Berg et al. 2006).

na - not available
NA - not applicable
TAL - target analyte list

Table 4-1. Summary of Metal/Metalloid Data Qualifiers Applied to Equipment Blank Data

Analyte	Number of Samples Analyzed	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags		Count of Accepted Results Validator Flags		Laboratory Flags, % of Accepted Results		Validator Flags, % of Accepted Results	
					J	U	J	U	J	U	J	U
Aluminum	15	0 (0%)	15 (100%)	7	8	0	8	0	53	0	53	0
Antimony	15	0 (0%)	15 (100%)	1	0	14	0	14	0	93	0	93
Arsenic	15	0 (0%)	15 (100%)	0	0	15	0	15	0	100	0	100
Barium	15	0 (0%)	15 (100%)	6	5	4	5	4	33	27	33	27
Beryllium	15	0 (0%)	15 (100%)	0	0	15	0	15	0	100	0	100
Cadmium	15	0 (0%)	15 (100%)	1	2	12	2	12	13	80	13	80
Calcium	15	0 (0%)	15 (100%)	9	6	0	6	0	40	0	40	0
Chromium	15	0 (0%)	15 (100%)	1	11	3	11	3	73	20	73	20
Cobalt	15	0 (0%)	15 (100%)	0	1	14	1	14	7	93	7	93
Copper	15	0 (0%)	15 (100%)	15	0	0	0	0	0	0	0	0
Iron	15	0 (0%)	15 (100%)	0	13	2	13	2	87	13	87	13
Lead	15	0 (0%)	15 (100%)	0	9	6	9	6	60	40	60	40
Magnesium	15	0 (0%)	15 (100%)	14	1	0	1	0	7	0	7	0
Manganese	15	0 (0%)	15 (100%)	9	6	0	6	0	40	0	40	0
Mercury	15	0 (0%)	15 (100%)	6	9	0	9	0	60	0	60	0
Nickel	15	0 (0%)	15 (100%)	2	5	8	5	8	33	53	33	53
Potassium	15	0 (0%)	15 (100%)	0	1	14	1	14	7	93	7	93
Selenium	15	0 (0%)	15 (100%)	0	0	15	0	15	0	100	0	100
Silver	15	0 (0%)	15 (100%)	0	1	14	1	14	7	93	7	93
Sodium	15	0 (0%)	15 (100%)	0	4	11	4	11	27	73	27	73
Thallium	15	0 (0%)	15 (100%)	0	0	15	0	15	0	100	0	100
Vanadium	15	0 (0%)	15 (100%)	0	0	15	0	15	0	100	0	100
Zinc	15	0 (0%)	15 (100%)	2	13	0	13	0	87	0	87	0

Notes:

Data qualifiers:

Laboratory

J The result is an estimated value that was detected outside the quantitation range.

U The analyte was analyzed for, but was not detected at or above the method reporting limit/method detection limit (MRL/MDL).

Validator

J Quantitation is approximate due to limitations identified during the QA review (data validation).

U The analyte was not detected at or above the associated detection limit.

Table 4-2. Summary of Data Qualifiers Applied to Mussel Data

Analyte	Number of Samples Analyzed	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags						Count of Accepted Results Validator Flags						Laboratory Flags, % of Accepted Results						Validator Flags, % of Accepted Results					
					B	D	EMPC	J	J, B	U	EMPC	J	J-	U	U*	UJ	B	D	EMPC	J	J, B	U	EMPC	J	J-	U	U*	UJ
Metals/Metalloids																												
Aluminum	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Antimony	45	0 (0%)	45 (100%)	5	0	0	0	34	0	0	0	10	0	0	30	0	0	0	0	76	0	0	0	22	0	0	67	0
Arsenic	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barium	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beryllium	45	0 (0%)	45 (100%)	24	0	0	0	21	0	0	0	21	0	0	0	0	0	0	0	47	0	0	0	47	0	0	0	0
Cadmium	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calcium	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cobalt	45	0 (0%)	45 (100%)	43	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
Copper	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inorganic arsenic	27	0 (0%)	27 (100%)	18	0	0	0	0	0	0	0	0	3	0	6	0	0	0	0	0	0	0	0	0	11	0	22	0
Iron	45	0 (0%)	45 (100%)	32	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	29	0	0	0
Lead	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magnesium	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manganese	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl mercury	27	0 (0%)	27 (100%)	15	0	0	0	12	0	0	0	12	0	0	0	0	0	0	0	44	0	0	0	44	0	0	0	0
Nickel	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potassium	45	0 (0%)	45 (100%)	35	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0
Selenium	45	0 (0%)	45 (100%)	26	0	0	0	19	0	0	0	19	0	0	0	0	0	0	0	42	0	0	0	42	0	0	0	0
Silver	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sodium	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thallium	45	0 (0%)	45 (100%)	21	0	0	0	19	0	3	0	9	0	3	12	0	0	0	0	42	0	7	0	20	0	7	27	0
Vanadium	45	0 (0%)	45 (100%)	42	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0
Zinc	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conventional Parameters																												
Lipids	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total solids	45	0 (0%)	45 (100%)	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB Congeners																												
PCB 1	25	0 (0%)	25 (100%)	9	0	0	1	11	0	4	1	11	0	3	0	1	0	0	4	44	0	16	4	44	0	12	0	4
PCB 2	25	0 (0%)	25 (100%)	9	0	0	4	4	0	8	4	4	0	8	0	0	0	0	16	16	0	32	16	16	0	32	0	0
PCB 3	25	0 (0%)	25 (100%)	9	0	0	6	8	0	2	6	8	0	2	0	0	0	0	24	32	0	8	24	32	0	8	0	0
PCB 4/10	25	0 (0%)	25 (100%)	12	0	0	1	4	0	8	1	4	0	8	0	0	0	0	4	16	0	32	4	16	0	32	0	0
PCB 5/8	25	0 (0%)	25 (100%)	22	0	0	2	1	0	0	2	1	0	0	0	0	0	0	8	4	0	0	8	4	0	0	0	0
PCB 6	25	0 (0%)	25 (100%)	21	0	0	2	0	0	2	2	0	0	2	0	0	0	0	8	0	0	8	8	0	0	8	0	0
PCB 7/9	25	0 (0%)	25 (100%)	9	0	0	0	0	0	16	0	0	0	16	0	0	0	0	0	0	0	64	0	0	0	64	0	0
PCB 11	25	0 (0%)	25 (100%)	0	25	0	0	0	0	0	0	0	0	0	6	0	100	0	0	0	0	0	0	0	0	0	24	0
PCB 12/13	25	0 (0%)	25 (100%)	9	0	0	2	7	0	7	2	7	0	7	0	0	0	0	8	28	0	28	8	28	0	28	0	0
PCB 14	25	0 (0%)	25 (100%)	0	0	0	0	3	0	22	0	3	0	22	0	0	0	0	0	12	0	88	0	12	0	88	0	0
PCB 15	25	0 (0%)	25 (100%)	23	0	0	2	0	0	0	2	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0
PCB 16/32	25	0 (0%)	25 (100%)	10	15	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0
PCB 17	25	0 (0%)	25 (100%)	16	9	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0
PCB 18	25	0 (0%)	25 (100%)	24	0	1	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
PCB 19	25	0 (0%)	25 (100%)	24	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0
PCB 20/21/33	25	0 (0%)	25 (100%)	18	7	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0
PCB 22	25	0 (0%)	25 (100%)	18	7	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0
PCB 23	25	0 (0%)	25 (100%)	9	0	0	1	3	0	12	1	3	0	12	0	0	0	0	4	12	0	48	4	12	0	48	0	0
PCB 24/27	25	0 (0%)	25 (100%)	23	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0
PCB 25	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 26	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 28	25	0 (0%)	25 (100%)	18	7	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0
PCB 29	25	0 (0%)	25 (100%)	9	0	0	1	13	0	2	1	13	0	2	0	0	0	0	4	52	0	8	4	52	0	8	0	0
PCB 30	25	0 (0%)	25 (100%)	9	0	0	0	0	0	16	0	0	0	16	0	0	0	0	0	0	0	64	0	0	0	64	0	0
PCB 31	25	0 (0%)	25 (100%)	16	9	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0
PCB 34	25	0 (0%)	25 (100%)	10	0	0	1	14	0	0	1	14	0	0	0	0	0	0	4	56	0	0	4	56	0	0	0	0

Table 4-2. Summary of Data Qualifiers Applied to Mussel Data

Analyte	Number of Samples Analyzed	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags						Count of Accepted Results Validator Flags						Laboratory Flags, % of Accepted Results						Validator Flags, % of Accepted Results					
					B	D	EMPC	J	J, B	U	EMPC	J	J-	U	U*	UJ	B	D	EMPC	J	J, B	U	EMPC	J	J-	U	U*	UJ
PCB Congeners (continued)																												
PCB 35	25	0 (0%)	25 (100%)	9	0	0	0	14	0	2	0	14	0	2	0	0	0	0	0	56	0	8	0	56	0	8	0	0
PCB 36	25	0 (0%)	25 (100%)	0	0	0	0	7	0	18	0	7	0	18	0	0	0	0	0	28	0	72	0	28	0	72	0	0
PCB 37	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 38	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 39	25	0 (0%)	25 (100%)	0	0	0	1	13	0	11	1	13	0	11	0	0	0	0	4	52	0	44	4	52	0	44	0	0
PCB 40	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 41/64/71/ 72	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 42/59	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 43/49	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 44	25	0 (0%)	25 (100%)	23	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0
PCB 45	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 46	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 47	25	0 (0%)	25 (100%)	6	19	0	0	0	0	0	0	0	0	0	0	0	76	0	0	0	0	0	0	0	0	0	0	0
PCB 48/75	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 50	25	0 (0%)	25 (100%)	9	0	0	2	13	0	1	2	13	0	1	0	0	0	0	8	52	0	4	8	52	0	4	0	0
PCB 51	25	0 (0%)	25 (100%)	16	9	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0
PCB 52/69	25	0 (0%)	25 (100%)	23	2	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
PCB 53	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 54	25	0 (0%)	25 (100%)	10	0	0	3	12	0	0	3	12	0	0	0	0	0	0	12	48	0	0	12	48	0	0	0	0
PCB 55	25	0 (0%)	25 (100%)	10	0	0	1	14	0	0	1	14	0	0	0	0	0	0	4	56	0	0	4	56	0	0	0	0
PCB 56/60	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 57	25	0 (0%)	25 (100%)	9	0	0	1	15	0	0	1	15	0	0	0	0	0	0	4	60	0	0	4	60	0	0	0	0
PCB 58	25	0 (0%)	25 (100%)	0	0	0	3	21	0	1	3	21	0	1	0	0	0	0	12	84	0	4	12	84	0	4	0	0
PCB 61/70	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 62	25	0 (0%)	25 (100%)	0	0	0	0	9	0	16	0	9	0	16	0	0	0	0	0	36	0	64	0	36	0	64	0	0
PCB 63	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 65	25	0 (0%)	25 (100%)	1	0	0	0	8	0	16	0	8	0	16	0	0	0	0	0	32	0	64	0	32	0	64	0	0
PCB 66/76	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 67	25	0 (0%)	25 (100%)	19	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	24	0	0	0	24	0	0	0	0
PCB 68	25	0 (0%)	25 (100%)	16	0	0	0	9	0	0	0	9	0	0	0	0	0	0	0	36	0	0	0	36	0	0	0	0
PCB 73	25	0 (0%)	25 (100%)	1	0	0	0	8	0	16	0	8	0	16	0	0	0	0	0	32	0	64	0	32	0	64	0	0
PCB 74	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 77	25	0 (0%)	25 (100%)	20	0	0	1	4	0	0	1	4	0	0	0	0	0	0	4	16	0	0	4	16	0	0	0	0
PCB 78	25	0 (0%)	25 (100%)	0	0	0	0	1	0	24	0	1	0	24	0	0	0	0	0	4	0	96	0	4	0	96	0	0
PCB 79	25	0 (0%)	25 (100%)	18	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	28	0	0	0	28	0	0	0	0
PCB 80	25	0 (0%)	25 (100%)	0	0	0	0	0	0	25	0	0	0	25	0	0	0	0	0	0	0	100	0	0	0	100	0	0
PCB 81	25	0 (0%)	25 (100%)	3	0	0	2	20	0	0	2	20	0	0	0	0	0	0	8	80	0	0	8	80	0	0	0	0
PCB 82	25	0 (0%)	25 (100%)	24	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0
PCB 83	25	0 (0%)	25 (100%)	0	0	0	1	4	0	20	1	4	0	20	0	0	0	0	4	16	0	80	4	16	0	80	0	0
PCB 84/92	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 85/116	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 86	25	0 (0%)	25 (100%)	7	0	0	0	5	0	13	0	5	0	13	0	0	0	0	0	20	0	52	0	20	0	52	0	0
PCB 87/117/125	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 88/91	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 89	25	0 (0%)	25 (100%)	10	0	0	4	11	0	0	4	11	0	0	0	0	0	0	16	44	0	0	16	44	0	0	0	0
PCB 90/101	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 93	25	0 (0%)	25 (100%)	0	0	0	0	0	0	25	0	0	0	25	0	0	0	0	0	0	0	100	0	0	0	100	0	0
PCB 94	25	0 (0%)	25 (100%)	10	0	0	0	15	0	0	0	15	0	0	0	0	0	0	0	60	0	0	0	60	0	0	0	0
PCB 95/98/102	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 96	25	0 (0%)	25 (100%)	10	0	0	4	11	0	0	4	11	0	0	0	0	0	0	16	44	0	0	16	44	0	0	0	0
PCB 97	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 100	25	0 (0%)	25 (100%)	24	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0
PCB 99	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 103	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 104	25	0 (0%)	25 (100%)	0	0	0	3	14	0	8	3	14	0	8	0	0	0	0	12	56	0	32	12	56	0	32	0	0

Table 4-2. Summary of Data Qualifiers Applied to Mussel Data

					Count of Accepted Results Laboratory Flags						Count of Accepted Results Validator Flags						Laboratory Flags, % of Accepted Results						Validator Flags, % of Accepted Results					
Analyte	Number of Samples Analyzed	Rejected Results	Accepted Results	Count of Results with No Flags	B	D	EMPC	J	J, B	U	EMPC	J	J-	U	U*	UJ	B	D	EMPC	J	J, B	U	EMPC	J	J-	U	U*	UJ
PCB Congeners (continued)																												
PCB 105	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 106/118	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 107/109	25	0 (0%)	25 (100%)	21	0	0	1	3	0	0	1	3	0	0	0	0	0	0	4	12	0	0	4	12	0	0	0	0
PCB 108/112	25	0 (0%)	25 (100%)	17	0	0	1	7	0	0	1	7	0	0	0	0	0	0	4	28	0	0	4	28	0	0	0	0
PCB 110	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 111/115	25	0 (0%)	25 (100%)	8	0	0	2	11	0	4	2	11	0	4	0	0	0	0	8	44	0	16	8	44	0	16	0	0
PCB 113	25	0 (0%)	25 (100%)	0	0	0	0	0	0	25	0	0	0	25	0	0	0	0	0	0	0	100	0	0	0	100	0	0
PCB 114	25	0 (0%)	25 (100%)	12	0	0	1	12	0	0	1	12	0	0	0	0	0	0	4	48	0	0	4	48	0	0	0	0
PCB 119	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 120	25	0 (0%)	25 (100%)	0	0	0	0	13	0	12	0	13	0	12	0	0	0	0	0	52	0	48	0	52	0	48	0	0
PCB 121	25	0 (0%)	25 (100%)	0	0	0	0	0	0	25	0	0	0	25	0	0	0	0	0	0	0	100	0	0	0	100	0	0
PCB 122	25	0 (0%)	25 (100%)	1	0	0	2	18	0	4	2	18	0	4	0	0	0	0	8	72	0	16	8	72	0	16	0	0
PCB 123	25	0 (0%)	25 (100%)	6	0	0	1	18	0	0	1	18	0	0	0	0	0	0	4	72	0	0	4	72	0	0	0	0
PCB 124	25	0 (0%)	25 (100%)	20	0	0	1	4	0	0	1	4	0	0	0	0	0	0	4	16	0	0	4	16	0	0	0	0
PCB 126	25	0 (0%)	25 (100%)	1	0	0	0	18	0	6	0	18	0	6	0	0	0	0	0	72	0	24	0	72	0	24	0	0
PCB 127	25	0 (0%)	25 (100%)	0	0	0	1	0	0	24	1	0	0	24	0	0	0	0	4	0	0	96	4	0	0	96	0	0
PCB 128/162	25	0 (0%)	25 (100%)	24	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0
PCB 129	25	0 (0%)	25 (100%)	19	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	24	0	0	0	24	0	0	0	0
PCB 130	25	0 (0%)	25 (100%)	24	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0
PCB 131/133	25	0 (0%)	25 (100%)	15	0	0	2	8	0	0	2	8	0	0	0	0	0	0	8	32	0	0	8	32	0	0	0	0
PCB 132/161	25	0 (0%)	25 (100%)	24	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0
PCB 134/143	25	0 (0%)	25 (100%)	18	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	28	0	0	0	28	0	0	0	0
PCB 135	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 136	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 137	25	0 (0%)	25 (100%)	21	0	0	1	3	0	0	1	3	0	0	0	0	0	0	4	12	0	0	4	12	0	0	0	0
PCB 138/163/164	25	0 (0%)	25 (100%)	19	6	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0
PCB 139/149	25	0 (0%)	25 (100%)	19	6	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0
PCB 140	25	0 (0%)	25 (100%)	1	0	0	9	13	0	2	9	13	0	2	0	0	0	0	36	52	0	8	36	52	0	8	0	0
PCB 141	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 142	25	0 (0%)	25 (100%)	0	0	0	0	2	0	23	0	2	0	23	0	0	0	0	0	8	0	92	0	8	0	92	0	0
PCB 144	25	0 (0%)	25 (100%)	18	0	0	2	5	0	0	2	5	0	0	0	0	0	0	8	20	0	0	8	20	0	0	0	0
PCB 145	25	0 (0%)	25 (100%)	0	0	0	2	5	0	18	2	5	0	18	0	0	0	0	8	20	0	72	8	20	0	72	0	0
PCB 146/165	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 147	25	0 (0%)	25 (100%)	21	0	0	4	0	0	0	4	0	0	0	0	0	0	0	16	0	0	0	16	0	0	0	0	0
PCB 148	25	0 (0%)	25 (100%)	0	0	0	5	8	0	12	5	8	0	12	0	0	0	0	20	32	0	48	20	32	0	48	0	0
PCB 150	25	0 (0%)	25 (100%)	0	0	0	5	16	0	4	5	16	0	4	0	0	0	0	20	64	0	16	20	64	0	16	0	0
PCB 151	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 152	25	0 (0%)	25 (100%)	0	0	0	1	12	0	12	1	12	0	12	0	0	0	0	4	48	0	48	4	48	0	48	0	0
PCB 153	25	0 (0%)	25 (100%)	16	9	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0
PCB 154	25	0 (0%)	25 (100%)	23	0	0	2	0	0	0	2	0	0	0	0	0	0	0	8	0	0	0	8	0	0	0	0	0
PCB 155	25	0 (0%)	25 (100%)	0	0	0	5	15	0	5	5	15	0	5	0	0	0	0	20	60	0	20	20	60	0	20	0	0
PCB 156	25	0 (0%)	25 (100%)	21	0	0	1	3	0	0	1	3	0	0	0	0	0	0	4	12	0	0	4	12	0	0	0	0
PCB 157	25	0 (0%)	25 (100%)	6	0	0	0	19	0	0	0	19	0	0	0	0	0	0	0	76	0	0	0	76	0	0	0	0
PCB 158/160	25	0 (0%)	25 (100%)	18	0	0	2	5	0	0	2	5	0	0	0	0	0	0	8	20	0	0	8	20	0	0	0	0
PCB 159	25	0 (0%)	25 (100%)	4	0	0	2	2	0	17	2	2	0	17	0	0	0	0	8	8	0	68	8	8	0	68	0	0
PCB 166	25	0 (0%)	25 (100%)	0	0	0	3	18	0	4	3	18	0	4	0	0	0	0	12	72	0	16	12	72	0	16	0	0
PCB 167	25	0 (0%)	25 (100%)	21	0	0	1	3	0	0	1	3	0	0	0	0	0	0	4	12	0	0	4	12	0	0	0	0
PCB 168	25	0 (0%)	25 (100%)	0	0	0	2	8	0	15	2	8	0	15	0	0	0	0	8	32	0	60	8	32	0	60	0	0
PCB 169	25	0 (0%)	25 (100%)	0	0	0	1	23	0	1	1	23	0	1	0	0	0	0	4	92	0	4	4	92	0	4	0	0
PCB 170	25	0 (0%)	25 (100%)	24	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0
PCB 171	25	0 (0%)	25 (100%)	18	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	28	0	0	0	28	0	0	0	0
PCB 172	25	0 (0%)	25 (100%)	20	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	20	0	0	0	20	0	0	0	0
PCB 173	25	0 (0%)	25 (100%)	0	0	0	2	16	0	7	2	16	0	7	0	0	0	0	8	64	0	28	8	64	0	28	0	0
PCB 174	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 175	25	0 (0%)	25 (100%)	4	0	0	2	17	0	2	2	17	0	2	0	0	0	0	8	68	0	8	8	68	0	8	0	0

Table 4-2. Summary of Data Qualifiers Applied to Mussel Data

					Count of Accepted Results Laboratory Flags						Count of Accepted Results Validator Flags						Laboratory Flags, % of Accepted Results						Validator Flags, % of Accepted Results					
Analyte	Number of Samples Analyzed	Rejected Results	Accepted Results	Count of Results with No Flags	B	D	EMPC	J	J, B	U	EMPC	J	J-	U	U*	UJ	B	D	EMPC	J	J, B	U	EMPC	J	J-	U	U*	UJ
PCB Congeners (continued)																												
PCB 176	25	0 (0%)	25 (100%)	18	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	28	0	0	0	28	0	0	0	0
PCB 177	25	0 (0%)	25 (100%)	24	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0
PCB 178	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 179	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 180	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 181	25	0 (0%)	25 (100%)	0	0	0	0	0	0	25	0	0	0	25	0	0	0	0	0	0	0	100	0	0	0	100	0	0
PCB 182/187	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 183	25	0 (0%)	25 (100%)	24	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0
PCB 184	25	0 (0%)	25 (100%)	1	0	0	1	15	0	8	1	15	0	8	0	0	0	0	4	60	0	32	4	60	0	32	0	0
PCB 185	25	0 (0%)	25 (100%)	17	0	0	1	7	0	0	1	7	0	0	0	0	0	0	4	28	0	0	4	28	0	0	0	0
PCB 186	25	0 (0%)	25 (100%)	0	0	0	0	0	0	25	0	0	0	25	0	0	0	0	0	0	0	100	0	0	0	100	0	0
PCB 188	25	0 (0%)	25 (100%)	0	0	0	6	12	0	7	6	12	0	7	0	0	0	0	24	48	0	28	24	48	0	28	0	0
PCB 189	25	0 (0%)	25 (100%)	2	0	0	2	18	0	3	2	18	0	3	0	0	0	0	8	72	0	12	8	72	0	12	0	0
PCB 190	25	0 (0%)	25 (100%)	18	0	0	1	6	0	0	1	6	0	0	0	0	0	0	4	24	0	0	4	24	0	0	0	0
PCB 191	25	0 (0%)	25 (100%)	1	0	0	2	15	0	7	2	15	0	7	0	0	0	0	8	60	0	28	8	60	0	28	0	0
PCB 192	25	0 (0%)	25 (100%)	0	0	0	1	0	0	24	1	0	0	24	0	0	0	0	4	0	0	96	4	0	0	96	0	0
PCB 193	25	0 (0%)	25 (100%)	20	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	20	0	0	0	20	0	0	0	0
PCB 194	25	0 (0%)	25 (100%)	12	10	0	0	0	3	0	0	2	0	0	1	0	40	0	0	0	12	0	0	8	0	0	4	0
PCB 195	25	0 (0%)	25 (100%)	18	0	0	3	4	0	0	3	4	0	0	0	0	0	0	12	16	0	0	12	16	0	0	0	0
PCB 196/203	25	0 (0%)	25 (100%)	18	0	0	1	6	0	0	1	6	0	0	0	0	0	0	4	24	0	0	4	24	0	0	0	0
PCB 197	25	0 (0%)	25 (100%)	2	0	0	2	16	0	5	2	16	0	5	0	0	0	0	8	64	0	20	8	64	0	20	0	0
PCB 198	25	0 (0%)	25 (100%)	2	0	0	2	17	0	4	2	17	0	4	0	0	0	0	8	68	0	16	8	68	0	16	0	0
PCB 199	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 200	25	0 (0%)	25 (100%)	15	0	0	5	5	0	0	5	5	0	0	0	0	0	0	20	20	0	0	20	20	0	0	0	0
PCB 201	25	0 (0%)	25 (100%)	18	0	0	3	2	0	2	3	2	0	2	0	0	0	0	12	8	0	8	12	8	0	8	0	0
PCB 202	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 204	25	0 (0%)	25 (100%)	0	0	0	0	2	0	23	0	2	0	23	0	0	0	0	0	8	0	92	0	8	0	92	0	0
PCB 205	25	0 (0%)	25 (100%)	1	0	0	0	21	0	3	0	21	0	3	0	0	0	0	0	84	0	12	0	84	0	12	0	0
PCB 206	25	0 (0%)	25 (100%)	22	0	0	1	2	0	0	1	2	0	0	0	0	0	0	4	8	0	0	4	8	0	0	0	0
PCB 207	25	0 (0%)	25 (100%)	5	0	0	0	11	2	7	0	13	0	7	0	0	0	0	0	44	8	28	0	52	0	28	0	0
PCB 208	25	0 (0%)	25 (100%)	21	0	0	1	3	0	0	1	3	0	0	0	0	0	0	4	12	0	0	4	12	0	0	0	0
Decachlorobiphenyl	25	0 (0%)	25 (100%)	19	0	0	1	5	0	0	1	5	0	0	0	0	0	0	4	20	0	0	4	20	0	0	0	0
Monochlorobiphenyl homologs	25	0 (0%)	25 (100%)	21	0	0	2	0	0	2	2	0	0	2	0	0	0	0	8	0	0	8	8	0	0	8	0	0
Dichlorobiphenyl homologs	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichlorobiphenyl homologs	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tetrachlorobiphenyl homologs	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentachlorobiphenyl homologs	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexachlorobiphenyl homologs	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heptachlorobiphenyl homologs	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Octachlorobiphenyl homologs	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nonachlorobiphenyl homologs	25	0 (0%)	25 (100%)	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decachlorobiphenyl homologs	25	0 (0%)	25 (100%)	24	0	0	1	0	0	0	1	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0
Dioxins/Furans																												
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	23	0 (0%)	23 (100%)	0	0	0	6	4	0	13	6	4	0	13	0	0	0	0	26	17	0	57	26	17	0	57	0	0
1,2,3,4,6,7,8-Heptachlorodibenzofuran	23	0 (0%)	23 (100%)	0	0	0	0	2	0	21	0	2	0	21	0	0	0	0	0	9	0	91	0	9	0	91	0	0
1,2,3,4,7,8,9-Heptachlorodibenzofuran	23	0 (0%)	23 (100%)	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	100	0	0	0	100	0	0
1,2,3,4,7,8-Hexachlorodibenzodioxin	23	0 (0%)	23 (100%)	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	100	0	0	0	100	0	0
1,2,3,4,7,8-Hexachlorodibenzofuran	23	0 (0%)	23 (100%)	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	100	0	0	0	100	0	0
1,2,3,6,7,8-Hexachlorodibenzodioxin	23	0 (0%)	23 (100%)	0	0	0	1	0	0	22	1	0	0	22	0	0	0	0	4	0	0	96	4	0	0	96	0	0
1,2,3,6,7,8-Hexachlorodibenzofuran	23	0 (0%)	23 (100%)	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	100	0	0	0	100	0	0
1,2,3,7,8,9-Hexachlorodibenzodioxin	23	0 (0%)	23 (100%)	0	0	0	0	1	0	22	0	1	0	22	0	0	0	0	0	4	0	96	0	4	0	96	0	0
1,2,3,7,8,9-Hexachlorodibenzofuran	23	0 (0%)	23 (100%)	0	0	0	0	1	0	22	0	1	0	22	0	0	0	0	0	4	0	96	0	4	0	96	0	0
1,2,3,7,8-Pentachlorodibenzodioxin	23	0 (0%)	23 (100%)	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	100	0	0	0	100	0	0
1,2,3,7,8-Pentachlorodibenzofuran	23	0 (0%)	23 (100%)	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	100	0	0	0	100	0	0
2,3,4,6,7,8-Hexachlorodibenzofuran	23	0 (0%)	23 (100%)	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	100	0	0	0	100	0	0

Table 4-2. Summary of Data Qualifiers Applied to Mussel Data

Analyte	Number of Samples Analyzed	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags						Count of Accepted Results Validator Flags						Laboratory Flags, % of Accepted Results						Validator Flags, % of Accepted Results					
					B	D	EMPC	J	J, B	U	EMPC	J	J-	U	U*	UJ	B	D	EMPC	J	J, B	U	EMPC	J	J-	U	U*	UJ
Dioxins/Furans (continued)																												
2,3,4,7,8-Pentachlorodibenzofuran	23	0 (0%)	23 (100%)	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	100	0	0	0	100	0	0
2,3,7,8-Tetrachlorodibenzodioxin	23	0 (0%)	23 (100%)	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	100	0	0	0	100	0	0
2,3,7,8-Tetrachlorodibenzofuran	23	0 (0%)	23 (100%)	0	0	0	0	0	0	23	0	0	0	23	0	0	0	0	0	0	0	100	0	0	0	100	0	0
Tetrachlorodibenzodioxin (Total)	23	0 (0%)	23 (100%)	0	0	0	0	2	0	21	0	2	0	21	0	0	0	0	0	9	0	91	0	9	0	91	0	0
Tetrachlorodibenzofuran (Total)	23	0 (0%)	23 (100%)	0	0	0	3	1	0	19	3	1	0	19	0	0	0	0	13	4	0	83	13	4	0	83	0	0
Pentachlorodibenzodioxin (Total)	23	0 (0%)	23 (100%)	0	0	0	2	0	0	21	2	0	0	21	0	0	0	0	9	0	0	91	9	0	0	91	0	0
Pentachlorodibenzofuran (Total)	23	0 (0%)	23 (100%)	0	0	0	1	0	0	22	1	0	0	22	0	0	0	0	4	0	0	96	4	0	0	96	0	0
Hexachlorodibenzodioxin (Total)	23	0 (0%)	23 (100%)	1	0	0	1	0	0	21	1	0	0	21	0	0	0	0	4	0	0	91	4	0	0	91	0	0
Hexachlorodibenzofuran (Total)	23	0 (0%)	23 (100%)	0	0	0	0	1	0	22	0	1	0	22	0	0	0	0	0	4	0	96	0	4	0	96	0	0
Heptachlorodibenzodioxin (Total)	23	0 (0%)	23 (100%)	0	0	0	4	8	0	11	4	8	0	11	0	0	0	0	17	35	0	48	17	35	0	48	0	0
Heptachlorodibenzofuran (Total)	23	0 (0%)	23 (100%)	0	0	0	0	3	0	20	0	3	0	20	0	0	0	0	0	13	0	87	0	13	0	87	0	0
Octachlorodibenzodioxin	23	0 (0%)	23 (100%)	0	0	0	7	12	0	4	7	12	0	4	0	0	0	0	30	52	0	17	30	52	0	17	0	0
Octachlorodibenzofuran	23	0 (0%)	23 (100%)	0	0	0	2	2	0	19	2	2	0	19	0	0	0	0	9	9	0	83	9	9	0	83	0	0

Notes:
PCB - polychlorinated biphenyl
Data qualifiers:

Laboratory

B	The compound was also detected in the method blank.
D	Sample was analysed as a dilution.
EMPC	Estimated maximum possible concentration.
J	The result is an estimated value that was detected outside the quantitation range.
J, B	The result is an estimated value that was detected outside the quantitation range. The compound was also detected in the method blank.
U	The analyte was analyzed for, but was not detected at or above the method reporting limit/method detection limit (MRL/MDL).

Validator

EMPC	Chromatographic peaks are present in the expected retention time window; however, the peaks do not meet all of the conditions required for a positive identification. The detection limit represents the maximum possible concentration if the analyte was present.
J	Quantitation is approximate due to limitations identified during the QA review (data validation).
J-	Quantitation is approximate and the result may be biased low.
U	The analyte was not detected at or above the associated detection limit.
U*	The analyte should be considered not detected because it was detected in an associated blank at a similar level.
UJ	This analyte was not detected at or above the associated detection limit. Quantitation is approximate due to limitations identified during the QA review (data validation).

Table 4-3. Summary of Data Qualifiers Applied to Crayfish Data

					Count of Accepted Results Laboratory Flags						Count of Accepted Results Validator Flags								Laboratory Flags, % of Accepted Results						Validator Flags, % of Accepted Results							
Analyte	Number of Samples Analyzed[a]	Rejected Results	Accepted Results	Count of Results with No Flags	B	D	EMPC	J	J, B	U	EMPC	J	J-	J EMPC	J+	U	U*	UJ	B	D	EMPC	J	J, B	U	EMPC	J	J-	J EMPC	J+	U	U*	UJ
Metals/Metalloids																																
Aluminum	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Antimony	81	0 (0%)	81 (100%)	19	0	0	0	42	0	0	0	0	0	0	0	0	62	0	0	0	0	52	0	0	0	0	0	0	0	0	77	0
Arsenic	81	0 (0%)	81 (100%)	80	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
Barium	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beryllium	81	0 (0%)	81 (100%)	36	0	0	0	36	0	9	0	36	0	0	0	9	0	0	0	0	0	44	0	11	0	44	0	0	0	11	0	0
Cadmium	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calcium	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cobalt	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inorganic arsenic	34	0 (0%)	34 (100%)	28	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0
Iron	81	0 (0%)	81 (100%)	71	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0
Lead	81	0 (0%)	81 (100%)	71	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0
Magnesium	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manganese	81	0 (0%)	81 (100%)	65	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0
Mercury	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl mercury	34	0 (0%)	34 (100%)	31	0	0	0	0	0	1	0	2	0	0	0	1	0	0	0	0	0	0	0	3	0	6	0	0	0	3	0	0
Nickel	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potassium	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	81	0 (0%)	81 (100%)	47	0	0	0	34	0	0	0	34	0	0	0	0	0	0	0	0	0	42	0	0	0	42	0	0	0	0	0	0
Silver	81	0 (0%)	81 (100%)	71	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0
Sodium	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thallium	81	0 (0%)	81 (100%)	60	0	0	0	21	0	0	0	8	0	0	0	0	13	0	0	0	0	26	0	0	0	10	0	0	0	0	16	0
Vanadium	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zinc	81	0 (0%)	81 (100%)	71	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0
Conventional Parameters																																
Lipids	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total solids	81	0 (0%)	81 (100%)	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB Congeners																																
PCB 1	34	0 (0%)	34 (100%)	9	0	0	2	20	0	3	2	20	0	0	0	3	0	0	0	0	6	59	0	9	6	59	0	0	0	9	0	0
PCB 2	34	0 (0%)	34 (100%)	6	0	0	0	20	0	8	0	20	0	0	0	8	0	0	0	0	0	59	0	24	0	59	0	0	0	24	0	0
PCB 3	34	0 (0%)	34 (100%)	9	0	0	2	21	0	2	2	21	0	0	0	2	0	0	0	0	6	62	0	6	6	62	0	0	0	6	0	0
PCB 4/10	34	0 (0%)	34 (100%)	21	0	0	3	0	0	10	3	0	0	0	0	10	0	0	0	0	9	0	0	29	9	0	0	0	0	29	0	0
PCB 5/8	34	0 (0%)	34 (100%)	33	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0
PCB 6	34	0 (0%)	34 (100%)	25	0	0	4	0	0	5	4	0	0	0	0	5	0	0	0	0	12	0	0	15	12	0	0	0	0	15	0	0
PCB 7/9	34	0 (0%)	34 (100%)	7	0	0	0	13	0	14	0	13	0	0	0	14	0	0	0	0	0	38	0	41	0	38	0	0	0	41	0	0
PCB 11	34	0 (0%)	34 (100%)	6	28	0	0	0	0	0	0	0	0	0	0	0	4	0	82	0	0	0	0	0	0	0	0	0	0	0	12	0
PCB 12/13	34	0 (0%)	34 (100%)	18	0	0	0	6	0	10	0	6	0	0	0	10	0	0	0	0	0	18	0	29	0	18	0	0	0	29	0	0
PCB 14	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
PCB 15	34	0 (0%)	34 (100%)	30	0	0	0	0	0	4	0	0	0	0	0	4	0	0	0	0	0	0	0	12	0	0	0	0	0	12	0	0
PCB 16/32	34	0 (0%)	34 (100%)	21	13	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 17	34	0 (0%)	34 (100%)	27	7	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 18	34	0 (0%)	34 (100%)	32	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
PCB 19	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 20/21/33	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 22	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 23	34	0 (0%)	34 (100%)	5	0	0	4	9	0	16	4	9	0	0	0	16	0	0	0	0	12	26	0	47	12	26	0	0	0	47	0	0
PCB 24/27	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 25	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 26	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 28	34	0 (0%)	34 (100%)	32	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0
PCB 29	34	0 (0%)	34 (100%)	7	0	0	3	24	0	0	3	24	0	0	0	0	0	0	0	0	9	71	0	0	9	71	0	0	0	0	0	0
PCB 30	34	0 (0%)	34 (100%)	5	0	0	0	0	0	29	0	0	0	0	0	29	0	0	0	0	0	0	0	85	0	0	0	0	0	85	0	0
PCB 31	34	0 (0%)	34 (100%)	27	7	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 34	34	0 (0%)	34 (100%)	22	0	0	1	11	0	0	1	11	0	0	0	0	0	0	0	0	3	32	0	0	3	32	0	0	0	0	0	0
PCB 35	34	0 (0%)	34 (100%)	7	0	0	1	22	0	4	1	22	0	0	0	4	0	0	0	0	3	65	0	12	3	65	0	0	0	12	0	0
PCB 36	34	0 (0%)	34 (100%)	0	0	0	0	4	0	30	0	4	0	0	0	30	0	0	0	0	0	12	0	88	0	12	0	0	0	88	0	0
PCB 37	34	0 (0%)	34 (100%)	33	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0
PCB 38	34	0 (0%)	34 (100%)	33	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0
PCB 39	34	0 (0%)	34 (100%)	0	0	0	0	13	0	21	0	13	0	0	0	21	0	0	0	0	0	38	0	62	0	38	0	0	0	62	0	0
PCB 40	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 41/64/71/ 72	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 42/59	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 43/49	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4-3. Summary of Data Qualifiers Applied to Crayfish Data

Analyte	Number of Samples Analyzed[a]	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags						Count of Accepted Results Validator Flags								Laboratory Flags, % of Accepted Results						Validator Flags, % of Accepted Results							
					B	D	EMPC	J	J, B	U	EMPC	J	J-	J EMPC	J+	U	U*	UJ	B	D	EMPC	J	J, B	U	EMPC	J	J-	J EMPC	J+	U	U*	UJ
PCB Congeners (continued)																																
PCB 44	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 45	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 46	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 47	34	0 (0%)	34 (100%)	6	28	0	0	0	0	0	0	0	0	0	0	0	0	0	82	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 48/75	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 50	34	0 (0%)	34 (100%)	9	0	0	3	22	0	0	3	22	0	0	0	0	0	0	0	0	9	65	0	0	9	65	0	0	0	0	0	0
PCB 51	34	0 (0%)	34 (100%)	29	5	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 52/69	34	0 (0%)	34 (100%)	27	7	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 53	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 54	34	0 (0%)	34 (100%)	19	0	0	0	15	0	0	0	15	0	0	0	0	0	0	0	0	0	44	0	0	0	44	0	0	0	0	0	0
PCB 55	34	0 (0%)	34 (100%)	18	0	0	1	15	0	0	1	15	0	0	0	0	0	0	0	0	3	44	0	0	3	44	0	0	0	0	0	0
PCB 56/60	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 57	34	0 (0%)	34 (100%)	15	0	0	1	18	0	0	1	18	0	0	0	0	0	0	0	0	3	53	0	0	3	53	0	0	0	0	0	0
PCB 58	34	0 (0%)	34 (100%)	0	0	0	3	30	0	1	3	30	0	0	0	1	0	0	0	0	9	88	0	3	9	88	0	0	0	3	0	0
PCB 61/70	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 62	34	0 (0%)	34 (100%)	0	0	0	2	4	0	28	2	4	0	0	0	28	0	0	0	0	6	12	0	82	6	12	0	0	0	82	0	0
PCB 63	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 65	34	0 (0%)	34 (100%)	0	0	0	1	5	0	28	1	5	0	0	0	28	0	0	0	0	3	15	0	82	3	15	0	0	0	82	0	0
PCB 66/76	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 67	34	0 (0%)	34 (100%)	27	0	0	1	6	0	0	1	6	0	0	0	0	0	0	0	0	3	18	0	0	3	18	0	0	0	0	0	0
PCB 68	34	0 (0%)	34 (100%)	29	0	0	1	4	0	0	1	4	0	0	0	0	0	0	0	0	3	12	0	0	3	12	0	0	0	0	0	0
PCB 73	34	0 (0%)	34 (100%)	14	0	0	2	9	0	9	2	9	0	0	0	9	0	0	0	0	6	26	0	26	6	26	0	0	0	26	0	0
PCB 74	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 77	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 78	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
PCB 79	34	0 (0%)	34 (100%)	32	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0
PCB 80	34	0 (0%)	34 (100%)	0	0	0	0	2	0	32	0	2	0	0	0	32	0	0	0	0	0	6	0	94	0	6	0	0	0	94	0	0
PCB 81	34	0 (0%)	34 (100%)	5	0	0	5	24	0	0	5	24	0	0	0	0	0	0	0	0	15	71	0	0	15	71	0	0	0	0	0	0
PCB 82	34	0 (0%)	34 (100%)	32	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	3	3	0	0	3	3	0	0	0	0	0	0
PCB 83	34	0 (0%)	34 (100%)	0	0	0	0	3	0	31	0	3	0	0	0	31	0	0	0	0	0	9	0	91	0	9	0	0	0	91	0	0
PCB 84/92	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 85/116	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 86	34	0 (0%)	34 (100%)	0	0	0	0	8	0	26	0	8	0	0	0	26	0	0	0	0	0	24	0	76	0	24	0	0	0	76	0	0
PCB 87/117/125	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 88/91	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 89	34	0 (0%)	34 (100%)	12	0	0	6	14	0	2	6	14	0	0	0	2	0	0	0	0	18	41	0	6	18	41	0	0	0	6	0	0
PCB 90/101	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 93	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
PCB 94	34	0 (0%)	34 (100%)	13	0	0	4	16	0	1	4	16	0	0	0	1	0	0	0	0	12	47	0	3	12	47	0	0	0	3	0	0
PCB 95/98/102	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 96	34	0 (0%)	34 (100%)	18	0	0	0	16	0	0	0	16	0	0	0	0	0	0	0	0	0	47	0	0	0	47	0	0	0	0	0	0
PCB 97	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 100	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 99	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 103	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 104	34	0 (0%)	34 (100%)	0	0	0	5	24	0	5	5	24	0	0	0	5	0	0	0	0	15	71	0	15	15	71	0	0	0	15	0	0
PCB 105	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 106/118	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 107/109	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 108/112	34	0 (0%)	34 (100%)	22	0	0	3	9	0	0	3	9	0	0	0	0	0	0	0	0	9	26	0	0	9	26	0	0	0	0	0	0
PCB 110	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 111/115	34	0 (0%)	34 (100%)	11	0	0	0	18	0	5	0	18	0	0	0	5	0	0	0	0	0	53	0	15	0	53	0	0	0	15	0	0
PCB 113	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
PCB 114	34	0 (0%)	34 (100%)	32	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	3	3	0	0	3	3	0	0	0	0	0	0
PCB 119	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 120	34	0 (0%)	34 (100%)	3	0	0	1	27	0	3	1	27	0	0	0	3	0	0	0	0	3	79	0	9	3	79	0	0	0	9	0	0
PCB 121	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
PCB 122	34	0 (0%)	34 (100%)	3	0	0	0	12	0	19	0	12	0	0	0	19	0	0	0	0	0	35	0	56	0	35	0	0	0	56	0	0
PCB 123	34	0 (0%)	34 (100%)	23	0	0	2	9	0	0	2	9	0	0	0	0	0	0	0	0	6	26	0	0	6	26	0	0	0	0	0	0
PCB 124	34	0 (0%)	34 (100%)	32	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	3	3	0	0	3	3	0	0	0	0	0	0
PCB 126	34	0 (0%)	34 (100%)	3	0	0	2	27	0	2	2	27	0	0	0	2	0	0	0	0	6	79	0	6	6	79	0	0	0	6	0	0
PCB 127	34	0 (0%)	34 (100%)	0	0	0	0	2	0	32	0	2	0	0	0	32	0	0	0	0	0	6	0	94	0	6	0	0	0	94	0	0
PCB 128/162	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 129	34	0 (0%)	34 (100%)	21	0	0	2	11	0	0	2	11	0	0	0	0	0	0	0	0	6	32	0	0	6	32	0	0	0	0	0	0

Table 4-3. Summary of Data Qualifiers Applied to Crayfish Data

Analyte	Number of Samples Analyzed[a]	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags						Count of Accepted Results Validator Flags								Laboratory Flags, % of Accepted Results						Validator Flags, % of Accepted Results							
					B	D	EMPC	J	J, B	U	EMPC	J	J-	J EMPC	J+	U	U*	UJ	B	D	EMPC	J	J, B	U	EMPC	J	J-	J EMPC	J+	U	U*	UJ
PCB Congeners (continued)																																
PCB 130	34	0 (0%)	34 (100%)	33	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0
PCB 131/133	34	0 (0%)	34 (100%)	29	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	15	0	0	0	15	0	0	0	0	0	0
PCB 132/161	34	0 (0%)	34 (100%)	29	0	0	1	2	0	2	1	2	0	0	0	2	0	0	0	0	3	6	0	6	3	6	0	0	0	6	0	0
PCB 134/143	34	0 (0%)	34 (100%)	18	0	0	0	16	0	0	0	16	0	0	0	0	0	0	0	0	0	47	0	0	0	47	0	0	0	0	0	0
PCB 135	34	0 (0%)	34 (100%)	33	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0
PCB 136	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 137	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 138/163/164	34	0 (0%)	34 (100%)	28	6	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 139/149	34	0 (0%)	34 (100%)	28	6	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 140	34	0 (0%)	34 (100%)	5	0	0	7	19	0	3	7	19	0	0	0	3	0	0	0	0	21	56	0	9	21	56	0	0	0	9	0	0
PCB 141	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 142	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
PCB 144	34	0 (0%)	34 (100%)	32	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	3	3	0	0	3	3	0	0	0	0	0	0
PCB 145	34	0 (0%)	34 (100%)	0	0	0	0	1	0	33	0	1	0	0	0	33	0	0	0	0	0	3	0	97	0	3	0	0	0	97	0	0
PCB 146/165	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 147	34	0 (0%)	34 (100%)	29	0	0	4	1	0	0	4	1	0	0	0	0	0	0	0	0	12	3	0	0	12	3	0	0	0	0	0	0
PCB 148	34	0 (0%)	34 (100%)	1	0	0	3	28	0	2	3	28	0	0	0	2	0	0	0	0	9	82	0	6	9	82	0	0	0	6	0	0
PCB 150	34	0 (0%)	34 (100%)	0	0	0	11	17	0	6	11	17	0	0	0	6	0	0	0	0	32	50	0	18	32	50	0	0	0	18	0	0
PCB 151	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 152	34	0 (0%)	34 (100%)	0	0	0	2	8	0	24	2	8	0	0	0	24	0	0	0	0	6	24	0	71	6	24	0	0	0	71	0	0
PCB 153	34	0 (0%)	34 (100%)	29	5	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 154	34	0 (0%)	34 (100%)	30	0	0	3	1	0	0	3	1	0	0	0	0	0	0	0	0	9	3	0	0	9	3	0	0	0	0	0	0
PCB 155	34	0 (0%)	34 (100%)	0	0	0	10	24	0	0	10	24	0	0	0	0	0	0	0	0	29	71	0	0	29	71	0	0	0	0	0	0
PCB 156	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 157	34	0 (0%)	34 (100%)	32	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	3	3	0	0	3	3	0	0	0	0	0	0
PCB 158/160	34	0 (0%)	34 (100%)	33	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0
PCB 159	34	0 (0%)	34 (100%)	5	0	0	0	1	0	28	0	1	0	0	0	28	0	0	0	0	0	3	0	82	0	3	0	0	0	82	0	0
PCB 166	34	0 (0%)	34 (100%)	2	0	0	1	29	0	2	1	29	0	0	0	2	0	0	0	0	3	85	0	6	3	85	0	0	0	6	0	0
PCB 167	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 168	34	0 (0%)	34 (100%)	1	0	0	4	18	0	11	4	18	0	0	0	11	0	0	0	0	12	53	0	32	12	53	0	0	0	32	0	0
PCB 169	34	0 (0%)	34 (100%)	1	0	0	4	29	0	0	4	29	0	0	0	0	0	0	0	0	12	85	0	0	12	85	0	0	0	0	0	0
PCB 170	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 171	34	0 (0%)	34 (100%)	32	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0
PCB 172	34	0 (0%)	34 (100%)	33	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0
PCB 173	34	0 (0%)	34 (100%)	0	0	0	0	6	0	28	0	6	0	0	0	28	0	0	0	0	0	18	0	82	0	18	0	0	0	82	0	0
PCB 174	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 175	34	0 (0%)	34 (100%)	15	0	0	2	15	0	2	2	15	0	0	0	2	0	0	0	0	6	44	0	6	6	44	0	0	0	6	0	0
PCB 176	34	0 (0%)	34 (100%)	21	0	0	0	13	0	0	0	13	0	0	0	0	0	0	0	0	0	38	0	0	0	38	0	0	0	0	0	0
PCB 177	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 178	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 179	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 180	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 181	34	0 (0%)	34 (100%)	1	0	0	0	3	0	30	0	3	0	0	0	30	0	0	0	0	0	9	0	88	0	9	0	0	0	88	0	0
PCB 182/187	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 183	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 184	34	0 (0%)	34 (100%)	1	0	0	3	23	0	7	3	23	0	0	0	7	0	0	0	0	9	68	0	21	9	68	0	0	0	21	0	0
PCB 185	34	0 (0%)	34 (100%)	21	0	0	0	13	0	0	0	13	0	0	0	0	0	0	0	0	0	38	0	0	0	38	0	0	0	0	0	0
PCB 186	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
PCB 188	34	0 (0%)	34 (100%)	0	0	0	5	26	0	3	5	26	0	0	0	3	0	0	0	0	15	76	0	9	15	76	0	0	0	9	0	0
PCB 189	34	0 (0%)	34 (100%)	22	0	0	2	10	0	0	2	10	0	0	0	0	0	0	0	0	6	29	0	0	6	29	0	0	0	0	0	0
PCB 190	34	0 (0%)	34 (100%)	32	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	3	3	0	0	3	3	0	0	0	0	0	0
PCB 191	34	0 (0%)	34 (100%)	17	0	0	2	15	0	0	2	15	0	0	0	0	0	0	0	0	6	44	0	0	6	44	0	0	0	0	0	0
PCB 192	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
PCB 193	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 194	34	0 (0%)	34 (100%)	27	6	0	1	0	0	0	1	0	0	0	0	0	0	0	18	0	3	0	0	0	3	0	0	0	0	0	0	0
PCB 195	34	0 (0%)	34 (100%)	33	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0
PCB 196/203	34	0 (0%)	34 (100%)	32	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	3	0	0	0	6	0	0	0	0	0	0
PCB 197	34	0 (0%)	34 (100%)	8	0	0	3	23	0	0	3	23	0	0	0	0	0	0	0	0	9	68	0	0	9	68	0	0	0	0	0	0
PCB 198	34	0 (0%)	34 (100%)	3	0	0	3	23	0	5	3	23	0	0	0	5	0	0	0	0	9	68	0	15	9	68	0	0	0	15	0	0
PCB 199	34	0 (0%)	34 (100%)	33	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
PCB 200	34	0 (0%)	34 (100%)	11	0	0	4	18	0	1	3	18	0	1	0	1	0	0	0	0	12	53	0	3	9	53	0	3	0	3	0	0
PCB 201	34	0 (0%)	34 (100%)	28	0	0	1	5	0	0	1	5	0	0	0	0	0	0	0	0	3	15	0	0	3	15	0	0	0	0	0	0
PCB 202	34	0 (0%)	34 (100%)	30	0	0	2	1	0	0	2	2	0	0	0	0	0	0	0	0	6	3	0	0	6	6	0	0	0	0	0	0
PCB 204	34	0 (0%)	34 (100%)	0	0	0	0	1	0	33	0	1	0	0	0	32	0	1	0	0	0	3	0	97	0	3	0	0	0	94	0	3

Table 4-3. Summary of Data Qualifiers Applied to Crayfish Data

Analyte	Number of Samples Analyzed[a]	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags						Count of Accepted Results Validator Flags								Laboratory Flags, % of Accepted Results						Validator Flags, % of Accepted Results							
					B	D	EMPC	J	J, B	U	EMPC	J	J-	J EMPC	J+	U	U*	UJ	B	D	EMPC	J	J, B	U	EMPC	J	J-	J EMPC	J+	U	U*	UJ
PCB Congeners (continued)																																
PCB 205	34	0 (0%)	34 (100%)	3	0	0	4	23	0	4	4	23	0	0	0	4	0	0	0	0	12	68	0	12	12	68	0	0	0	12	0	0
PCB 206	34	0 (0%)	34 (100%)	31	0	0	2	1	0	0	2	1	0	0	0	0	0	0	0	0	6	3	0	0	6	3	0	0	0	0	0	0
PCB 207	34	0 (0%)	34 (100%)	8	0	0	3	23	0	0	3	23	0	0	0	0	0	0	0	0	9	68	0	0	9	68	0	0	0	0	0	0
PCB 208	34	0 (0%)	34 (100%)	27	0	0	1	6	0	0	1	6	0	0	0	0	0	0	0	0	3	18	0	0	3	18	0	0	0	0	0	0
Decachlorobiphenyl	34	0 (0%)	34 (100%)	15	0	0	4	14	0	0	4	15	0	0	0	0	0	0	0	0	12	41	0	0	12	44	0	0	0	0	0	0
Monochlorobiphenyl homologs	34	0 (0%)	34 (100%)	30	0	0	2	0	0	2	2	0	0	0	0	2	0	0	0	0	6	0	0	6	6	0	0	0	0	6	0	0
Dichlorobiphenyl homologs	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichlorobiphenyl homologs	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tetrachlorobiphenyl homologs	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentachlorobiphenyl homologs	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexachlorobiphenyl homologs	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heptachlorobiphenyl homologs	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Octachlorobiphenyl homologs	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nonachlorobiphenyl homologs	34	0 (0%)	34 (100%)	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decachlorobiphenyl homologs	34	0 (0%)	34 (100%)	30	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	12	0	0	0	12	0	0	0	0	0	0	0
Dioxins/Furans																																
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	34	0 (0%)	34 (100%)	0	0	0	4	3	0	27	4	3	0	0	0	27	0	0	0	0	12	9	0	79	12	9	0	0	0	79	0	0
1,2,3,4,6,7,8-Heptachlorodibenzofuran	34	0 (0%)	34 (100%)	0	0	0	6	2	0	26	6	2	0	0	0	26	0	0	0	0	18	6	0	76	18	6	0	0	0	76	0	0
1,2,3,4,7,8,9-Heptachlorodibenzofuran	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
1,2,3,4,7,8-Hexachlorodibenzodioxin	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
1,2,3,4,7,8-Hexachlorodibenzofuran	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
1,2,3,6,7,8-Hexachlorodibenzodioxin	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
1,2,3,6,7,8-Hexachlorodibenzofuran	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
1,2,3,7,8,9-Hexachlorodibenzodioxin	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
1,2,3,7,8,9-Hexachlorodibenzofuran	34	0 (0%)	34 (100%)	0	0	0	1	0	0	33	1	0	0	0	0	33	0	0	0	0	3	0	0	97	3	0	0	0	0	97	0	0
1,2,3,7,8-Pentachlorodibenzodioxin	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
1,2,3,7,8-Pentachlorodibenzofuran	34	0 (0%)	34 (100%)	0	0	0	1	0	0	33	1	0	0	0	0	33	0	0	0	0	3	0	0	97	3	0	0	0	0	97	0	0
2,3,4,6,7,8-Hexachlorodibenzofuran	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
2,3,4,7,8-Pentachlorodibenzofuran	34	0 (0%)	34 (100%)	0	0	0	1	0	0	33	1	0	0	0	0	33	0	0	0	0	3	0	0	97	3	0	0	0	0	97	0	0
2,3,7,8-Tetrachlorodibenzodioxin	34	0 (0%)	34 (100%)	0	0	0	0	0	0	34	0	0	0	0	0	34	0	0	0	0	0	0	0	100	0	0	0	0	0	100	0	0
2,3,7,8-Tetrachlorodibenzofuran	34	0 (0%)	34 (100%)	10	0	0	6	4	0	14	6	4	0	0	0	14	0	0	0	0	18	12	0	41	18	12	0	0	0	41	0	0
Tetrachlorodibenzodioxin (Total)	34	0 (0%)	34 (100%)	3	0	0	1	4	0	26	1	4	0	0	0	26	0	0	0	0	3	12	0	76	3	12	0	0	0	76	0	0
Tetrachlorodibenzofuran (Total)	34	0 (0%)	34 (100%)	12	0	0	6	5	0	11	6	5	0	0	0	11	0	0	0	0	18	15	0	32	18	15	0	0	0	32	0	0
Pentachlorodibenzodioxin (Total)	34	0 (0%)	34 (100%)	0	0	0	5	0	0	29	5	0	0	0	0	29	0	0	0	0	15	0	0	85	15	0	0	0	0	85	0	0
Pentachlorodibenzofuran (Total)	34	0 (0%)	34 (100%)	1	0	0	11	9	0	13	11	9	0	0	0	13	0	0	0	0	32	26	0	38	32	26	0	0	0	38	0	0
Hexachlorodibenzodioxin (Total)	34	0 (0%)	34 (100%)	0	0	0	2	0	0	32	2	0	0	0	0	32	0	0	0	0	6	0	0	94	6	0	0	0	0	94	0	0
Hexachlorodibenzofuran (Total)	34	0 (0%)	34 (100%)	1	0	0	5	0	0	28	5	0	0	0	0	28	0	0	0	0	15	0	0	82	15	0	0	0	0	82	0	0
Heptachlorodibenzodioxin (Total)	34	0 (0%)	34 (100%)	0	0	0	4	6	0	24	4	6	0	0	0	24	0	0	0	0	12	18	0	71	12	18	0	0	0	71	0	0
Heptachlorodibenzofuran (Total)	34	0 (0%)	34 (100%)	0	0	0	3	2	6	23	3	8	0	0	0	23	0	0	0	0	9	6	18	68	9	24	0	0	0	68	0	0
Octachlorodibenzodioxin	34	0 (0%)	34 (100%)	0	0	0	3	18	0	13	3	18	0	0	0	13	0	0	0	0	9	53	0	38	9	53	0	0	0	38	0	0
Octachlorodibenzofuran	34	0 (0%)	34 (100%)	0	0	0	0	8	0	26	0	8	0	0	0	26	0	0	0	0	0	24	0	76	0	24	0	0	0	76	0	0

Notes:
[a] Qualifier counts do not include laboratory quality control samples
PCB - polychlorinated biphenyl
Data qualifiers:

Laboratory

B	The compound was also detected in the method blank.
D	Sample was analysed as a dilution.
EMPC	Estimated maximum possible concentration.
J	The result is an estimated value that was detected outside the quantitation range.
J, B	The result is an estimated value that was detected outside the quantitation range. The compound was also detected in the method blank.
U	The analyte was analyzed for, but was not detected at or above the method reporting limit/method detection limit (MRL/MDL).

Validator

EMPC	Chromatographic peaks are present in the expected retention time window; however, the peaks do not meet all of the conditions required for a positive identification. The detection limit represents the maximum possible concentration if the analyte was present.
J	Quantitation is approximate due to limitations identified during the QA review (data validation).
J-	Quantitation is approximate and the result may be biased low.
J EMPC	Chromatographic peaks are present in the expected retention time window; however, the peaks do not meet all of the conditions required for a positive identification. The detection limit represents the maximum possible concentration if the analyte was present. Quantitation is approximate due to limitations identified during the QA review (data validation).
J+	Quantitation is approximate and the result may be biased high.
U	This analyte was not detected at or above the associated detection limit.
U*	The analyte should be considered not detected because it was detected in an associated blank at a similar level.
UJ	This analyte was not detected at or above the associated detection limit. Quantitation is approximate due to limitations identified during the QA review (data validation).

Table 4-4. Summary of Data Qualifiers Applied to Clam Data

Analyte	Number of Samples Analyzed	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags				Count of Accepted Results Validator Flags					Laboratory Flags, % of Accepted Results				Validator Flags, % of Accepted Results				
					B	EMPC	J	U	EMPC	J	J-	U	U*	B	EMPC	J	U	EMPC	J	J-	U	U*
Metals/Metalloids																						
Aluminum	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Antimony	1	0 (0%)	1 (100%)	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	100
Arsenic	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barium	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beryllium	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cadmium	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calcium	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chromium	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cobalt	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Copper	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inorganic arsenic	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iron	1	0 (0%)	1 (100%)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	100	0	0
Lead	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magnesium	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manganese	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercury	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methyl mercury	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nickel	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potassium	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Selenium	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silver	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sodium	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thallium	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vanadium	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zinc	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conventional Parameters																						
Lipids	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total solids	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB Congeners																						
PCB 1	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 2	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 3	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 4/10	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 5/8	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 6	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 7/9	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 11	1	0 (0%)	1 (100%)	0	1	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0
PCB 12/13	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 14	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 15	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 16/32	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 17	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 18	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 19	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 20/21/33	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 22	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 23	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 24/27	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 25	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 26	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 28	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 29	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 30	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 31	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 34	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 35	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0

Table 4-4. Summary of Data Qualifiers Applied to Clam Data

Analyte	Number of Samples Analyzed	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags				Count of Accepted Results Validator Flags					Laboratory Flags, % of Accepted Results				Validator Flags, % of Accepted Results				
					B	EMPC	J	U	EMPC	J	J-	U	U*	B	EMPC	J	U	EMPC	J	J-	U	U*
PCB Congeners (continued)																						
PCB 36	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 37	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 38	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 39	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 40	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 41/64/71/ 72	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 42/59	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 43/49	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 44	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 45	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 46	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 47	1	0 (0%)	1 (100%)	0	1	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0
PCB 48/75	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 50	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 51	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 52/69	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 53	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 54	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 55	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 56/60	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 57	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 58	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 61/70	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 62	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 63	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 65	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 66/76	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 67	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 68	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 73	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 74	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 77	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 78	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 79	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 80	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 81	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 82	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 83	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 84/92	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 85/116	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 86	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 87/117/125	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 88/91	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 89	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 90/101	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 93	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 94	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 95/98/102	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 96	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 97	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 100	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 99	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 103	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 104	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 105	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 106/118	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 107/109	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4-4. Summary of Data Qualifiers Applied to Clam Data

Analyte	Number of Samples Analyzed	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags				Count of Accepted Results Validator Flags					Laboratory Flags, % of Accepted Results				Validator Flags, % of Accepted Results				
					B	EMPC	J	U	EMPC	J	J-	U	U*	B	EMPC	J	U	EMPC	J	J-	U	U*
PCB Congeners (continued)																						
PCB 108/112	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 110	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 111/115	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 113	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 114	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 119	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 120	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 121	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 122	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 123	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 124	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 126	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 127	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 128/162	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 129	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 130	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 131/133	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 132/161	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 134/143	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 135	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 136	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 137	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 138/163/164	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 139/149	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 140	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 141	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 142	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 144	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 145	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 146/165	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 147	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 148	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 150	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 151	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 152	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 153	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 154	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 155	1	0 (0%)	1 (100%)	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0	0
PCB 156	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 157	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 158/160	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 159	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 166	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 167	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 168	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 169	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 170	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 171	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 172	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 173	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 174	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 175	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 176	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 177	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 178	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 179	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4-4. Summary of Data Qualifiers Applied to Clam Data

Analyte	Number of Samples Analyzed	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags				Count of Accepted Results Validator Flags					Laboratory Flags, % of Accepted Results				Validator Flags, % of Accepted Results				
					B	EMPC	J	U	EMPC	J	J-	U	U*	B	EMPC	J	U	EMPC	J	J-	U	U*
PCB Congeners (continued)																						
PCB 180	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 181	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 182/187	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 183	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 184	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 185	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 186	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 188	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 189	1	0 (0%)	1 (100%)	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0	0
PCB 190	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 191	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 192	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 193	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 194	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 195	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 196/203	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 197	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 198	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 199	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 200	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 201	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 202	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCB 204	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
PCB 205	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 206	1	0 (0%)	1 (100%)	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0	0
PCB 207	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
PCB 208	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decachlorobiphenyl	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monochlorobiphenyl homologs	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichlorobiphenyl homologs	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichlorobiphenyl homologs	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tetrachlorobiphenyl homologs	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentachlorobiphenyl homologs	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexachlorobiphenyl homologs	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heptachlorobiphenyl homologs	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Octachlorobiphenyl homologs	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nonachlorobiphenyl homologs	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decachlorobiphenyl homologs	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dioxins/Furans																						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	1	0 (0%)	1 (100%)	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0	0
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
1,2,3,4,7,8-Hexachlorodibenzodioxin	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
1,2,3,4,7,8-Hexachlorodibenzofuran	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
1,2,3,6,7,8-Hexachlorodibenzodioxin	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
1,2,3,6,7,8-Hexachlorodibenzofuran	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
1,2,3,7,8,9-Hexachlorodibenzodioxin	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
1,2,3,7,8,9-Hexachlorodibenzofuran	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
1,2,3,7,8-Pentachlorodibenzodioxin	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
1,2,3,7,8-Pentachlorodibenzofuran	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
2,3,4,6,7,8-Hexachlorodibenzofuran	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
2,3,4,7,8-Pentachlorodibenzofuran	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
2,3,7,8-Tetrachlorodibenzodioxin	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
2,3,7,8-Tetrachlorodibenzofuran	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tetrachlorodibenzodioxin (Total)	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
Tetrachlorodibenzofuran (Total)	1	0 (0%)	1 (100%)	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentachlorodibenzodioxin (Total)	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0

Table 4-4. Summary of Data Qualifiers Applied to Clam Data

Analyte	Number of Samples Analyzed	Rejected Results	Accepted Results	Count of Results with No Flags	Count of Accepted Results Laboratory Flags				Count of Accepted Results Validator Flags					Laboratory Flags, % of Accepted Results				Validator Flags, % of Accepted Results				
					B	EMPC	J	U	EMPC	J	J-	U	U*	B	EMPC	J	U	EMPC	J	J-	U	U*
Dioxins/Furans (continued)																						
Pentachlorodibenzofuran (Total)	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
Hexachlorodibenzodioxin (Total)	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
Hexachlorodibenzofuran (Total)	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
Heptachlorodibenzodioxin (Total)	1	0 (0%)	1 (100%)	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0	0
Heptachlorodibenzofuran (Total)	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0
Octachlorodibenzodioxin	1	0 (0%)	1 (100%)	0	0	0	1	0	0	1	0	0	0	0	0	100	0	0	100	0	0	0
Octachlorodibenzofuran	1	0 (0%)	1 (100%)	0	0	0	0	1	0	0	0	1	0	0	0	0	100	0	0	0	100	0

Notes:

PCB - polychlorinated biphenyl

Data qualifiers:

Laboratory

B	The compound was also detected in the method blank.
EMPC	Estimated maximum possible concentration
J	The result is an estimated value that was detected outside the quantitation range.
U	The analyte was analyzed for, but was not detected at or above the method reporting limit/method detection limit (MRL/MDL).

Validator

EMPC	Chromatographic peaks are present in the expected retention time window; however, the peaks do not meet all of the conditions required for a positive identification. The detection limit represents the maximum possible concentration if the analyte was present.
J	Quantitation is approximate due to limitations identified during the QA review (data validation).
J-	Quantitation is approximate and the result may be biased low.
U	The analyte was not detected at or above the associated detection limit.
U*	The analyte should be considered not detected because it was detected in an associated blank at a similar level.

Table 4-5. Results for Mussel Composites from Area A1 for Both Delayed and Non-Delayed Samples

Sample Identification	A1-MU-C001-ST	A1-MU-C002-ST	A1-MU-C003-ST	A1-MU-C004-ST	A1-MU-C005-ST	A1-MU-C006-ST
Delay in Shipment?	Yes	Yes	No	No	No	No
Sampling Date	5/3/2016	5/3/2016	9/28/2016	9/28/2016	9/28/2016	9/28/2016
Sampling Location ID[a]	MB05	MB05	MB43	MB43	MB43	MB43
Species	*Anodonta*	*Anodonta*	*Anodonta*	*Anodonta*	*Anodonta*	*Anodonta*
Average Organism Weight	3.7 g	31.0 g	28.2 g	31.2 g	28.6 g	30.8 g
Metals/Metalloids (mg/kg wwm except mercury)						
Aluminum	117	133	29.5	31.2	25.8	51
Antimony	0.201	0.043	0.011 U*	0.034	0.017	0.014 U*
Arsenic	0.93	1.13	0.46	0.51	0.48	0.53
Barium	61.7	144	35.4	46	28.3	45.7
Beryllium	0.0081	0.0116	0.0031 J	0.0041	0.0035 J	0.0046
Cadmium	0.567	0.523	0.426	0.521	0.399	0.519
Calcium	2560	6350	5340	6870	2180	4630
Chromium	0.394	1.73	0.395	0.54	0.247	0.438
Cobalt	0.148	0.205	0.0561	0.0806	0.0478	0.0775
Copper	3.73	2	0.793	1.37	0.78	1.07
Iron	420 J-	337 J-	102	165	118	182
Lead	1.44	1.27	0.242	0.592	0.24	0.357
Magnesium	171	118	73.2	76	69.8	89.2
Manganese	346	499	241	319	185	304
Mercury (µg/kg ww)	13.8	11.8	6.48	6.17	5.95	6.96
Nickel	0.285	0.879	0.237	0.279	0.189	0.248
Potassium	222	142	151	144	161	173
Selenium	0.46	0.41	0.17 J	0.19 J	0.19 J	0.2 J
Silver	0.0288	0.0297	0.0154	0.0159	0.0087	0.0149
Sodium	342	283	344	349	316	333
Thallium	0.0084	0.007	0.004	0.0037 J	0.0044	0.0047
Vanadium	0.304	0.325	0.069	0.08	0.065	0.186
Zinc	45.8	39.8	13.3	17.9	11.5	17.8
Conventional Parameters (% ww)						
Total solids	14.3	11.6	6.7	6.88	6.28	7.34

Notes:

Shaded cells indicate delayed shipment samples.

[a] MB05 is a beach location in the central portion of the sampling area and MB43 is a dive location near Deadman's Eddy (see Map 2-2).

Data qualifiers:

Validator

J	Quantitation is approximate due to limitations identified during the QA review (data validation).
J-	Quantitation is approximate and the result may be biased low.
U*	The analyte should be considered not detected because it was detected in an associated blank at a similar level.

Table 4-6. Results for Crayfish Partial-Body Composites from Area A5 for Both Delayed and Non-Delayed Samples

Sample Identification	A5-CR-C001-PB	A5-CR-C002-PB	A5-CR-C003-PB	A5-CR-C004-PB	A5-CR-C005-PB	A5-CR-C006-PB
Delay in Shipment?	No	No	No	Yes	Yes	Yes
Sampling Date	5/1/16	5/1/16	5/1/16	5/3/16	5/3/16	5/3/16
Sampling Location ID[a]	CT05, CT11, CT16, CT25	CT02, CT15	CT02, CT04	CT15	CT01, CT12	CT04, CT11
Species	Northern	Northern	Signal	Northern	Northern	Signal/Northern
Average Organism Weight	12 g	33 g	61 g	37.5 g	50.5 g	60.5
Metals/Metalloids (mg/kg ww, except mercury and methyl mercury)						
Aluminum	241	161	92.8	270	178	157
Antimony	0.015 U*	0.01 U*	0.013 U	0.011 U*	0.01 U*	0.022 U*
Arsenic	0.31	0.22	0.185	0.42	0.28	0.23
Barium	68.8	53.8	54.4	73.3	63.7	69.1
Beryllium	0.008	0.0051	0.00335	0.0099	0.0056 J	0.0054 J
Cadmium	0.228	0.126	0.163	0.198	0.251	0.252
Calcium	40800	51900	34800	41500	52700	42400
Chromium	1.23	0.793	0.436	0.896	0.9	0.957
Cobalt	0.177	0.124	0.0836	0.208	0.2	0.141
Copper	30.2	24.1	46.6	31.3	29.7	36.1
Inorganic arsenic	0.0598 J-	0.0436 J-	0.0263	0.108	0.081	0.0709
Iron	214	134	83.6	216	153	136
Lead	0.568	0.326	0.756	0.231	0.589	1.66
Magnesium	755	676	793	820	851	883
Manganese	33	49.5	36.4	20.7	38.1	41.1
Mercury (µg/kg ww)	16.6	32.4	37.9	13.4	15.5	38.3
Methyl mercury (µg/kg ww)	0.6 U	12.9	29.2	13.6	10.2	33.1
Nickel	0.678	0.432	0.438	0.551	0.547	0.651
Potassium	1910	1960	2040	1920	1670	1800
Selenium	0.24	0.19 J	0.33	0.26 J	0.2 J	0.33
Silver	0.109	0.0571	0.0886	0.0971	0.102	0.0903
Sodium	2000	2130	1990	2190	1890	2060
Thallium	0.0151	0.0152	0.0211	0.0139	0.0192	0.0221
Vanadium	0.51	0.347	0.206	0.517	0.375	0.35
Zinc	24.6	24.2	28.9	27.9	24.9	28.5
Conventional Parameters (% ww)						
Lipids	0.777	0.446	0.46	2.13	0.568	0.67
Total solids	29.9	31.9	27.3	33.3	30.8	30.8
PCB Congeners (pg/g ww)						
PCB 1	0.15 J	0.106 J	0.0976	1.33	0.458 J	0.697
PCB 2	0.0749 J	0.111 J	0.0439	1.04	0.219 J	0.332 J
PCB 3	0.15 J	0.131 J	0.104	1.57	0.416 J	0.922
PCB 4/10	1.16	0.92	1.08	3.2	2.49	2.76
PCB 5/8	5.81	4.37	4.42	12	9.97	9.65
PCB 6	2.15	1.54	1.77	4.8	3.55	3.69
PCB 7/9	0.564 J	0.432 U	0.453	0.71 J	1	0.567 J
PCB 11	7.57	6.41	5.7	14.2	11.2	10.3
PCB 12/13	1.08	0.866 J	0.746	1.94	1.36	1.37
PCB 14	0.0575 U	0.121 U	0.0537 U	0.0973 U	0.117 U	0.0658 U
PCB 15	5.03	3.72	3.01	7.89	5.79	5.13
PCB 16/32	24.8	20.9	15.5	48.9	34.4	37
PCB 17	14.3	11.7	9.24	31.5	20.5	22.4
PCB 18	29.8	24.6	19	65.7	41.8	47.9
PCB 19	3.02	2.02	1.62	5.91	4.02	5.05
PCB 20/21/33	18.5	11.1	11.4	31.2	27.4	21
PCB 22	12.4	8.8	8.4	22.2	20.5	14.6
PCB 23	0.0478 J	0.0368 J	0.0896 U	0.0801 EMPC	0.159 U	0.0682 EMPC
PCB 24/27	3.92	3.35	2.51	8.4	5.57	5.84
PCB 25	12.4	6.82	8.91	26.7	20.8	15.8
PCB 26	18.6	9.74	13.8	40.7	30.4	26.2
PCB 28	71.9	40.1	41.2	117	107	70.2
PCB 29	0.21 J	0.129 J	0.186	0.496 J	0.33 J	0.274 J
PCB 30	0.0368 U	0.0505 U	0.0387 U	0.0483 U	0.072 U	0.0485 U
PCB 31	54.5	32.9	35.9	82.8	91.2	61.5
PCB 34	0.739	0.284 EMPC	0.54	1.49	1.07	0.848
PCB 35	0.267 J	0.171 J	0.144	0.526	0.296 J	0.238 J
PCB 36	0.102 J	0.124 U	0.0927 U	0.317 J	0.204 U	0.207 U
PCB 37	5.17	2.72	2.26	9.23	6.52	5.01
PCB 38	2.4	1.85	1.33	5	3.36	3.73
PCB 39	0.116 J	0.0566 J	0.0863 U	0.18 J	0.19 U	0.193 U
PCB 40	4.71	4.08	2.93	9.12	6.32	5.22
PCB 41/64/71/ 72	43.6	36.4	27.5	77.8	64	45.7
PCB 42/59	17.4	14.2	10.4	31.7	23.1	17.1
PCB 43/49	95.3	63.9	50.7	161	110	88.1
PCB 44	48.9	38.2	27.9	85	61.1	45.2
PCB 45	8.8	5.88	4.85	14.8	10	8.83
PCB 46	3.02	1.72	1.71	4.81	3.41	2.63
PCB 47	60	37.8	28.9	90.5	64.4	50.6
PCB 48/75	11.2	7.53	5.62	19.1	12.2	8.91
PCB 50	0.378 J	0.228 J	0.213	0.613	0.567	0.415 J
PCB 51	6.71	4.97	3.85	11.9	8.75	6.99
PCB 52/69	119	74.6	58.7	194	125	102
PCB 53	15.8	10.7	8.29	27	17.3	16.3
PCB 54	0.597	0.37 J	0.36	1.35	0.881	0.737
PCB 55	0.56	0.493	0.269	1.25	0.874	0.709
PCB 56/60	18.2	12.9	6.75	28.6	17.8	12.1
PCB 57	0.614	0.412 J	0.248	0.953	0.736	0.526
PCB 58	0.422 J	0.232 J	0.107	0.386 J	0.282 J	0.202 J
PCB 61/70	41.9	29.3	18.7	71.8	42.3	31.7
PCB 62	0.0432 U	0.111 U	0.071 U	0.136 U	0.21 U	0.137 U
PCB 63	4.36	2.63	1.57	5.84	4.09	2.9
PCB 65	0.0457 U	0.117 U	0.075 U	0.144 U	0.222 U	0.144 U
PCB 66/76	73	39.6	21.1	87.2	57.7	37.5
PCB 67	1.35	0.821	0.5	2.11	1.39	1.07
PCB 68	1.33	0.862	0.637	1.95	1.53	1.14
PCB 73	0.402 J	0.322 J	0.247	0.983	0.714	0.537
PCB 74	40	24.1	11.9	47.8	35.2	21.9
PCB 77	3.14	1.51	0.645	3.13	1.89	1.49
PCB 78	0.0506 U	0.103 U	0.0656 U	0.142 U	0.192 U	0.135 U
PCB 79	1.91	1.28	0.474	2.38	1.85	1.06
PCB 80	0.0452 U	0.0923 U	0.0566 U	0.116 U	0.184 U	0.126 U
PCB 81	0.529	0.222 J	0.0912	0.474 J	0.263 J	0.188 J
PCB 82	1.59	1.49	0.916	4.04	1.94	2.14
PCB 83	0.0383 U	0.0917 U	0.0248	0.0916 U	0.114 U	0.0675 U
PCB 84/92	25.8	14.8	7.5	41.8	20.6	16.8
PCB 85/116	23.2	11.3	3.35	24.9	13	7.88
PCB 86	0.0654 U	0.157 U	0.133 U	0.156 U	0.195 U	0.115 U

Table 4-6. Results for Crayfish Partial-Body Composites from Area A5 for Both Delayed and Non-Delayed Samples

Sample Identification	A5-CR-C001-PB	A5-CR-C002-PB	A5-CR-C003-PB	A5-CR-C004-PB	A5-CR-C005-PB	A5-CR-C006-PB
Delay in Shipment?	No	No	No	Yes	Yes	Yes
Sampling Date	5/1/16	5/1/16	5/1/16	5/3/16	5/3/16	5/3/16
Sampling Location ID[a]	CT05, CT11, CT16, CT25	CT02, CT15	CT02, CT04	CT15	CT01, CT12	CT04, CT11
Species	Northern	Northern	Signal	Northern	Northern	Signal/Northern
Average Organism Weight	12 g	33 g	61 g	37.5 g	50.5 g	60.5
PCB Congeners (pg/g ww) (continued)						
PCB 87/117/125	26.9	13.3	5.28	31.2	15.5	11.5
PCB 88/91	8.71	7.21	4.4	18.8	10.5	9.85
PCB 89	0.295 J	0.343 J	0.171	0.733	0.564	0.43 J
PCB 90/101	110	55.2	26.7	149	76.8	48.1
PCB 93	0.054 U	0.141 U	0.119 U	0.143 U	0.174 U	0.0997 U
PCB 94	0.465 J	0.344 J	0.244	1.06	0.478 J	0.473 J
PCB 95/98/102	42.3	29	16.6	79.7	42.4	37.3
PCB 96	0.507	0.397 J	0.348	1.23	0.598	0.65
PCB 97	9.26	6.93	4.05	17.8	9.32	8.03
PCB 100	1.9	1.81	1.13	5.07	3.07	2.64
PCB 99	85.6	42.3	15.9	98.4	58.2	34.5
PCB 103	1.87	1.28	0.851	3.85	2.38	1.96
PCB 104	0.129 J	0.0846 J	0.0638	0.284 J	0.146 J	0.159 J
PCB 105	41.7	17.5	5.8	33	22.7	7.21
PCB 106/118	93.4	46.2	21.8	92.1	52.6	54.3
PCB 107/109	7.48	3.78	2.97	9.12	4.19	6.06
PCB 108/112	2.99	1.62	0.657	4.03	1.98	1.52
PCB 110	22	19.3	10	43.5	24.5	22.8
PCB 111/115	2.61	0.899 J	0.421	2.2	0.98 J	0.699 J
PCB 113	0.0451 U	0.103 U	0.0863 U	0.109 U	0.128 U	0.077 U
PCB 114	2.95	1.42	0.838	2.52	1.7	2.08
PCB 119	3.87	2.09	0.668	4.69	2.44	1.69
PCB 120	0.113 J	0.256 J	0.244	0.556	0.319 J	0.611
PCB 121	0.0336 U	0.0876 U	0.0741 U	0.0893 U	0.108 U	0.0621 U
PCB 122	0.784	0.338 J	0.186 U	0.749	0.233 U	0.129 U
PCB 123	2.46	1.18	0.642	2.28	1.23	1.98
PCB 124	3.39	1.62	0.499	3.48	1.91	0.823
PCB 126	0.552	0.234 J	0.0983	0.548	0.447 J	0.288 J
PCB 127	0.0464 U	0.0584 U	0.192 U	0.366 U	0.26 U	0.139 U
PCB 128/162	18.3	7.65	2.33	15.7	8.82	3.62
PCB 129	1.81	0.724	0.366	2.2	1.02	0.498
PCB 130	10.8	5.23	1.92	10.1	8.18	2.26
PCB 131/133	4.03	2.3	0.919	4.31	3.14	2.1
PCB 132/161	5.27	3.01	1.2	7.69	2.86	2.02
PCB 134/143	2.03	1.08	0.432	2.62	1.21	0.839 J
PCB 135	6.38	3.35	1.31	9.56	4.31	3.49
PCB 136	5.07	3.82	1.33	8.55	4.95	4.3
PCB 138/163/164	169	78.5	33.6	160	120	61.4
PCB 137	6.18	3.15	2.52	6.19	3.6	6.82
PCB 139/149	66.7	36.3	11.6	81.2	47	28.1
PCB 140	0.631	0.382 J	0.0766 U	0.669	0.278 EMPC	0.215 EMPC
PCB 141	20.5	9.2	2.61	19.1	13.7	4.57
PCB 142	0.147 U	0.106 U	0.112 U	0.319 U	0.208 U	0.185 U
PCB 144	3.81	2.32	0.827	5.22	3.29	1.8
PCB 145	0.0533 U	0.112 U	0.0842 U	0.144 U	0.127 U	0.128 U
PCB 146/165	31.9	17	11.9	33.2	24.9	26
PCB 147	3.44	2.29	0.993	5	3.07	2.45
PCB 148	0.347 J	0.26 J	0.0778	0.603	0.412 J	0.25 J
PCB 150	0.184 J	0.134 J	0.0645 U	0.342 J	0.188 J	0.187 J
PCB 151	18.6	9.93	3.67	27.6	12.4	8.79
PCB 152	0.0513 U	0.107 U	0.081 U	0.137 J	0.123 U	0.0789 J
PCB 153	189	89.5	56.4	189	145	171
PCB 154	3.04	2.1	0.654	4.62	2.63	2.02
PCB 155	0.341 J	0.223 J	0.108	0.487 J	0.317 J	0.18 EMPC
PCB 156	10.4	5.57	4.16	9.37	7.14	11.4
PCB 157	2.7	1.26	0.691	2.29	1.94	2.01
PCB 158/160	13	6.37	1.39	12.2	8.85	3.17
PCB 159	0.079 U	0.0595 U	0.0623 U	0.193 U	0.119 U	0.118 U
PCB 166	0.562	0.274 J	0.186	0.463 J	0.33 J	0.442 J
PCB 167	6.05	3.11	2.62	5.17	4.46	6.7
PCB 168	0.262 J	0.16 J	0.0704 U	0.38 J	0.367 J	0.116 U
PCB 169	0.185 J	0.0914 J	0.0909	0.225 J	0.199 J	0.202 J
PCB 170	21.6	9.04	6.7	29.2	18.5	24.6
PCB 171	4	2.02	0.831	5.49	3.2	2.27
PCB 172	6.29	2.88	1.52	8.21	5.61	3.01
PCB 173	0.067 J	0.0617 U	0.0623 U	0.196 U	0.111 U	0.0943 U
PCB 174	21.9	10.9	1.91	38.3	17.5	9.63
PCB 175	1.14	0.556	0.216	1.64	0.827	0.56
PCB 176	1.54	0.989	0.259	2.37	1.31	0.971
PCB 177	20.9	9.91	3.53	30.9	17.8	9.83
PCB 178	12.5	5.94	1.21	16.2	11.6	5.22
PCB 179	4.26	2.29	0.797	6.86	2.38	2.3
PCB 180	79.1	38.5	38.5	107	67.9	152
PCB 181	0.033 U	0.0514 U	0.0708	0.163 U	0.0924 U	0.288 J
PCB 182/187	82.3	41.2	27.7	108	72.2	102
PCB 183	20.6	9.27	3.99	28.2	16.9	15.5
PCB 184	0.369 J	0.179 J	0.0493 U	0.48 J	0.226 J	0.145 J
PCB 185	2.13	1.06	0.302	4.36	1.18	0.801
PCB 186	0.0309 U	0.0462 U	0.0454 U	0.116 U	0.0868 U	0.0514 U
PCB 188	0.183 J	0.105 J	0.0798	0.342 J	0.147 J	0.209 J
PCB 189	1.06	0.562	0.48	1.19	1.01	1.71
PCB 190	3.63	2.05	0.888	5.67	1.77	2.09
PCB 191	1.07	0.504	0.28	1.1	0.95	1.29
PCB 192	0.0258 U	0.0403 U	0.0407 U	0.128 U	0.0724 U	0.0616 U
PCB 193	5.33	2.72	2.06	6.47	5.01	8.11
PCB 194	10.5	3.91	4.26	19.2	10.6	14.8
PCB 195	4.28	2.18	1.73	7.85	4.38	5.86
PCB 196/203	8.77	4.86	3.92	15.7	5.51	13.3
PCB 197	0.53	0.311 J	0.186	1.04	0.594	0.881
PCB 198	0.426 J	0.233 J	0.109	0.836	0.235 J	0.257 J
PCB 199	21.4	8	5.65	34.8	20.2	23.5
PCB 200	0.909	0.398 J	0.108	1.36	0.592	0.556
PCB 201	1.78	1	0.462	3.26	1.77	2.42
PCB 202	5.68	2.51	0.587	10.5	5.26	3.74
PCB 204	0.0487 U	0.0801 U	0.0612 U	0.174 U	0.0631 U	0.135 U
PCB 205	0.272 J	0.143 J	0.0763 U	0.467 J	0.0993 J	0.136 J
PCB 206	2	1.23	0.996	3.52	1.13	1.36
PCB 207	0.592	0.256 J	0.446	0.928	0.566	1.38
PCB 208	1.71	0.673	0.408	2.74	1.5	1.07

Table 4-6. Results for Crayfish Partial-Body Composites from Area A5 for Both Delayed and Non-Delayed Samples

Sample Identification	A5-CR-C001-PB	A5-CR-C002-PB	A5-CR-C003-PB	A5-CR-C004-PB	A5-CR-C005-PB	A5-CR-C006-PB
Delay in Shipment?	No	No	No	Yes	Yes	Yes
Sampling Date	5/1/16	5/1/16	5/1/16	5/3/16	5/3/16	5/3/16
Sampling Location ID[a]	CT05, CT11, CT16, CT25	CT02, CT15	CT02, CT04	CT15	CT01, CT12	CT04, CT11
Species	Northern	Northern	Signal	Northern	Northern	Signal/Northern
Average Organism Weight	12 g	33 g	61 g	37.5 g	50.5 g	60.5
PCB Congeners (pg/g ww) (continued)						
Decachlorobiphenyl	0.88	0.365 J	0.86	1.05	0.745	2.89
Total PCB congeners, 1/2 DL	2300	1310	848	3240	2170	1880
Total PCB congeners, 0 DL	2290	1300	846	3240	2170	1880
PCB TEQ, mammal, 1/2 DL	0.066	0.0287	0.0159	0.0664	0.0537	0.0377
PCB TEQ, mammal, 0 DL	0.066	0.0287	0.00884	0.0664	0.0537	0.0377
Monochlorobiphenyl homologs	0.375	0.349	0.224	3.94	1.09	1.95
Dichlorobiphenyl homologs	23.4	17.8	17.2	44.8	35.3	33.5
Trichlorobiphenyl homologs	273	177	172	498	415	337
Tetrachlorobiphenyl homologs	623	415	295	983	674	512
Pentachlorobiphenyl homologs	523	282	132	677	371	282
Hexachlorobiphenyl homologs	601	295	144	623	434	356
Heptachlorobiphenyl homologs	290	141	91.3	401	246	342
Octachlorobiphenyl homologs	54.6	23.5	16.7	95	49.2	65.6
Nonachlorobiphenyl homologs	4.3	2.16	1.85	7.2	3.19	3.82
Decachlorobiphenyl homologs	0.88	0.365	0.86	1.05	0.745	2.89
Dioxins/Furans (pg/g ww)						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	0.0892 U	0.0778 U	0.0791 U	0.0964 EMPC	0.114 U	0.0986 U
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.0342 U	0.0299 U	0.0543 U	0.0504 U	0.153 EMPC	0.048 U
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0416 U	0.0353 U	0.0496 U	0.0615 U	0.0732 U	0.0586 U
1,2,3,4,7,8-Hexachlorodibenzodioxin	0.104 U	0.117 U	0.0928 U	0.109 U	0.101 U	0.107 U
1,2,3,4,7,8-Hexachlorodibenzofuran	0.0396 U	0.0336 U	0.0393 U	0.0567 U	0.0353 U	0.0395 U
1,2,3,6,7,8-Hexachlorodibenzodioxin	0.106 U	0.122 U	0.095 U	0.116 U	0.103 U	0.113 U
1,2,3,6,7,8-Hexachlorodibenzofuran	0.0377 U	0.0335 U	0.0395 U	0.0558 U	0.0378 U	0.0406 U
1,2,3,7,8,9-Hexachlorodibenzodioxin	0.11 U	0.125 U	0.0978 U	0.118 U	0.11 U	0.122 U
1,2,3,7,8,9-Hexachlorodibenzofuran	0.0528 U	0.0475 U	0.0523 U	0.0732 U	0.0539 U	0.0596 U
1,2,3,7,8-Pentachlorodibenzodioxin	0.069 U	0.0604 U	0.0444 U	0.0752 U	0.0641 U	0.0683 U
1,2,3,7,8-Pentachlorodibenzofuran	0.0762 U	0.0557 U	0.0578 U	0.071 U	0.0575 U	0.0586 U
2,3,4,6,7,8-Hexachlorodibenzofuran	0.0394 U	0.0367 U	0.0411 U	0.0618 U	0.0394 U	0.0435 U
2,3,4,7,8-Pentachlorodibenzofuran	0.0793 U	0.0561 U	0.0561 U	0.071 U	0.0548 U	0.0595 U
2,3,7,8-Tetrachlorodibenzodioxin	0.0611 U	0.0751 U	0.036 U	0.0525 U	0.0506 U	0.0356 U
2,3,7,8-Tetrachlorodibenzofuran	0.303	0.136 J	0.196	0.346 EMPC	0.371	0.551
Dioxin TEQ, mammal, 1/2 DL	0.134	0.117	0.107	0.124	0.129	0.144
Dioxin TEQ, mammal, 0 DL	0.0304	0.0136	0.0198	0.000167	0.0373	0.0553
Total TEQ, mammal, 1/2 DL	0.2	0.146	0.123	0.19	0.183	0.182
Total TEQ, mammal, 0 DL	0.0965	0.0423	0.0286	0.0666	0.0911	0.093
Tetrachlorodibenzodioxin (Total)	0.523	0.237	0.036 U	0.507	0.0506 U	0.0356 U
Tetrachlorodibenzofuran (Total)	0.303	0.136 J	0.196	0.263	0.371	0.551
Pentachlorodibenzodioxin (Total)	0.069 U	0.0604 U	0.0444 U	0.0752 U	0.0913 EMPC	0.0683 U
Pentachlorodibenzofuran (Total)	0.0778 U	0.0559 U	0.0569 U	0.214 J	0.0852 J	0.0595 U
Hexachlorodibenzodioxin (Total)	0.106 U	0.122 U	0.0952 U	0.375 EMPC	0.0662 EMPC	0.114 U
Hexachlorodibenzofuran (Total)	0.0896 EMPC	0.0376 U	0.0428 U	0.133 EMPC	0.0412 U	0.0452 U
Heptachlorodibenzodioxin (Total)	0.142 EMPC	0.0778 U	0.0791 U	0.15 J	0.114 U	0.0986 U
Heptachlorodibenzofuran (Total)	0.0377 U	0.0325 U	0.0606 U	0.166 J	0.325 EMPC	0.15 J
Octachlorodibenzodioxin	0.468 J	0.129 U	0.399	0.45 J	0.618 J	0.502 J
Octachlorodibenzofuran	0.112 U	0.143 U	0.141	0.106 J	0.173 J	0.109 J

Notes:

Partial-body is the whole body minus the carapace and stomach.

Shaded cells indicate delayed shipment samples.

[a] Sampling locations are shown on Map 2-13.

DL - detection limit

PCB - polychlorinated biphenyl

TEQ - toxic equivalents

Data qualifiers:

<u>Validator</u>

EMPC	Chromatographic peaks are present in the expected retention time window; however, the peaks do not meet all of the conditions required for a positive identification. The detection limit represents the maximum possible concentration if the analyte was present.
J	Quantitation is approximate due to limitations identified during the QA review (data validation).
J-	Quantitation is approximate and the result may be biased low.
U	The analyte was not detected at or above the associated detection limit.
U*	The analyte should be considered not detected because it was detected in an associated blank at a similar level.

Table 4-7. Results for Crayfish Carapace and Stomach Composites from Area A5 for Both Delayed and Non-Delayed Samples

Sample Identification	A5-CR-C001-CS	A5-CR-C002-CS	A5-CR-C003-CS	A5-CR-C004-CS	A5-CR-C005-CS	A5-CR-C006-CS
Delay in Shipment?	No	No	No	Yes	Yes	Yes
Sampling Date	5/1/16	5/1/16	5/1/16	5/3/16	5/3/16	5/3/16
Sampling Location ID[a]	CT05, CT11, CT16, CT25	CT02, CT15	CT02, CT04	CT15	CT01, CT12	CT04, CT11
Species	Northern	Northern	Signal	Northern	Northern	Signal/Northern
Average Organism Weight	12 g	33 g	61 g	37.5 g	50.5 g	60.5
Metals/Metalloids (mg/kg ww except mercury)						
Aluminum	1030	548	68.3	1150	878	89.7
Antimony	0.018 U*	0.017 U*	0.015 U	0.021 U*	0.025 U*	0.02 U*
Arsenic	0.66	0.72	0.255	0.97	0.7	0.19 J
Barium	153	83.6	95.9	165	130	147
Beryllium	0.0333	0.018	0.0022	0.039	0.0273	0.0033 U
Cadmium	0.383	0.369	0.114	0.211	0.268	0.26
Calcium	75900	59500	55500	92000	87200	82200
Chromium	11.6	2.5	0.349	5.6	4.33	0.521
Cobalt	0.735	0.438	0.0979	0.818	0.635	0.13
Copper	24.1	21.3	20.1	17.3	39.6	25.1
Iron	1080	531	59.3	1160	801	78.7
Lead	1.11	0.699	0.514	1.03	1.28	1.47
Magnesium	1520	875	830	1720	1420	1130
Manganese	83.4	118	38.2	72.3	96.2	48.8
Mercury (µg/kg ww)	7.99	9.83	10.4	4.85	7.38	18.3
Nickel	5.34	1.48	0.542	3.08	2.49	0.518
Potassium	1670	1460	1130	1670	1430	1390
Selenium	0.24	0.31	0.46	0.3 J	0.23 J	0.42
Silver	0.0882	0.0604	0.0243	0.053	0.0774	0.063
Sodium	2180	2380	2330	2380	1900	2130
Thallium	0.0343	0.022	0.0208	0.035	0.0423	0.0362
Vanadium	2.43	1.19	0.163	2.35	1.83	0.211
Zinc	16.5	14.2	9.98	21.4	15.1	12.8
Conventional Parameters (% ww)						
Total solids	43.3	35.3	31.8	51.1	44.9	42

Notes:

Shaded cells indicate delayed shipment samples.

[a] Sampling locations are shown on Map 2-13.

Data qualifiers:

Validator

J Quantitation is approximate due to limitations identified during the QA review (data validation).

U The analyte was not detected at or above the associated detection limit.

U* The analyte should be considered not detected because it was detected in an associated blank at a similar level.

Table 5-1a. Summary of Results for Mussel Composites from Site Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Metals/Metalloids (mg/kg ww except mercury and methyl mercury)																	
Aluminum	36	36	100	17	86	7.62	90.1	470	100	NA	NA	NA	NA	7.62	90.1	470	100
Antimony	36	14	39	0.0069	36	0.002	0.0266	0.201	0.0523	0.0005	0.00334	0.007	0.00195	0.0005	0.0124	0.201	0.0339
Arsenic	36	36	100	0.0024	100	0.345	0.613	1.61	0.265	NA	NA	NA	NA	0.345	0.613	1.61	0.265
Barium	36	36	100	3.4	100	28.3	57.8	144	20.7	NA	NA	NA	NA	28.3	57.8	144	20.7
Beryllium	36	36	100	0.034	0	0.0021	0.00579	0.0197	0.00378	NA	NA	NA	NA	0.0021	0.00579	0.0197	0.00378
Cadmium	36	36	100	0.017	100	0.339	0.535	0.975	0.137	NA	NA	NA	NA	0.339	0.535	0.975	0.137
Calcium	36	36	100	NA	NA	1880	4960	9470	1850	NA	NA	NA	NA	1880	4960	9470	1850
Chromium	36	36	100	26	0	0.187	0.567	1.73	0.348	NA	NA	NA	NA	0.187	0.567	1.73	0.348
Cobalt	36	36	100	0.0051	100	0.0436	0.0941	0.226	0.0433	NA	NA	NA	NA	0.0436	0.0941	0.226	0.0433
Copper	36	36	100	0.69	75	0.328	1.04	3.73	0.678	NA	NA	NA	NA	0.328	1.04	3.73	0.678
Inorganic arsenic	18	13	72	0.0024	100	0.0311	0.066	0.101	0.0257	0.0029	0.00362	0.0044	0.000675	0.0029	0.0487	0.101	0.0359
Iron	36	36	100	12	100	51.5	201	590	114	NA	NA	NA	NA	51.5	201	590	114
Lead	36	36	100	NA	NA	0.0861	0.366	1.44	0.344	NA	NA	NA	NA	0.0861	0.366	1.44	0.344
Magnesium	36	36	100	NA	NA	57.2	112	387	65.1	NA	NA	NA	NA	57.2	112	387	65.1
Manganese	36	36	100	2.4	100	185	383	670	132	NA	NA	NA	NA	185	383	670	132
Mercury (µg/kg ww)	36	36	100	NA	NA	3.17	7.34	16.9	3.09	NA	NA	NA	NA	3.17	7.34	16.9	3.09
Methyl mercury (µg/kg ww)	18	18	100	1.7	44	0.8	1.84	4	0.875	NA	NA	NA	NA	0.8	1.84	4	0.875
Nickel	36	36	100	0.34	33	0.062	0.311	0.879	0.185	NA	NA	NA	NA	0.062	0.311	0.879	0.185
Potassium	36	36	100	NA	NA	57.5	140	312	52	NA	NA	NA	NA	57.5	140	312	52
Selenium	36	36	100	0.086	100	0.11	0.231	0.62	0.108	NA	NA	NA	NA	0.11	0.231	0.62	0.108
Silver	36	36	100	0.086	0	0.0087	0.023	0.0546	0.0124	NA	NA	NA	NA	0.0087	0.023	0.0546	0.0124
Sodium	36	36	100	NA	NA	194	302	415	44.4	NA	NA	NA	NA	194	302	415	44.4
Thallium	36	28	78	0.00017	100	0.0021	0.00616	0.0156	0.00321	0.00115	0.00161	0.0022	0.00038	0.00115	0.00515	0.0156	0.00342
Vanadium	36	36	100	0.086	67	0.026	0.21	0.948	0.208	NA	NA	NA	NA	0.026	0.21	0.948	0.208
Zinc	36	36	100	5.1	100	11.5	23.4	45.8	10.4	NA	NA	NA	NA	11.5	23.4	45.8	10.4
Conventional Parameters (% ww)																	
Lipids	16	16	100	NA	NA	0.12	0.364	1	0.187	NA	NA	NA	NA	0.12	0.364	1	0.187
Total solids	36	36	100	NA	NA	3.81	8	18.8	3.53	NA	NA	NA	NA	3.81	8	18.8	3.53
PCB Congeners (pg/g ww)																	
PCB 1	16	13	81	NA	NA	0.067	111	256	97.4	0.01095	0.0586	0.1325	0.0649	0.01095	90.5	256	98
PCB 2	16	10	62	NA	NA	0.032	16.7	28.2	9.56	0.0079	0.0178	0.0362	0.0111	0.0079	10.4	28.2	11.2
PCB 3	16	12	75	NA	NA	0.0531	74.3	145	56.9	0.009	0.0316	0.0425	0.0153	0.009	55.7	145	59
PCB 4/10	16	11	69	NA	NA	0.628	299	617	212	0.0655	0.126	0.177	0.0519	0.0655	206	617	225
PCB 5/8	16	15	94	NA	NA	0.807	801	1960	798	1.66	1.66	1.66	NA	0.807	751	1960	797
PCB 6	16	14	88	NA	NA	0.734	180	421	167	0.1405	0.423	0.705	0.399	0.1405	157	421	167
PCB 7/9	16	8	50	NA	NA	160	217	294	44.8	0.03835	0.114	0.1805	0.0561	0.03835	108	294	116
PCB 11	16	12	75	NA	NA	4.36	11.3	18.3	5.06	1.1	2.16	2.71	0.746	1.1	9.05	18.3	5.98
PCB 12/13	16	11	69	NA	NA	0.249	38.1	65.6	25.3	0.093	0.217	0.4325	0.141	0.093	26.2	65.6	27.5
PCB 14	16	3	19	NA	NA	0.144	0.169	0.182	0.0217	0.022	0.0813	0.1705	0.0456	0.022	0.0977	0.182	0.0546
PCB 15	16	16	100	NA	NA	0.58	92.5	232	96.1	NA	NA	NA	NA	0.58	92.5	232	96.1
PCB 16/32	16	16	100	NA	NA	2.34	345	977	362	NA	NA	NA	NA	2.34	345	977	362
PCB 17	16	16	100	NA	NA	1.21	261	766	277	NA	NA	NA	NA	1.21	261	766	277
PCB 18	16	16	100	NA	NA	2.57	773	3160	915	NA	NA	NA	NA	2.57	773	3160	915
PCB 19	16	16	100	NA	NA	0.206	68.8	224	75.8	NA	NA	NA	NA	0.206	68.8	224	75.8
PCB 20/21/33	16	16	100	NA	NA	2.89	309	812	325	NA	NA	NA	NA	2.89	309	812	325
PCB 22	16	16	100	NA	NA	2.35	135	375	139	NA	NA	NA	NA	2.35	135	375	139
PCB 23	16	8	50	NA	NA	1.05	1.67	2.31	0.465	0.00565	0.0221	0.04915	0.0155	0.00565	0.846	2.31	0.908
PCB 24/27	16	16	100	NA	NA	0.335	44.7	127	46.7	NA	NA	NA	NA	0.335	44.7	127	46.7
PCB 25	16	16	100	NA	NA	1.15	49	122	46.5	NA	NA	NA	NA	1.15	49	122	46.5
PCB 26	16	16	100	NA	NA	1.78	92.5	233	89.9	NA	NA	NA	NA	1.78	92.5	233	89.9
PCB 28	16	16	100	NA	NA	15.2	473	1320	476	NA	NA	NA	NA	15.2	473	1320	476
PCB 29	16	15	94	NA	NA	0.0321	6.28	15.6	6.18	0.047	0.047	0.047	NA	0.0321	5.89	15.6	6.17
PCB 30	16	8	50	NA	NA	0.657	1.02	1.58	0.288	0.002285	0.0118	0.0256	0.00762	0.002285	0.515	1.58	0.556
PCB 31	16	16	100	NA	NA	6.48	508	1340	523	NA	NA	NA	NA	6.48	508	1340	523
PCB 34	16	15	94	NA	NA	0.0729	2.82	6.17	2.53	0.1175	0.118	0.1175	NA	0.0729	2.66	6.17	2.54
PCB 35	16	16	100	NA	NA	0.0785	2.12	6.26	2.14	NA	NA	NA	NA	0.0785	2.12	6.26	2.14
PCB 36	16	5	31	NA	NA	0.0343	0.117	0.158	0.049	0.00775	0.0449	0.07	0.0244	0.00775	0.0673	0.158	0.0471
PCB 37	16	16	100	NA	NA	1.21	31.2	87.2	31.5	NA	NA	NA	NA	1.21	31.2	87.2	31.5

Table 5-1a. Summary of Results for Mussel Composites from Site Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
PCB Congeners (pg/g ww) (continued)																	
PCB 38	16	16	100	NA	NA	0.526	2.83	7.24	2.34	NA	NA	NA	NA	0.526	2.83	7.24	2.34
PCB 39	16	10	62	NA	NA	0.0478	0.211	0.415	0.125	0.00725	0.0486	0.115	0.0378	0.00725	0.15	0.415	0.128
PCB 40	16	16	100	NA	NA	1.29	20.3	49.9	18.9	NA	NA	NA	NA	1.29	20.3	49.9	18.9
PCB 41/64/71/ 72	16	16	100	NA	NA	12.1	139	343	124	NA	NA	NA	NA	12.1	139	343	124
PCB 42/59	16	16	100	NA	NA	4.49	52.2	129	47.3	NA	NA	NA	NA	4.49	52.2	129	47.3
PCB 43/49	16	16	100	NA	NA	19	193	473	170	NA	NA	NA	NA	19	193	473	170
PCB 44	16	16	100	NA	NA	6.22	172	442	168	NA	NA	NA	NA	6.22	172	442	168
PCB 45	16	16	100	NA	NA	1.75	54.9	134	55.2	NA	NA	NA	NA	1.75	54.9	134	55.2
PCB 46	16	16	100	NA	NA	0.661	19.2	47.4	19.3	NA	NA	NA	NA	0.661	19.2	47.4	19.3
PCB 47	16	16	100	NA	NA	8.79	64.4	147	48.9	NA	NA	NA	NA	8.79	64.4	147	48.9
PCB 48/75	16	16	100	NA	NA	2.76	51.7	132	50.3	NA	NA	NA	NA	2.76	51.7	132	50.3
PCB 50	16	16	100	NA	NA	0.0612	1.48	3.59	1.44	NA	NA	NA	NA	0.0612	1.48	3.59	1.44
PCB 51	16	16	100	NA	NA	0.879	16.9	41	15.5	NA	NA	NA	NA	0.879	16.9	41	15.5
PCB 52/69	16	16	100	NA	NA	26.1	289	714	265	NA	NA	NA	NA	26.1	289	714	265
PCB 53	16	16	100	NA	NA	2.05	54.4	128	52.7	NA	NA	NA	NA	2.05	54.4	128	52.7
PCB 54	16	15	94	NA	NA	0.158	1.54	3.49	1.3	0.02505	0.0251	0.02505	NA	0.02505	1.44	3.49	1.31
PCB 55	16	16	100	NA	NA	0.178	1.44	3.17	1.18	NA	NA	NA	NA	0.178	1.44	3.17	1.18
PCB 56/60	16	16	100	NA	NA	3.44	32.4	84	27.2	NA	NA	NA	NA	3.44	32.4	84	27.2
PCB 57	16	15	94	NA	NA	0.116	0.782	1.73	0.573	0.1165	0.117	0.1165	NA	0.116	0.74	1.73	0.578
PCB 58	16	14	88	NA	NA	0.0462	0.203	0.395	0.11	0.01565	0.0371	0.0585	0.0303	0.01565	0.182	0.395	0.117
PCB 61/70	16	16	100	NA	NA	9.37	92	240	79.6	NA	NA	NA	NA	9.37	92	240	79.6
PCB 62	16	8	50	NA	NA	0.147	0.194	0.255	0.0406	0.004645	0.0264	0.055	0.0205	0.004645	0.11	0.255	0.0918
PCB 63	16	16	100	NA	NA	0.627	4.41	10.9	3.51	NA	NA	NA	NA	0.627	4.41	10.9	3.51
PCB 65	16	8	50	NA	NA	0.27	0.356	0.532	0.0832	0.004915	0.028	0.0585	0.0217	0.004915	0.192	0.532	0.179
PCB 66/76	16	16	100	NA	NA	8.96	63.3	159	49	NA	NA	NA	NA	8.96	63.3	159	49
PCB 67	16	16	100	NA	NA	0.253	3.25	8.86	2.97	NA	NA	NA	NA	0.253	3.25	8.86	2.97
PCB 68	16	16	100	NA	NA	0.241	0.696	1.13	0.262	NA	NA	NA	NA	0.241	0.696	1.13	0.262
PCB 73	16	5	31	NA	NA	0.171	0.361	0.51	0.13	0.004545	0.0303	0.066	0.0219	0.004545	0.134	0.51	0.173
PCB 74	16	16	100	NA	NA	5.19	47.2	124	40.3	NA	NA	NA	NA	5.19	47.2	124	40.3
PCB 77	16	15	94	NA	NA	0.449	1.21	4.08	0.918	0.1155	0.116	0.1155	NA	0.1155	1.14	4.08	0.928
PCB 78	16	1	6	NA	NA	0.0526	0.0526	0.0526	NA	0.00496	0.0343	0.061	0.0191	0.00496	0.0355	0.061	0.019
PCB 79	16	16	100	NA	NA	0.351	1.02	1.56	0.466	NA	NA	NA	NA	0.351	1.02	1.56	0.466
PCB 80	16	0	0	NA	NA	NA	NA	NA	NA	0.004245	0.03	0.064	0.0182	0.004245	0.03	0.064	0.0182
PCB 81	16	16	100	NA	NA	0.0761	0.386	1.88	0.427	NA	NA	NA	NA	0.0761	0.386	1.88	0.427
PCB 82	16	16	100	NA	NA	1.03	3.85	8.47	2.19	NA	NA	NA	NA	1.03	3.85	8.47	2.19
PCB 83	16	4	25	NA	NA	0.0585	0.0673	0.0855	0.0125	0.002495	0.0253	0.0515	0.0172	0.002495	0.0358	0.0855	0.0245
PCB 84/92	16	16	100	NA	NA	6.47	35.7	82.7	26.7	NA	NA	NA	NA	6.47	35.7	82.7	26.7
PCB 85/116	16	16	100	NA	NA	2.67	8.05	15.8	3.95	NA	NA	NA	NA	2.67	8.05	15.8	3.95
PCB 86	16	10	62	NA	NA	0.0989	0.568	1.07	0.29	0.004255	0.0226	0.0665	0.0221	0.004255	0.364	1.07	0.354
PCB 87/117/125	16	16	100	NA	NA	4.67	18.4	39.5	11.1	NA	NA	NA	NA	4.67	18.4	39.5	11.1
PCB 88/91	16	16	100	NA	NA	2.77	16.4	36.4	12	NA	NA	NA	NA	2.77	16.4	36.4	12
PCB 89	16	14	88	NA	NA	0.126	1.25	2.67	0.915	0.116	0.121	0.126	0.00707	0.116	1.11	2.67	0.935
PCB 90/101	16	16	100	NA	NA	17.2	74.4	167	49	NA	NA	NA	NA	17.2	74.4	167	49
PCB 93	16	0	0	NA	NA	NA	NA	NA	NA	0.003725	0.0425	0.085	0.0257	0.003725	0.0425	0.085	0.0257
PCB 94	16	16	100	NA	NA	0.133	0.841	1.84	0.639	NA	NA	NA	NA	0.133	0.841	1.84	0.639
PCB 95/98/102	16	16	100	NA	NA	12.3	92.6	214	76.8	NA	NA	NA	NA	12.3	92.6	214	76.8
PCB 96	16	15	94	NA	NA	0.156	2.15	4.57	1.86	0.103	0.103	0.103	NA	0.103	2.02	4.57	1.87
PCB 97	16	16	100	NA	NA	3.53	14.9	33.1	9.38	NA	NA	NA	NA	3.53	14.9	33.1	9.38
PCB 100	16	16	100	NA	NA	0.506	1.3	2.11	0.44	NA	NA	NA	NA	0.506	1.3	2.11	0.44
PCB 99	16	16	100	NA	NA	9.2	34.1	70.1	18.8	NA	NA	NA	NA	9.2	34.1	70.1	18.8
PCB 103	16	16	100	NA	NA	0.411	1.39	2.65	0.732	NA	NA	NA	NA	0.411	1.39	2.65	0.732
PCB 104	16	12	75	NA	NA	0.0353	0.0742	0.0994	0.019	0.007	0.0298	0.0525	0.0193	0.007	0.0631	0.0994	0.0271
PCB 105	16	16	100	NA	NA	3.46	6.29	13.7	2.38	NA	NA	NA	NA	3.46	6.29	13.7	2.38
PCB 106/118	16	16	100	NA	NA	9.48	19.5	32.3	6.48	NA	NA	NA	NA	9.48	19.5	32.3	6.48
PCB 107/109	16	16	100	NA	NA	0.866	1.83	2.99	0.606	NA	NA	NA	NA	0.866	1.83	2.99	0.606
PCB 108/112	16	16	100	NA	NA	0.616	2.6	5.49	1.61	NA	NA	NA	NA	0.616	2.6	5.49	1.61
PCB 110	16	16	100	NA	NA	13.4	38.9	77.3	18.9	NA	NA	NA	NA	13.4	38.9	77.3	18.9
PCB 111/115	16	13	81	NA	NA	0.394	1.2	2.65	0.669	0.00228	0.0756	0.215	0.121	0.00228	0.99	2.65	0.752

Table 5-1a. Summary of Results for Mussel Composites from Site Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
PCB Congeners (pg/g ww) (continued)																	
PCB 113	16	0	0	NA	NA	NA	NA	NA	NA	0.002835	0.031	0.0595	0.0188	0.002835	0.031	0.0595	0.0188
PCB 114	16	16	100	NA	NA	0.282	0.744	2.68	0.57	NA	NA	NA	NA	0.282	0.744	2.68	0.57
PCB 119	16	16	100	NA	NA	0.456	1.37	2.54	0.548	NA	NA	NA	NA	0.456	1.37	2.54	0.548
PCB 120	16	10	62	NA	NA	0.127	0.181	0.243	0.0386	0.0021	0.0107	0.03015	0.00986	0.0021	0.117	0.243	0.0904
PCB 121	16	0	0	NA	NA	NA	NA	NA	NA	0.00232	0.0264	0.053	0.016	0.00232	0.0264	0.053	0.016
PCB 122	16	14	88	NA	NA	0.134	0.214	0.458	0.0917	0.03125	0.0734	0.1155	0.0596	0.03125	0.196	0.458	0.0991
PCB 123	16	16	100	NA	NA	0.195	0.608	3.66	0.825	NA	NA	NA	NA	0.195	0.608	3.66	0.825
PCB 124	16	15	94	NA	NA	0.553	1.17	2.02	0.413	0.2285	0.229	0.2285	NA	0.2285	1.11	2.02	0.464
PCB 126	16	15	94	NA	NA	0.0904	0.217	1.26	0.29	0.0535	0.0535	0.0535	NA	0.0535	0.207	1.26	0.283
PCB 127	16	0	0	NA	NA	NA	NA	NA	NA	0.01445	0.0671	0.1605	0.0537	0.01445	0.0671	0.1605	0.0537
PCB 128/162	16	16	100	NA	NA	1.78	3.07	6.38	1.07	NA	NA	NA	NA	1.78	3.07	6.38	1.07
PCB 129	16	16	100	NA	NA	0.448	0.904	1.87	0.316	NA	NA	NA	NA	0.448	0.904	1.87	0.316
PCB 130	16	16	100	NA	NA	1.11	1.93	4.4	0.737	NA	NA	NA	NA	1.11	1.93	4.4	0.737
PCB 131/133	16	16	100	NA	NA	0.709	1.17	2.02	0.323	NA	NA	NA	NA	0.709	1.17	2.02	0.323
PCB 132/161	16	16	100	NA	NA	3.73	6.66	12	2.01	NA	NA	NA	NA	3.73	6.66	12	2.01
PCB 134/143	16	16	100	NA	NA	0.977	1.91	3.19	0.677	NA	NA	NA	NA	0.977	1.91	3.19	0.677
PCB 135	16	16	100	NA	NA	2.3	5.58	8.66	1.83	NA	NA	NA	NA	2.3	5.58	8.66	1.83
PCB 136	16	16	100	NA	NA	2.17	7.45	14	4.21	NA	NA	NA	NA	2.17	7.45	14	4.21
PCB 138/163/164	16	16	100	NA	NA	16.7	28.3	60.2	9.94	NA	NA	NA	NA	16.7	28.3	60.2	9.94
PCB 137	16	16	100	NA	NA	0.652	1.15	1.88	0.32	NA	NA	NA	NA	0.652	1.15	1.88	0.32
PCB 139/149	16	16	100	NA	NA	13.2	28.2	42.9	8.11	NA	NA	NA	NA	13.2	28.2	42.9	8.11
PCB 140	16	12	75	NA	NA	0.153	0.235	0.441	0.0732	0.0435	0.0899	0.1405	0.04	0.0435	0.199	0.441	0.092
PCB 141	16	16	100	NA	NA	2.57	4.98	10.2	1.7	NA	NA	NA	NA	2.57	4.98	10.2	1.7
PCB 142	16	2	12	NA	NA	0.0198	0.0249	0.03	0.00721	0.0087	0.0377	0.0805	0.024	0.0087	0.0361	0.0805	0.0229
PCB 144	16	15	94	NA	NA	0.939	2.04	3.52	0.76	0.373	0.373	0.373	NA	0.373	1.94	3.52	0.845
PCB 145	16	5	31	NA	NA	0.0573	0.0734	0.0904	0.0143	0.002895	0.0264	0.055	0.0184	0.002895	0.0411	0.0904	0.028
PCB 146/165	16	16	100	NA	NA	3.79	5.99	11.7	1.89	NA	NA	NA	NA	3.79	5.99	11.7	1.89
PCB 147	16	15	94	NA	NA	0.587	1.21	1.83	0.348	0.805	0.805	0.805	NA	0.587	1.19	1.83	0.351
PCB 148	16	7	44	NA	NA	0.0782	0.12	0.17	0.0326	0.003825	0.0269	0.054	0.0189	0.003825	0.0676	0.17	0.0537
PCB 150	16	11	69	NA	NA	0.0853	0.168	0.259	0.0661	0.0101	0.0577	0.0995	0.0351	0.0101	0.133	0.259	0.0777
PCB 151	16	16	100	NA	NA	4.75	10.7	16.5	3.45	NA	NA	NA	NA	4.75	10.7	16.5	3.45
PCB 152	16	10	62	NA	NA	0.0594	0.146	0.234	0.0578	0.002785	0.0234	0.053	0.0192	0.002785	0.1	0.234	0.0769
PCB 153	16	16	100	NA	NA	21.7	35.5	67.1	10.9	NA	NA	NA	NA	21.7	35.5	67.1	10.9
PCB 154	16	15	94	NA	NA	0.499	1.08	1.51	0.252	0.423	0.423	0.423	NA	0.423	1.04	1.51	0.293
PCB 155	16	12	75	NA	NA	0.0607	0.118	0.239	0.0493	0.0283	0.0451	0.057	0.0124	0.0283	0.0997	0.239	0.0536
PCB 156	16	16	100	NA	NA	0.884	1.78	3.82	0.648	NA	NA	NA	NA	0.884	1.78	3.82	0.648
PCB 157	16	16	100	NA	NA	0.274	0.519	1.32	0.234	NA	NA	NA	NA	0.274	0.519	1.32	0.234
PCB 158/160	16	16	100	NA	NA	1.31	2.36	4.53	0.756	NA	NA	NA	NA	1.31	2.36	4.53	0.756
PCB 159	16	4	25	NA	NA	0.426	0.556	0.646	0.0943	0.00905	0.0279	0.04985	0.0129	0.00905	0.16	0.646	0.24
PCB 166	16	14	88	NA	NA	0.0607	0.107	0.231	0.0407	0.0215	0.0343	0.047	0.018	0.0215	0.0976	0.231	0.0455
PCB 167	16	16	100	NA	NA	0.683	1.22	2.4	0.41	NA	NA	NA	NA	0.683	1.22	2.4	0.41
PCB 168	16	7	44	NA	NA	0.0473	0.0807	0.165	0.0461	0.00545	0.0182	0.0494	0.0141	0.00545	0.0456	0.165	0.0445
PCB 169	16	15	94	NA	NA	0.0363	0.086	0.147	0.0316	0.01445	0.0145	0.01445	NA	0.01445	0.0816	0.147	0.0353
PCB 170	16	16	100	NA	NA	3.37	6.12	11.4	1.93	NA	NA	NA	NA	3.37	6.12	11.4	1.93
PCB 171	16	16	100	NA	NA	1.03	1.88	3.3	0.527	NA	NA	NA	NA	1.03	1.88	3.3	0.527
PCB 172	16	16	100	NA	NA	0.984	1.84	3.51	0.605	NA	NA	NA	NA	0.984	1.84	3.51	0.605
PCB 173	16	15	94	NA	NA	0.119	0.184	0.353	0.0565	0.0225	0.0225	0.0225	NA	0.0225	0.174	0.353	0.0679
PCB 174	16	16	100	NA	NA	5.29	9.84	19.9	3.3	NA	NA	NA	NA	5.29	9.84	19.9	3.3
PCB 175	16	15	94	NA	NA	0.293	0.449	0.75	0.113	0.099	0.099	0.099	NA	0.099	0.427	0.75	0.14
PCB 176	16	16	100	NA	NA	0.658	1.24	2.13	0.343	NA	NA	NA	NA	0.658	1.24	2.13	0.343
PCB 177	16	16	100	NA	NA	3.86	6.55	13.5	2.36	NA	NA	NA	NA	3.86	6.55	13.5	2.36
PCB 178	16	16	100	NA	NA	1.66	3.12	5.77	0.938	NA	NA	NA	NA	1.66	3.12	5.77	0.938
PCB 179	16	16	100	NA	NA	2.83	5.69	10.8	1.83	NA	NA	NA	NA	2.83	5.69	10.8	1.83
PCB 180	16	16	100	NA	NA	12.1	22.9	40	6.97	NA	NA	NA	NA	12.1	22.9	40	6.97
PCB 181	16	0	0	NA	NA	NA	NA	NA	NA	0.00316	0.0195	0.0308	0.00812	0.00316	0.0195	0.0308	0.00812
PCB 182/187	16	16	100	NA	NA	9.06	16.9	30.3	4.94	NA	NA	NA	NA	9.06	16.9	30.3	4.94
PCB 183	16	16	100	NA	NA	2.51	4.91	7.53	1.25	NA	NA	NA	NA	2.51	4.91	7.53	1.25
PCB 184	16	14	88	NA	NA	0.0859	0.184	0.441	0.0866	0.01015	0.0308	0.0515	0.0292	0.01015	0.165	0.441	0.0964

Table 5-1a. Summary of Results for Mussel Composites from Site Areas

Analyte	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
PCB Congeners (pg/g ww) (continued)																	
PCB 185	16	15	94	NA	NA	0.771	1.22	2.46	0.392	0.2805	0.281	0.2805	NA	0.2805	1.16	2.46	0.445
PCB 186	16	0	0	NA	NA	NA	NA	NA	NA	0.002485	0.0145	0.02295	0.00598	0.002485	0.0145	0.02295	0.00598
PCB 188	16	10	62	NA	NA	0.0476	0.0665	0.0914	0.0149	0.00248	0.0171	0.03545	0.0125	0.00248	0.048	0.0914	0.0282
PCB 189	16	16	100	NA	NA	0.185	0.302	0.485	0.0877	NA	NA	NA	NA	0.185	0.302	0.485	0.0877
PCB 190	16	16	100	NA	NA	0.729	1.45	2.6	0.423	NA	NA	NA	NA	0.729	1.45	2.6	0.423
PCB 191	16	15	94	NA	NA	0.186	0.306	0.463	0.0705	0.094	0.094	0.094	NA	0.094	0.293	0.463	0.0864
PCB 192	16	0	0	NA	NA	NA	NA	NA	NA	0.002475	0.0153	0.02415	0.00636	0.002475	0.0153	0.02415	0.00636
PCB 193	16	16	100	NA	NA	0.673	1.28	2.39	0.391	NA	NA	NA	NA	0.673	1.28	2.39	0.391
PCB 194	16	16	100	NA	NA	3.5	5.69	9.11	1.76	NA	NA	NA	NA	3.5	5.69	9.11	1.76
PCB 195	16	16	100	NA	NA	1.33	2.21	3.63	0.654	NA	NA	NA	NA	1.33	2.21	3.63	0.654
PCB 196/203	16	16	100	NA	NA	3.8	7.69	13.2	2.62	NA	NA	NA	NA	3.8	7.69	13.2	2.62
PCB 197	16	15	94	NA	NA	0.141	0.257	0.477	0.084	0.1055	0.106	0.1055	NA	0.1055	0.247	0.477	0.0895
PCB 198	16	15	94	NA	NA	0.194	0.333	0.64	0.118	0.082	0.082	0.082	NA	0.082	0.317	0.64	0.13
PCB 199	16	16	100	NA	NA	5.18	10.1	19.7	4.11	NA	NA	NA	NA	5.18	10.1	19.7	4.11
PCB 200	16	14	88	NA	NA	0.405	0.76	1.5	0.263	0.406	0.481	0.555	0.105	0.405	0.725	1.5	0.264
PCB 201	16	16	100	NA	NA	0.543	0.977	1.79	0.336	NA	NA	NA	NA	0.543	0.977	1.79	0.336
PCB 202	16	16	100	NA	NA	1.59	2.87	5.67	1.09	NA	NA	NA	NA	1.59	2.87	5.67	1.09
PCB 204	16	2	12	NA	NA	0.0193	0.0299	0.0404	0.0149	0.0087	0.0246	0.03975	0.0112	0.0087	0.0253	0.0404	0.0113
PCB 205	16	16	100	NA	NA	0.197	0.318	0.485	0.0801	NA	NA	NA	NA	0.197	0.318	0.485	0.0801
PCB 206	16	16	100	NA	NA	2.79	4.68	7.87	1.62	NA	NA	NA	NA	2.79	4.68	7.87	1.62
PCB 207	16	16	100	NA	NA	0.244	0.419	0.64	0.123	NA	NA	NA	NA	0.244	0.419	0.64	0.123
PCB 208	16	16	100	NA	NA	0.911	1.71	3.07	0.631	NA	NA	NA	NA	0.911	1.71	3.07	0.631
Decachlorobiphenyl	16	16	100	NA	NA	0.925	2.06	3.77	0.912	NA	NA	NA	NA	0.925	2.06	3.77	0.912
Total PCB congeners, 1/2 DL	16	16	100	NA	NA	479	6530	16100	6150	NA	NA	NA	NA	479	6530	16100	6150
Total PCB congeners, 0 DL	16	16	100	NA	NA	478	6530	16100	6150	NA	NA	NA	NA	478	6530	16100	6150
PCB TEQ, mammal, 1/2 DL	16	16	100	0.0024	100	0.00769	0.0241	0.133	0.0294	NA	NA	NA	NA	0.00769	0.0241	0.133	0.0294
PCB TEQ, mammal, 0 DL	16	16	100	0.0024	94	0.00234	0.0235	0.133	0.0297	NA	NA	NA	NA	0.00234	0.0235	0.133	0.0297
Monochlorobiphenyl homologs	16	13	81	NA	NA	0.0976	193	429	166	0.0291	0.0527	0.068	0.0207	0.0291	157	429	168
Dichlorobiphenyl homologs	16	16	100	NA	NA	5.71	1350	3580	1430	NA	NA	NA	NA	5.71	1350	3580	1430
Trichlorobiphenyl homologs	16	16	100	NA	NA	39	3110	8860	3230	NA	NA	NA	NA	39	3110	8860	3230
Tetrachlorobiphenyl homologs	16	16	100	NA	NA	124	1380	3420	1240	NA	NA	NA	NA	124	1380	3420	1240
Pentachlorobiphenyl homologs	16	16	100	NA	NA	90.8	380	819	240	NA	NA	NA	NA	90.8	380	819	240
Hexachlorobiphenyl homologs	16	16	100	NA	NA	81.6	154	272	43.5	NA	NA	NA	NA	81.6	154	272	43.5
Heptachlorobiphenyl homologs	16	16	100	NA	NA	45.2	86.2	158	26	NA	NA	NA	NA	45.2	86.2	158	26
Octachlorobiphenyl homologs	16	16	100	NA	NA	16.8	31.1	56	10.8	NA	NA	NA	NA	16.8	31.1	56	10.8
Nonachlorobiphenyl homologs	16	16	100	NA	NA	4.03	6.81	11.6	2.36	NA	NA	NA	NA	4.03	6.81	11.6	2.36
Decachlorobiphenyl homologs	16	16	100	NA	NA	0.925	2.06	3.77	0.912	NA	NA	NA	NA	0.925	2.06	3.77	0.912
Dioxins/Furans (pg/g ww)																	
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	15	3	20	NA	NA	0.0758	0.132	0.187	0.0556	0.02775	0.0655	0.2415	0.0628	0.02775	0.0788	0.2415	0.0655
1,2,3,4,6,7,8-Heptachlorodibenzofuran	15	1	7	NA	NA	0.18	0.18	0.18	NA	0.0059	0.0261	0.082	0.0205	0.0059	0.0363	0.18	0.0444
1,2,3,4,7,8,9-Heptachlorodibenzofuran	15	0	0	NA	NA	NA	NA	NA	NA	0.0066	0.0311	0.081	0.0195	0.0066	0.0311	0.081	0.0195
1,2,3,4,7,8-Hexachlorodibenzodioxin	15	0	0	NA	NA	NA	NA	NA	NA	0.02035	0.0514	0.1405	0.0341	0.02035	0.0514	0.1405	0.0341
1,2,3,4,7,8-Hexachlorodibenzofuran	15	0	0	NA	NA	NA	NA	NA	NA	0.0054	0.0211	0.063	0.0154	0.0054	0.0211	0.063	0.0154
1,2,3,6,7,8-Hexachlorodibenzodioxin	15	0	0	NA	NA	NA	NA	NA	NA	0.0198	0.0528	0.1425	0.034	0.0198	0.0528	0.1425	0.034
1,2,3,6,7,8-Hexachlorodibenzofuran	15	0	0	NA	NA	NA	NA	NA	NA	0.0053	0.0209	0.0635	0.0156	0.0053	0.0209	0.0635	0.0156
1,2,3,7,8,9-Hexachlorodibenzodioxin	15	1	7	NA	NA	0.183	0.183	0.183	NA	0.0198	0.0547	0.149	0.0371	0.0198	0.0633	0.183	0.0488
1,2,3,7,8,9-Hexachlorodibenzofuran	15	1	7	NA	NA	0.0665	0.0665	0.0665	NA	0.0077	0.0303	0.094	0.0228	0.0077	0.0328	0.094	0.0239
1,2,3,7,8-Pentachlorodibenzodioxin	15	0	0	NA	NA	NA	NA	NA	NA	0.0087	0.0396	0.0795	0.0166	0.0087	0.0396	0.0795	0.0166
1,2,3,7,8-Pentachlorodibenzofuran	15	0	0	NA	NA	NA	NA	NA	NA	0.0058	0.0379	0.108	0.0256	0.0058	0.0379	0.108	0.0256
2,3,4,6,7,8-Hexachlorodibenzofuran	15	0	0	NA	NA	NA	NA	NA	NA	0.00595	0.023	0.072	0.0176	0.00595	0.023	0.072	0.0176
2,3,4,7,8-Pentachlorodibenzofuran	15	0	0	NA	NA	NA	NA	NA	NA	0.00505	0.0385	0.111	0.0267	0.00505	0.0385	0.111	0.0267
2,3,7,8-Tetrachlorodibenzodioxin	15	0	0	NA	NA	NA	NA	NA	NA	0.00498	0.0236	0.071	0.016	0.00498	0.0236	0.071	0.016
2,3,7,8-Tetrachlorodibenzofuran	15	0	0	NA	NA	NA	NA	NA	NA	0.0071	0.0319	0.0875	0.0234	0.0071	0.0319	0.0875	0.0234
Dioxin TEQ, mammal, 1/2 DL	15	12	80	0.0024	100	0.0255	0.0984	0.221	0.0448	0.0425	0.074	0.1285	0.0474	0.0255	0.0935	0.221	0.0448
Dioxin TEQ, mammal, 0 DL	15	12	80	0.0024	17	0.0000291	0.00243	0.0201	0.00566	0	0	0	0	0	0.00194	0.0201	0.00511
Total TEQ, mammal, 1/2 DL	15	15	100	NA	NA	0.0374	0.132	0.269	0.0621	NA	NA	NA	NA	0.0374	0.132	0.269	0.0621
Total TEQ, mammal, 0 DL	15	15	100	NA	NA	0.00248	0.0252	0.133	0.0305	NA	NA	NA	NA	0.00248	0.0252	0.133	0.0305

Table 5-1a. Summary of Results for Mussel Composites from Site Areas

Analyte	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Dioxins/Furans (pg/g ww) (continued)																	
Tetrachlorodibenzodioxin (Total)	15	2	13	NA	NA	0.0256	0.109	0.192	0.118	0.01255	0.0253	0.071	0.0163	0.01255	0.0364	0.192	0.0456
Tetrachlorodibenzofuran (Total)	15	1	7	NA	NA	0.102	0.102	0.102	NA	0.0071	0.0339	0.0875	0.0237	0.0071	0.0384	0.102	0.0288
Pentachlorodibenzodioxin (Total)	15	0	0	NA	NA	NA	NA	NA	NA	0.0087	0.0453	0.105	0.0254	0.0087	0.0453	0.105	0.0254
Pentachlorodibenzofuran (Total)	15	0	0	NA	NA	NA	NA	NA	NA	0.0054	0.0382	0.1095	0.0261	0.0054	0.0382	0.1095	0.0261
Hexachlorodibenzodioxin (Total)	15	1	7	NA	NA	1.17	1.17	1.17	NA	0.02	0.0538	0.144	0.0356	0.02	0.128	1.17	0.29
Hexachlorodibenzofuran (Total)	15	1	7	NA	NA	0.0665	0.0665	0.0665	NA	0.00605	0.0241	0.0725	0.018	0.00605	0.0269	0.0725	0.0205
Heptachlorodibenzodioxin (Total)	15	7	47	NA	NA	0.0968	0.15	0.187	0.0297	0.02775	0.0728	0.2415	0.0762	0.02775	0.109	0.2415	0.0697
Heptachlorodibenzofuran (Total)	15	2	13	NA	NA	0.0298	0.167	0.305	0.195	0.01365	0.0302	0.081	0.0199	0.01365	0.0485	0.305	0.0733
Octachlorodibenzodioxin	15	9	60	NA	NA	0.346	0.649	1.12	0.284	0.184	0.237	0.2845	0.0401	0.184	0.484	1.12	0.301
Octachlorodibenzofuran	15	1	7	NA	NA	0.0971	0.0971	0.0971	NA	0.0186	0.0701	0.2245	0.0594	0.0186	0.0719	0.2245	0.0577

Notes:

Field split results were averaged with the parent sample result.

As reflected in the total count of results, there was insufficient mass to analyze for PCB congeners in two site area mussel samples and for dioxins/furans in three site area mussel samples.

Three significant figures were applied to the mean and standard deviation (SD).

[a] Summary statistics were calculated using half the method detection limit (MDL) for non-detected inorganic results (including methyl mercury) and half the estimated detection limit (EDL) for non-detected organic results.

[b] For non-detected results, the minimum value is half the MDL for inorganic results and half the EDL for organic results.

DL - detection limit

HH RBC - human health risk-based concentration

NA - not applicable

PCB - polychlorinated biphenyl

TEQ - toxic equivalents

Table 5-1b. Summary of Results for Mussel Composites from Reference Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Metals/Metalloids (mg/kg ww except mercury and methyl mercury)																	
Aluminum	6	6	100	17	83	5.29	56.3	128	44.4	NA	NA	NA	NA	5.29	56.3	128	44.4
Antimony	6	0	0	0.0069	NA	NA	NA	NA	NA	0.001	0.00167	0.0025	0.000606	0.001	0.00167	0.0025	0.000606
Arsenic	6	6	100	0.0024	100	0.605	0.813	0.98	0.131	NA	NA	NA	NA	0.605	0.813	0.98	0.131
Barium	6	6	100	3.4	100	21.3	25.3	27.4	2.35	NA	NA	NA	NA	21.3	25.3	27.4	2.35
Beryllium	6	6	100	0.034	0	0.002	0.00417	0.0069	0.00173	NA	NA	NA	NA	0.002	0.00417	0.0069	0.00173
Cadmium	6	6	100	0.017	100	0.0463	0.0722	0.107	0.0216	NA	NA	NA	NA	0.0463	0.0722	0.107	0.0216
Calcium	6	6	100	NA	NA	2370	3090	3830	510	NA	NA	NA	NA	2370	3090	3830	510
Chromium	6	6	100	26	0	0.193	0.556	0.937	0.274	NA	NA	NA	NA	0.193	0.556	0.937	0.274
Cobalt	6	6	100	0.0051	100	0.0593	0.0837	0.125	0.0242	NA	NA	NA	NA	0.0593	0.0837	0.125	0.0242
Copper	6	6	100	0.69	83	0.638	1.13	1.56	0.306	NA	NA	NA	NA	0.638	1.13	1.56	0.306
Inorganic arsenic	6	6	100	0.0024	100	0.0254	0.0427	0.0714	0.0163	NA	NA	NA	NA	0.0254	0.0427	0.0714	0.0163
Iron	6	6	100	12	100	156	185	221	23.5	NA	NA	NA	NA	156	185	221	23.5
Lead	6	6	100	NA	NA	0.0595	0.0777	0.103	0.0167	NA	NA	NA	NA	0.0595	0.0777	0.103	0.0167
Magnesium	6	6	100	NA	NA	96.5	163	202	43.4	NA	NA	NA	NA	96.5	163	202	43.4
Manganese	6	6	100	2.4	100	236	274	313	34.1	NA	NA	NA	NA	236	274	313	34.1
Mercury (µg/kg ww)	6	6	100	NA	NA	21.3	37.4	46.3	8.92	NA	NA	NA	NA	21.3	37.4	46.3	8.92
Methyl mercury (µg/kg ww)	6	6	100	1.7	100	5.2	22.9	35	10.4	NA	NA	NA	NA	5.2	22.9	35	10.4
Nickel	6	6	100	0.34	50	0.127	0.277	0.419	0.108	NA	NA	NA	NA	0.127	0.277	0.419	0.108
Potassium	6	6	100	NA	NA	168	213	272	37.3	NA	NA	NA	NA	168	213	272	37.3
Selenium	6	6	100	0.086	100	0.37	0.455	0.55	0.0764	NA	NA	NA	NA	0.37	0.455	0.55	0.0764
Silver	6	6	100	0.086	0	0.0389	0.0551	0.0718	0.0109	NA	NA	NA	NA	0.0389	0.0551	0.0718	0.0109
Sodium	6	6	100	NA	NA	251	281	309	20.2	NA	NA	NA	NA	251	281	309	20.2
Thallium	6	2	33	0.00017	100	0.0006	0.00065	0.0007	0.0000707	0.0002	0.0003	0.0005	0.000141	0.0002	0.000417	0.0007	0.000214
Vanadium	6	6	100	0.086	83	0.0485	0.172	0.34	0.104	NA	NA	NA	NA	0.0485	0.172	0.34	0.104
Zinc	6	6	100	5.1	100	10.7	13.5	17.6	2.71	NA	NA	NA	NA	10.7	13.5	17.6	2.71
Conventional Parameters (% ww)																	
Lipids	6	6	100	NA	NA	0.422	0.834	1.37	0.338	NA	NA	NA	NA	0.422	0.834	1.37	0.338
Total solids	6	6	100	NA	NA	8.44	11.7	15.1	2.62	NA	NA	NA	NA	8.44	11.7	15.1	2.62
PCB Congeners (pg/g ww)																	
PCB 1	6	4	67	NA	NA	0.0825	0.15	0.266	0.0809	0.01265	0.0131	0.0135	0.000601	0.01265	0.104	0.266	0.0944
PCB 2	6	1	17	NA	NA	0.0446	0.0446	0.0446	NA	0.0109	0.0285	0.0429	0.0152	0.0109	0.0312	0.0446	0.0151
PCB 3	6	3	50	NA	NA	0.0923	0.102	0.117	0.0133	0.0129	0.0595	0.102	0.0447	0.0129	0.0806	0.117	0.0375
PCB 4/10	6	4	67	NA	NA	0.442	0.51	0.563	0.053	0.0555	0.0938	0.132	0.0541	0.0555	0.371	0.563	0.22
PCB 5/8	6	6	100	NA	NA	1.68	2.35	2.57	0.34	NA	NA	NA	NA	1.68	2.35	2.57	0.34
PCB 6	6	5	83	NA	NA	0.832	0.933	0.981	0.0586	0.105	0.105	0.105	NA	0.105	0.795	0.981	0.342
PCB 7/9	6	0	0	NA	NA	NA	NA	NA	NA	0.03405	0.0907	0.13	0.0423	0.03405	0.0907	0.13	0.0423
PCB 11	6	4	67	NA	NA	4.64	6.05	7.63	1.36	2.265	2.63	2.995	0.516	2.265	4.91	7.63	2.07
PCB 12/13	6	3	50	NA	NA	0.481	0.491	0.512	0.0179	0.0985	0.19	0.2415	0.0793	0.0985	0.341	0.512	0.173
PCB 14	6	0	0	NA	NA	NA	NA	NA	NA	0.0285	0.0396	0.087	0.0233	0.0285	0.0396	0.087	0.0233
PCB 15	6	6	100	NA	NA	1.31	1.68	2	0.289	NA	NA	NA	NA	1.31	1.68	2	0.289
PCB 16/32	6	6	100	NA	NA	6.93	7.82	9.04	0.833	NA	NA	NA	NA	6.93	7.82	9.04	0.833
PCB 17	6	6	100	NA	NA	3.9	4.47	5.29	0.503	NA	NA	NA	NA	3.9	4.47	5.29	0.503
PCB 18	6	6	100	NA	NA	8.49	9.23	10.5	0.824	NA	NA	NA	NA	8.49	9.23	10.5	0.824
PCB 19	6	6	100	NA	NA	0.602	0.751	0.836	0.0867	NA	NA	NA	NA	0.602	0.751	0.836	0.0867
PCB 20/21/33	6	6	100	NA	NA	4.09	7.57	10	2.03	NA	NA	NA	NA	4.09	7.57	10	2.03
PCB 22	6	6	100	NA	NA	3.39	6.11	7.71	1.58	NA	NA	NA	NA	3.39	6.11	7.71	1.58
PCB 23	6	2	33	NA	NA	0.0364	0.0369	0.0373	0.000636	0.02115	0.0328	0.038	0.00784	0.02115	0.0341	0.038	0.00643
PCB 24/27	6	6	100	NA	NA	1.07	1.2	1.42	0.13	NA	NA	NA	NA	1.07	1.2	1.42	0.13
PCB 25	6	6	100	NA	NA	2.62	5.03	6.77	1.42	NA	NA	NA	NA	2.62	5.03	6.77	1.42
PCB 26	6	6	100	NA	NA	3.79	7.52	9.76	2.09	NA	NA	NA	NA	3.79	7.52	9.76	2.09
PCB 28	6	6	100	NA	NA	12.6	25.9	35	7.55	NA	NA	NA	NA	12.6	25.9	35	7.55
PCB 29	6	5	83	NA	NA	0.0932	0.109	0.131	0.0138	0.0204	0.0204	0.0204	NA	0.0204	0.0944	0.131	0.0383
PCB 30	6	0	0	NA	NA	NA	NA	NA	NA	0.00565	0.0132	0.0243	0.00766	0.00565	0.0132	0.0243	0.00766
PCB 31	6	6	100	NA	NA	10.4	21.8	28.9	6.44	NA	NA	NA	NA	10.4	21.8	28.9	6.44
PCB 34	6	6	100	NA	NA	0.116	0.241	0.331	0.0747	NA	NA	NA	NA	0.116	0.241	0.331	0.0747
PCB 35	6	5	83	NA	NA	0.143	0.169	0.218	0.0296	0.02845	0.0285	0.02845	NA	0.02845	0.146	0.218	0.0632
PCB 36	6	1	17	NA	NA	0.0463	0.0463	0.0463	NA	0.01095	0.0301	0.0389	0.0117	0.01095	0.0328	0.0463	0.0124
PCB 37	6	6	100	NA	NA	0.743	1.7	2.17	0.525	NA	NA	NA	NA	0.743	1.7	2.17	0.525

Table 5-1b. Summary of Results for Mussel Composites from Reference Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
PCB Congeners (pg/g ww) (continued)																	
PCB 38	6	6	100	NA	NA	0.528	0.974	1.83	0.492	NA	NA	NA	NA	0.528	0.974	1.83	0.492
PCB 39	6	2	33	NA	NA	0.0519	0.0565	0.061	0.00643	0.0252	0.0325	0.0362	0.00515	0.0252	0.0405	0.061	0.0133
PCB 40	6	6	100	NA	NA	1.49	2.24	2.86	0.535	NA	NA	NA	NA	1.49	2.24	2.86	0.535
PCB 41/64/71/ 72	6	6	100	NA	NA	14.1	20.1	24.7	4.35	NA	NA	NA	NA	14.1	20.1	24.7	4.35
PCB 42/59	6	6	100	NA	NA	4.65	7.11	8.83	1.69	NA	NA	NA	NA	4.65	7.11	8.83	1.69
PCB 43/49	6	6	100	NA	NA	22.7	32.4	39.8	6.7	NA	NA	NA	NA	22.7	32.4	39.8	6.7
PCB 44	6	6	100	NA	NA	6.03	15.8	23.8	7.37	NA	NA	NA	NA	6.03	15.8	23.8	7.37
PCB 45	6	6	100	NA	NA	1.76	2.7	3.3	0.589	NA	NA	NA	NA	1.76	2.7	3.3	0.589
PCB 46	6	6	100	NA	NA	0.64	0.926	1.1	0.166	NA	NA	NA	NA	0.64	0.926	1.1	0.166
PCB 47	6	6	100	NA	NA	12.6	17.9	21.4	3.44	NA	NA	NA	NA	12.6	17.9	21.4	3.44
PCB 48/75	6	6	100	NA	NA	2.75	3.96	4.98	0.792	NA	NA	NA	NA	2.75	3.96	4.98	0.792
PCB 50	6	3	50	NA	NA	0.107	0.14	0.183	0.039	0.015	0.0342	0.052	0.0185	0.015	0.0871	0.183	0.0641
PCB 51	6	6	100	NA	NA	1.41	2.15	2.64	0.45	NA	NA	NA	NA	1.41	2.15	2.64	0.45
PCB 52/69	6	6	100	NA	NA	25.3	37.1	48.4	8.3	NA	NA	NA	NA	25.3	37.1	48.4	8.3
PCB 53	6	6	100	NA	NA	3.12	4.53	5.4	0.828	NA	NA	NA	NA	3.12	4.53	5.4	0.828
PCB 54	6	4	67	NA	NA	0.109	0.165	0.206	0.0407	0.079	0.0875	0.096	0.012	0.079	0.139	0.206	0.0512
PCB 55	6	5	83	NA	NA	0.192	0.283	0.406	0.086	0.1	0.1	0.1	NA	0.1	0.252	0.406	0.107
PCB 56/60	6	6	100	NA	NA	5.04	7.11	9.37	1.65	NA	NA	NA	NA	5.04	7.11	9.37	1.65
PCB 57	6	6	100	NA	NA	0.169	0.208	0.249	0.0343	NA	NA	NA	NA	0.169	0.208	0.249	0.0343
PCB 58	6	4	67	NA	NA	0.0498	0.0892	0.114	0.0288	0.043	0.0478	0.0525	0.00672	0.043	0.0754	0.114	0.0311
PCB 61/70	6	6	100	NA	NA	13.3	18.8	26.4	4.99	NA	NA	NA	NA	13.3	18.8	26.4	4.99
PCB 62	6	0	0	NA	NA	NA	NA	NA	NA	0.0088	0.0221	0.0373	0.0133	0.0088	0.0221	0.0373	0.0133
PCB 63	6	6	100	NA	NA	0.857	1.2	1.48	0.235	NA	NA	NA	NA	0.857	1.2	1.48	0.235
PCB 65	6	0	0	NA	NA	NA	NA	NA	NA	0.0093	0.0233	0.03945	0.014	0.0093	0.0233	0.03945	0.014
PCB 66/76	6	6	100	NA	NA	12.1	17.5	23.2	4.17	NA	NA	NA	NA	12.1	17.5	23.2	4.17
PCB 67	6	6	100	NA	NA	0.388	0.474	0.574	0.0642	NA	NA	NA	NA	0.388	0.474	0.574	0.0642
PCB 68	6	6	100	NA	NA	0.292	0.416	0.491	0.068	NA	NA	NA	NA	0.292	0.416	0.491	0.068
PCB 73	6	4	67	NA	NA	0.102	0.164	0.231	0.054	0.00925	0.0109	0.0125	0.0023	0.00925	0.113	0.231	0.0896
PCB 74	6	6	100	NA	NA	7.82	10.4	13	2.15	NA	NA	NA	NA	7.82	10.4	13	2.15
PCB 77	6	6	100	NA	NA	0.347	0.502	0.659	0.131	NA	NA	NA	NA	0.347	0.502	0.659	0.131
PCB 78	6	0	0	NA	NA	NA	NA	NA	NA	0.0079	0.0209	0.03635	0.0122	0.0079	0.0209	0.03635	0.0122
PCB 79	6	6	100	NA	NA	0.334	0.484	0.859	0.201	NA	NA	NA	NA	0.334	0.484	0.859	0.201
PCB 80	6	0	0	NA	NA	NA	NA	NA	NA	0.00695	0.0179	0.03135	0.0105	0.00695	0.0179	0.03135	0.0105
PCB 81	6	5	83	NA	NA	0.0868	0.133	0.239	0.0679	0.0545	0.0545	0.0545	NA	0.0545	0.12	0.239	0.0687
PCB 82	6	5	83	NA	NA	1.15	1.74	2.9	0.715	0.725	0.725	0.725	NA	0.725	1.57	2.9	0.762
PCB 83	6	0	0	NA	NA	NA	NA	NA	NA	0.0071	0.0311	0.0575	0.0238	0.0071	0.0311	0.0575	0.0238
PCB 84/92	6	6	100	NA	NA	6.52	9.47	17	3.82	NA	NA	NA	NA	6.52	9.47	17	3.82
PCB 85/116	6	6	100	NA	NA	2.76	3.89	5.51	1.03	NA	NA	NA	NA	2.76	3.89	5.51	1.03
PCB 86	6	1	17	NA	NA	0.0951	0.0951	0.0951	NA	0.0121	0.0442	0.0915	0.0382	0.0121	0.0526	0.0951	0.04
PCB 87/117/125	6	6	100	NA	NA	4.96	7.32	13.5	3.17	NA	NA	NA	NA	4.96	7.32	13.5	3.17
PCB 88/91	6	6	100	NA	NA	3.22	4.32	6.45	1.18	NA	NA	NA	NA	3.22	4.32	6.45	1.18
PCB 89	6	5	83	NA	NA	0.0978	0.208	0.285	0.0709	0.0925	0.0925	0.0925	NA	0.0925	0.189	0.285	0.079
PCB 90/101	6	6	100	NA	NA	18.1	26.2	45.9	10.2	NA	NA	NA	NA	18.1	26.2	45.9	10.2
PCB 93	6	0	0	NA	NA	NA	NA	NA	NA	0.0108	0.0466	0.085	0.0359	0.0108	0.0466	0.085	0.0359
PCB 94	6	6	100	NA	NA	0.144	0.211	0.317	0.0627	NA	NA	NA	NA	0.144	0.211	0.317	0.0627
PCB 95/98/102	6	6	100	NA	NA	12.3	17.9	32.4	7.41	NA	NA	NA	NA	12.3	17.9	32.4	7.41
PCB 96	6	4	67	NA	NA	0.178	0.228	0.288	0.0485	0.076	0.084	0.092	0.0113	0.076	0.18	0.288	0.0836
PCB 97	6	6	100	NA	NA	3.76	5.58	10.1	2.32	NA	NA	NA	NA	3.76	5.58	10.1	2.32
PCB 100	6	5	83	NA	NA	0.708	0.879	1.06	0.145	0.37	0.37	0.37	NA	0.37	0.795	1.06	0.245
PCB 99	6	6	100	NA	NA	10.9	14.8	21.3	3.97	NA	NA	NA	NA	10.9	14.8	21.3	3.97
PCB 103	6	6	100	NA	NA	0.51	0.589	0.72	0.0936	NA	NA	NA	NA	0.51	0.589	0.72	0.0936
PCB 104	6	1	17	NA	NA	0.075	0.075	0.075	NA	0.0067	0.0285	0.053	0.021	0.0067	0.0362	0.075	0.0267
PCB 105	6	6	100	NA	NA	3.02	4.34	6.83	1.55	NA	NA	NA	NA	3.02	4.34	6.83	1.55
PCB 106/118	6	6	100	NA	NA	8.44	13.1	21.8	4.83	NA	NA	NA	NA	8.44	13.1	21.8	4.83
PCB 107/109	6	6	100	NA	NA	0.811	1.11	1.65	0.32	NA	NA	NA	NA	0.811	1.11	1.65	0.32
PCB 108/112	6	5	83	NA	NA	0.705	0.831	1.03	0.124	0.755	0.755	0.755	NA	0.705	0.818	1.03	0.115
PCB 110	6	6	100	NA	NA	12.3	19.3	36.2	8.83	NA	NA	NA	NA	12.3	19.3	36.2	8.83
PCB 111/115	6	5	83	NA	NA	0.257	0.351	0.417	0.0612	0.01275	0.0128	0.01275	NA	0.01275	0.295	0.417	0.149

Table 5-1b. Summary of Results for Mussel Composites from Reference Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
PCB Congeners (pg/g ww) (continued)																	
PCB 113	6	0	0	NA	NA	NA	NA	NA	NA	0.00785	0.0341	0.063	0.026	0.00785	0.0341	0.063	0.026
PCB 114	6	5	83	NA	NA	0.244	0.361	0.474	0.106	0.151	0.151	0.151	NA	0.151	0.326	0.474	0.128
PCB 119	6	6	100	NA	NA	0.621	0.805	1.06	0.181	NA	NA	NA	NA	0.621	0.805	1.06	0.181
PCB 120	6	2	33	NA	NA	0.0658	0.0763	0.0867	0.0148	0.00595	0.0174	0.0452	0.0187	0.00595	0.037	0.0867	0.0343
PCB 121	6	0	0	NA	NA	NA	NA	NA	NA	0.00675	0.029	0.053	0.0224	0.00675	0.029	0.053	0.0224
PCB 122	6	2	33	NA	NA	0.0836	0.102	0.12	0.0257	0.0194	0.05	0.076	0.0285	0.0194	0.0673	0.12	0.0366
PCB 123	6	5	83	NA	NA	0.183	0.29	0.459	0.102	0.0925	0.0925	0.0925	NA	0.0925	0.257	0.459	0.122
PCB 124	6	6	100	NA	NA	0.427	0.649	1.24	0.31	NA	NA	NA	NA	0.427	0.649	1.24	0.31
PCB 126	6	3	50	NA	NA	0.0713	0.104	0.152	0.0427	0.0125	0.0387	0.081	0.037	0.0125	0.0712	0.152	0.0504
PCB 127	6	0	0	NA	NA	NA	NA	NA	NA	0.0119	0.0408	0.085	0.0337	0.0119	0.0408	0.085	0.0337
PCB 128/162	6	6	100	NA	NA	0.958	1.4	2.22	0.467	NA	NA	NA	NA	0.958	1.4	2.22	0.467
PCB 129	6	6	100	NA	NA	0.33	0.518	0.958	0.239	NA	NA	NA	NA	0.33	0.518	0.958	0.239
PCB 130	6	5	83	NA	NA	0.69	0.921	1.33	0.262	0.2935	0.294	0.2935	NA	0.2935	0.817	1.33	0.347
PCB 131/133	6	4	67	NA	NA	0.453	0.598	0.732	0.15	0.19	0.221	0.251	0.0431	0.19	0.472	0.732	0.228
PCB 132/161	6	5	83	NA	NA	2.12	3.63	6.23	1.68	1.13	1.13	1.13	NA	1.13	3.22	6.23	1.81
PCB 134/143	6	6	100	NA	NA	0.545	0.897	1.68	0.408	NA	NA	NA	NA	0.545	0.897	1.68	0.408
PCB 135	6	6	100	NA	NA	1.62	2.59	4.99	1.27	NA	NA	NA	NA	1.62	2.59	4.99	1.27
PCB 136	6	6	100	NA	NA	1.37	1.98	3.42	0.738	NA	NA	NA	NA	1.37	1.98	3.42	0.738
PCB 138/163/164	6	6	100	NA	NA	10.4	14.3	21.5	4.45	NA	NA	NA	NA	10.4	14.3	21.5	4.45
PCB 137	6	5	83	NA	NA	0.441	0.699	1.1	0.273	0.202	0.202	0.202	NA	0.202	0.616	1.1	0.318
PCB 139/149	6	6	100	NA	NA	8.97	13.9	23.6	5.33	NA	NA	NA	NA	8.97	13.9	23.6	5.33
PCB 140	6	1	17	NA	NA	0.168	0.168	0.168	NA	0.03035	0.0627	0.1205	0.0396	0.03035	0.0802	0.168	0.0557
PCB 141	6	6	100	NA	NA	1.69	2.36	3.79	0.856	NA	NA	NA	NA	1.69	2.36	3.79	0.856
PCB 142	6	0	0	NA	NA	NA	NA	NA	NA	0.01165	0.0346	0.06	0.0239	0.01165	0.0346	0.06	0.0239
PCB 144	6	5	83	NA	NA	0.323	0.459	0.66	0.129	0.1515	0.152	0.1515	NA	0.1515	0.408	0.66	0.171
PCB 145	6	0	0	NA	NA	NA	NA	NA	NA	0.0083	0.039	0.0895	0.0299	0.0083	0.039	0.0895	0.0299
PCB 146/165	6	6	100	NA	NA	2.45	3.4	4.72	1.02	NA	NA	NA	NA	2.45	3.4	4.72	1.02
PCB 147	6	6	100	NA	NA	0.523	0.8	1.26	0.268	NA	NA	NA	NA	0.523	0.8	1.26	0.268
PCB 148	6	1	17	NA	NA	0.0908	0.0908	0.0908	NA	0.011	0.0446	0.1185	0.0422	0.011	0.0523	0.1185	0.0422
PCB 150	6	3	50	NA	NA	0.0479	0.0688	0.089	0.0206	0.02205	0.0497	0.0875	0.0339	0.02205	0.0593	0.089	0.0271
PCB 151	6	6	100	NA	NA	3.4	4.78	7.39	1.46	NA	NA	NA	NA	3.4	4.78	7.39	1.46
PCB 152	6	2	33	NA	NA	0.0336	0.043	0.0524	0.0133	0.017	0.0444	0.0865	0.0322	0.017	0.044	0.0865	0.0256
PCB 153	6	6	100	NA	NA	13.3	18.1	25.4	5.05	NA	NA	NA	NA	13.3	18.1	25.4	5.05
PCB 154	6	6	100	NA	NA	0.596	0.73	0.901	0.137	NA	NA	NA	NA	0.596	0.73	0.901	0.137
PCB 155	6	3	50	NA	NA	0.0663	0.101	0.15	0.0435	0.0206	0.0473	0.082	0.0315	0.0206	0.0743	0.15	0.045
PCB 156	6	5	83	NA	NA	0.431	0.564	0.811	0.161	0.2685	0.269	0.2685	NA	0.2685	0.515	0.811	0.188
PCB 157	6	6	100	NA	NA	0.144	0.218	0.351	0.0783	NA	NA	NA	NA	0.144	0.218	0.351	0.0783
PCB 158/160	6	4	67	NA	NA	0.567	0.673	0.912	0.162	0.2235	0.23	0.2365	0.00919	0.2235	0.525	0.912	0.261
PCB 159	6	2	33	NA	NA	0.125	0.135	0.145	0.0141	0.03145	0.0457	0.085	0.0262	0.03145	0.0754	0.145	0.0508
PCB 166	6	3	50	NA	NA	0.0478	0.083	0.143	0.0522	0.02	0.0306	0.0372	0.00925	0.02	0.0568	0.143	0.0442
PCB 167	6	6	100	NA	NA	0.337	0.52	0.853	0.207	NA	NA	NA	NA	0.337	0.52	0.853	0.207
PCB 168	6	1	17	NA	NA	0.0817	0.0817	0.0817	NA	0.00735	0.0192	0.03755	0.0153	0.00735	0.0296	0.0817	0.029
PCB 169	6	6	100	NA	NA	0.105	0.146	0.208	0.0367	NA	NA	NA	NA	0.105	0.146	0.208	0.0367
PCB 170	6	6	100	NA	NA	0.698	0.916	1.1	0.178	NA	NA	NA	NA	0.698	0.916	1.1	0.178
PCB 171	6	6	100	NA	NA	0.225	0.283	0.338	0.0439	NA	NA	NA	NA	0.225	0.283	0.338	0.0439
PCB 172	6	6	100	NA	NA	0.328	0.456	0.644	0.118	NA	NA	NA	NA	0.328	0.456	0.644	0.118
PCB 173	6	0	0	NA	NA	NA	NA	NA	NA	0.0136	0.0273	0.046	0.0135	0.0136	0.0273	0.046	0.0135
PCB 174	6	6	100	NA	NA	2.61	3.37	4.37	0.756	NA	NA	NA	NA	2.61	3.37	4.37	0.756
PCB 175	6	3	50	NA	NA	0.0614	0.0669	0.072	0.00531	0.0155	0.0282	0.0389	0.0118	0.0155	0.0475	0.072	0.0227
PCB 176	6	6	100	NA	NA	0.124	0.199	0.257	0.0436	NA	NA	NA	NA	0.124	0.199	0.257	0.0436
PCB 177	6	6	100	NA	NA	0.983	1.37	1.85	0.314	NA	NA	NA	NA	0.983	1.37	1.85	0.314
PCB 178	6	6	100	NA	NA	1.01	1.31	1.55	0.25	NA	NA	NA	NA	1.01	1.31	1.55	0.25
PCB 179	6	6	100	NA	NA	1.53	2.03	2.7	0.455	NA	NA	NA	NA	1.53	2.03	2.7	0.455
PCB 180	6	6	100	NA	NA	2.41	3.14	3.84	0.565	NA	NA	NA	NA	2.41	3.14	3.84	0.565
PCB 181	6	0	0	NA	NA	NA	NA	NA	NA	0.01135	0.0228	0.03835	0.0113	0.01135	0.0228	0.03835	0.0113
PCB 182/187	6	6	100	NA	NA	4.03	5.54	7.1	1.31	NA	NA	NA	NA	4.03	5.54	7.1	1.31
PCB 183	6	5	83	NA	NA	0.652	0.801	1.05	0.15	0.3755	0.376	0.3755	NA	0.3755	0.73	1.05	0.219
PCB 184	6	0	0	NA	NA	NA	NA	NA	NA	0.0084	0.0185	0.031	0.00945	0.0084	0.0185	0.031	0.00945

Table 5-1b. Summary of Results for Mussel Composites from Reference Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
PCB Congeners (pg/g ww) (continued)																	
PCB 185	6	6	100	NA	NA	0.284	0.371	0.441	0.0752	NA	NA	NA	NA	0.284	0.371	0.441	0.0752
PCB 186	6	0	0	NA	NA	NA	NA	NA	NA	0.00775	0.017	0.02855	0.00869	0.00775	0.017	0.02855	0.00869
PCB 188	6	1	17	NA	NA	0.0694	0.0694	0.0694	NA	0.0065	0.017	0.0295	0.0112	0.0065	0.0258	0.0694	0.0236
PCB 189	6	3	50	NA	NA	0.0281	0.0341	0.0373	0.0052	0.0161	0.0209	0.02675	0.00539	0.0161	0.0275	0.0373	0.00863
PCB 190	6	5	83	NA	NA	0.309	0.377	0.488	0.0728	0.1335	0.134	0.1335	NA	0.1335	0.337	0.488	0.119
PCB 191	6	0	0	NA	NA	NA	NA	NA	NA	0.00835	0.0168	0.02825	0.00831	0.00835	0.0168	0.02825	0.00831
PCB 192	6	0	0	NA	NA	NA	NA	NA	NA	0.0089	0.0179	0.03005	0.00884	0.0089	0.0179	0.03005	0.00884
PCB 193	6	6	100	NA	NA	0.312	0.426	0.527	0.0865	NA	NA	NA	NA	0.312	0.426	0.527	0.0865
PCB 194	6	6	100	NA	NA	0.364	0.527	0.653	0.118	NA	NA	NA	NA	0.364	0.527	0.653	0.118
PCB 195	6	4	67	NA	NA	0.164	0.218	0.267	0.0437	0.0985	0.101	0.103	0.00318	0.0985	0.179	0.267	0.0695
PCB 196/203	6	5	83	NA	NA	0.427	0.681	0.911	0.231	0.312	0.312	0.312	NA	0.312	0.62	0.911	0.255
PCB 197	6	1	17	NA	NA	0.0244	0.0244	0.0244	NA	0.0159	0.0347	0.0715	0.0222	0.0159	0.0329	0.0715	0.0203
PCB 198	6	2	33	NA	NA	0.0785	0.0958	0.113	0.0244	0.01015	0.0396	0.1045	0.0438	0.01015	0.0583	0.113	0.046
PCB 199	6	6	100	NA	NA	2.24	3.45	4.45	0.923	NA	NA	NA	NA	2.24	3.45	4.45	0.923
PCB 200	6	4	67	NA	NA	0.173	0.228	0.316	0.0682	0.0805	0.111	0.142	0.0435	0.0805	0.189	0.316	0.0824
PCB 201	6	2	33	NA	NA	0.103	0.12	0.136	0.0233	0.0181	0.0375	0.062	0.0182	0.0181	0.0648	0.136	0.0458
PCB 202	6	6	100	NA	NA	1.16	1.61	2.01	0.344	NA	NA	NA	NA	1.16	1.61	2.01	0.344
PCB 204	6	0	0	NA	NA	NA	NA	NA	NA	0.0069	0.0319	0.0805	0.0274	0.0069	0.0319	0.0805	0.0274
PCB 205	6	4	67	NA	NA	0.0432	0.0547	0.0783	0.0161	0.02315	0.027	0.0308	0.00541	0.02315	0.0454	0.0783	0.0191
PCB 206	6	6	100	NA	NA	0.297	0.715	1.32	0.359	NA	NA	NA	NA	0.297	0.715	1.32	0.359
PCB 207	6	0	0	NA	NA	NA	NA	NA	NA	0.00382	0.011	0.0221	0.00736	0.00382	0.011	0.0221	0.00736
PCB 208	6	6	100	NA	NA	0.236	0.492	0.829	0.203	NA	NA	NA	NA	0.236	0.492	0.829	0.203
Decachlorobiphenyl	6	6	100	NA	NA	0.107	0.273	0.655	0.206	NA	NA	NA	NA	0.107	0.273	0.655	0.206
Total PCB congeners, 1/2 DL	6	6	100	NA	NA	375	538	736	127	NA	NA	NA	NA	375	538	736	127
Total PCB congeners, 0 DL	6	6	100	NA	NA	368	534	733	129	NA	NA	NA	NA	368	534	733	129
PCB TEQ, mammal, 1/2 DL	6	6	100	0.0024	100	0.00644	0.0118	0.0209	0.00575	NA	NA	NA	NA	0.00644	0.0118	0.0209	0.00575
PCB TEQ, mammal, 0 DL	6	6	100	0.0024	100	0.00417	0.00961	0.0209	0.00698	NA	NA	NA	NA	0.00417	0.00961	0.0209	0.00698
Monochlorobiphenyl homologs	6	5	83	NA	NA	0.0923	0.18	0.266	0.0691	0.03955	0.0396	0.03955	NA	0.03955	0.157	0.266	0.0843
Dichlorobiphenyl homologs	6	6	100	NA	NA	7.52	11	12.8	1.82	NA	NA	NA	NA	7.52	11	12.8	1.82
Trichlorobiphenyl homologs	6	6	100	NA	NA	59.6	100	129	23.4	NA	NA	NA	NA	59.6	100	129	23.4
Tetrachlorobiphenyl homologs	6	6	100	NA	NA	138	205	259	46.3	NA	NA	NA	NA	138	205	259	46.3
Pentachlorobiphenyl homologs	6	6	100	NA	NA	93	133	228	49.8	NA	NA	NA	NA	93	133	228	49.8
Hexachlorobiphenyl homologs	6	6	100	NA	NA	51.8	72.8	115	25.2	NA	NA	NA	NA	51.8	72.8	115	25.2
Heptachlorobiphenyl homologs	6	6	100	NA	NA	15.5	20.3	25.9	4.43	NA	NA	NA	NA	15.5	20.3	25.9	4.43
Octachlorobiphenyl homologs	6	6	100	NA	NA	4.33	6.54	8.26	1.63	NA	NA	NA	NA	4.33	6.54	8.26	1.63
Nonachlorobiphenyl homologs	6	6	100	NA	NA	0.267	1.16	2.15	0.632	NA	NA	NA	NA	0.267	1.16	2.15	0.632
Decachlorobiphenyl homologs	6	6	100	NA	NA	0.107	0.273	0.655	0.206	NA	NA	NA	NA	0.107	0.273	0.655	0.206
Dioxins/Furans (pg/g ww)																	
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	5	1	20	NA	NA	0.303	0.303	0.303	NA	0.04885	0.114	0.2035	0.0675	0.04885	0.152	0.303	0.103
1,2,3,4,6,7,8-Heptachlorodibenzofuran	5	1	20	NA	NA	0.162	0.162	0.162	NA	0.01555	0.0445	0.072	0.0252	0.01555	0.068	0.162	0.0569
1,2,3,4,7,8,9-Heptachlorodibenzofuran	5	0	0	NA	NA	NA	NA	NA	NA	0.02065	0.0526	0.0925	0.0281	0.02065	0.0526	0.0925	0.0281
1,2,3,4,7,8-Hexachlorodibenzodioxin	5	0	0	NA	NA	NA	NA	NA	NA	0.0555	0.0965	0.1455	0.0365	0.0555	0.0965	0.1455	0.0365
1,2,3,4,7,8-Hexachlorodibenzofuran	5	0	0	NA	NA	NA	NA	NA	NA	0.01685	0.0421	0.0735	0.0248	0.01685	0.0421	0.0735	0.0248
1,2,3,6,7,8-Hexachlorodibenzodioxin	5	0	0	NA	NA	NA	NA	NA	NA	0.0585	0.0965	0.1405	0.0308	0.0585	0.0965	0.1405	0.0308
1,2,3,6,7,8-Hexachlorodibenzofuran	5	0	0	NA	NA	NA	NA	NA	NA	0.0167	0.0433	0.078	0.0263	0.0167	0.0433	0.078	0.0263
1,2,3,7,8,9-Hexachlorodibenzodioxin	5	0	0	NA	NA	NA	NA	NA	NA	0.06	0.101	0.139	0.032	0.06	0.101	0.139	0.032
1,2,3,7,8,9-Hexachlorodibenzofuran	5	0	0	NA	NA	NA	NA	NA	NA	0.02625	0.0581	0.1015	0.0352	0.02625	0.0581	0.1015	0.0352
1,2,3,7,8-Pentachlorodibenzodioxin	5	0	0	NA	NA	NA	NA	NA	NA	0.0395	0.0518	0.0705	0.0153	0.0395	0.0518	0.0705	0.0153
1,2,3,7,8-Pentachlorodibenzofuran	5	0	0	NA	NA	NA	NA	NA	NA	0.02045	0.052	0.0995	0.0335	0.02045	0.052	0.0995	0.0335
2,3,4,6,7,8-Hexachlorodibenzofuran	5	0	0	NA	NA	NA	NA	NA	NA	0.0189	0.0479	0.089	0.0314	0.0189	0.0479	0.089	0.0314
2,3,4,7,8-Pentachlorodibenzofuran	5	0	0	NA	NA	NA	NA	NA	NA	0.0235	0.0547	0.1065	0.0355	0.0235	0.0547	0.1065	0.0355
2,3,7,8-Tetrachlorodibenzodioxin	5	0	0	NA	NA	NA	NA	NA	NA	0.01965	0.0314	0.04475	0.0124	0.01965	0.0314	0.04475	0.0124
2,3,7,8-Tetrachlorodibenzofuran	5	0	0	NA	NA	NA	NA	NA	NA	0.0323	0.0497	0.083	0.0223	0.0323	0.0497	0.083	0.0223
Dioxin TEQ, mammal, 1/2 DL	5	2	40	0.0024	100	0.104	0.112	0.119	0.0106	0.058	0.0942	0.1195	0.0321	0.058	0.101	0.1195	0.0252
Dioxin TEQ, mammal, 0 DL	5	2	40	0.0024	50	0.000273	0.00278	0.00529	0.00355	0	0	0	0	0	0.00111	0.00529	0.00234
Total TEQ, mammal, 1/2 DL	5	5	100	NA	NA	0.11	0.175	0.249	0.067	NA	NA	NA	NA	0.11	0.175	0.249	0.067
Total TEQ, mammal, 0 DL	5	5	100	NA	NA	0.00444	0.00953	0.0262	0.00939	NA	NA	NA	NA	0.00444	0.00953	0.0262	0.00939

Table 5-1b. Summary of Results for Mussel Composites from Reference Areas

Analyte	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Dioxins/Furans (pg/g ww) (continued)																	
Tetrachlorodibenzodioxin (Total)	5	0	0	NA	NA	NA	NA	NA	NA	0.01965	0.0314	0.04475	0.0124	0.01965	0.0314	0.04475	0.0124
Tetrachlorodibenzofuran (Total)	5	0	0	NA	NA	NA	NA	NA	NA	0.03105	0.0561	0.083	0.0218	0.03105	0.0561	0.083	0.0218
Pentachlorodibenzodioxin (Total)	5	0	0	NA	NA	NA	NA	NA	NA	0.0395	0.0518	0.0705	0.0153	0.0395	0.0518	0.0705	0.0153
Pentachlorodibenzofuran (Total)	5	0	0	NA	NA	NA	NA	NA	NA	0.0219	0.0532	0.1025	0.0342	0.0219	0.0532	0.1025	0.0342
Hexachlorodibenzodioxin (Total)	5	0	0	NA	NA	NA	NA	NA	NA	0.058	0.098	0.1415	0.0328	0.058	0.098	0.1415	0.0328
Hexachlorodibenzofuran (Total)	5	0	0	NA	NA	NA	NA	NA	NA	0.01935	0.0474	0.085	0.0292	0.01935	0.0474	0.085	0.0292
Heptachlorodibenzodioxin (Total)	5	1	20	NA	NA	0.699	0.699	0.699	NA	0.078	0.137	0.2035	0.0518	0.078	0.249	0.699	0.255
Heptachlorodibenzofuran (Total)	5	1	20	NA	NA	0.365	0.365	0.365	NA	0.0179	0.0496	0.0815	0.0282	0.0179	0.113	0.365	0.143
Octachlorodibenzodioxin	5	2	40	NA	NA	0.911	1.41	1.9	0.699	0.175	0.276	0.448	0.15	0.175	0.728	1.9	0.718
Octachlorodibenzofuran	5	1	20	NA	NA	0.217	0.217	0.217	NA	0.0535	0.121	0.212	0.0735	0.0535	0.14	0.217	0.0768

Notes:

Field split results were averaged with the parent sample result.

As reflected in the total count of results, there was insufficient mass to analyze for dioxins/furans in one reference area mussel sample.

Three significant figures were applied to the mean and standard deviation (SD).

[a] Summary statistics were calculated using half the method detection limit (MDL) for non-detected inorganic results (including methyl mercury) and half the estimated detection limit (EDL) for non-detected organic results.

[b] For non-detected results, the minimum value is half the MDL for inorganic results and half the EDL for organic results.

DL - detection limit

HH RBC - human health risk-based concentration

NA - not applicable

PCB - polychlorinated biphenyl

TEQ - toxic equivalents

Table 5-2a. Summary of Results for Measured and Calculated Crayfish Whole-Body Composites from Site Areas

Analyte	Count of Results		%	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
	Total #	# Detected	Detected	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Measured and Calculated Whole-Body Composites															
Metals/Metalloids (mg/kg ww except mercury)															
Aluminum	30	30	100	22.7	132	356	81.6	NA	NA	NA	NA	22.7	132	356	81.6
Antimony	30	7	23	0.016	0.0405	0.0859	0.0237	0.0029	0.00568	0.0109	0.0019	0.0029	0.0138	0.0859	0.0185
Arsenic	30	30	100	0.19	0.355	0.69	0.106	NA	NA	NA	NA	0.19	0.355	0.69	0.106
Barium	30	30	100	21.2	65.8	136	25.6	NA	NA	NA	NA	21.2	65.8	136	25.6
Beryllium	30	29	97	0.000957	0.00492	0.0127	0.00253	0.0008	0.0008	0.0008	NA	0.0008	0.00478	0.0127	0.0026
Cadmium	30	30	100	0.141	0.334	0.592	0.131	NA	NA	NA	NA	0.141	0.334	0.592	0.131
Calcium	30	30	100	29800	43900	58300	7910	NA	NA	NA	NA	29800	43900	58300	7910
Chromium	30	30	100	0.177	1.01	2.34	0.512	NA	NA	NA	NA	0.177	1.01	2.34	0.512
Cobalt	30	30	100	0.0576	0.154	0.268	0.0562	NA	NA	NA	NA	0.0576	0.154	0.268	0.0562
Copper	30	30	100	21.3	37.7	59	10	NA	NA	NA	NA	21.3	37.7	59	10
Iron	30	30	100	52.1	143	308	63.3	NA	NA	NA	NA	52.1	143	308	63.3
Lead	30	30	100	0.175	0.48	1.64	0.325	NA	NA	NA	NA	0.175	0.48	1.64	0.325
Magnesium	30	30	100	394	676	936	150	NA	NA	NA	NA	394	676	936	150
Manganese	30	30	100	9.53	30.8	76	16.6	NA	NA	NA	NA	9.53	30.8	76	16.6
Mercury (µg/kg ww)	30	30	100	12.6	23.7	43.1	7.91	NA	NA	NA	NA	12.6	23.7	43.1	7.91
Nickel	30	30	100	0.219	0.656	1.2	0.247	NA	NA	NA	NA	0.219	0.656	1.2	0.247
Potassium	30	30	100	1540	1980	2700	276	NA	NA	NA	NA	1540	1980	2700	276
Selenium	30	30	100	0.187	0.281	0.4	0.0579	NA	NA	NA	NA	0.187	0.281	0.4	0.0579
Silver	30	30	100	0.0417	0.0935	0.13	0.0222	NA	NA	NA	NA	0.0417	0.0935	0.13	0.0222
Sodium	30	30	100	1890	2150	2390	129	NA	NA	NA	NA	1890	2150	2390	129
Thallium	30	30	100	0.0103	0.0188	0.0276	0.00407	NA	NA	NA	NA	0.0103	0.0188	0.0276	0.00407
Vanadium	30	30	100	0.0854	0.345	0.696	0.157	NA	NA	NA	NA	0.0854	0.345	0.696	0.157
Zinc	30	30	100	17.6	23.3	30.2	3.22	NA	NA	NA	NA	17.6	23.3	30.2	3.22
Conventional Parameters (% ww)															
Total solids	30	30	100	21.7	30.3	35	2.78	NA	NA	NA	NA	21.7	30.3	35	2.78
Measured Whole-Body Composites															
Metals/Metalloids (mg/kg ww except mercury)															
Aluminum	12	12	100	52.9	107	154	34.3	NA	NA	NA	NA	52.9	107	154	34.3
Antimony	12	1	8	0.016	0.016	0.016	NA	0.0029	0.00485	0.008	0.00176	0.0029	0.00578	0.016	0.00363
Arsenic	12	12	100	0.25	0.386	0.69	0.132	NA	NA	NA	NA	0.25	0.386	0.69	0.132
Barium	12	12	100	41	65.5	88.4	18.4	NA	NA	NA	NA	41	65.5	88.4	18.4
Beryllium	12	12	100	0.0024	0.00432	0.0065	0.00123	NA	NA	NA	NA	0.0024	0.00432	0.0065	0.00123
Cadmium	12	12	100	0.208	0.382	0.562	0.135	NA	NA	NA	NA	0.208	0.382	0.562	0.135
Calcium	12	12	100	34800	41300	47500	4790	NA	NA	NA	NA	34800	41300	47500	4790
Chromium	12	12	100	0.416	1.13	2.34	0.533	NA	NA	NA	NA	0.416	1.13	2.34	0.533
Cobalt	12	12	100	0.0988	0.169	0.236	0.0498	NA	NA	NA	NA	0.0988	0.169	0.236	0.0498
Copper	12	12	100	24	41.8	59	10.5	NA	NA	NA	NA	24	41.8	59	10.5
Iron	12	12	100	82.6	147	250	50.2	NA	NA	NA	NA	82.6	147	250	50.2
Lead	12	12	100	0.175	0.354	0.696	0.184	NA	NA	NA	NA	0.175	0.354	0.696	0.184
Magnesium	12	12	100	500	611	711	65.1	NA	NA	NA	NA	500	611	711	65.1
Manganese	12	12	100	15.9	27.3	76	17.8	NA	NA	NA	NA	15.9	27.3	76	17.8
Mercury (µg/kg ww)	12	12	100	13.8	24.1	34.3	5.99	NA	NA	NA	NA	13.8	24.1	34.3	5.99
Nickel	12	12	100	0.328	0.731	1.2	0.262	NA	NA	NA	NA	0.328	0.731	1.2	0.262
Potassium	12	12	100	1950	2230	2700	217	NA	NA	NA	NA	1950	2230	2700	217
Selenium	12	12	100	0.27	0.319	0.4	0.041	NA	NA	NA	NA	0.27	0.319	0.4	0.041
Silver	12	12	100	0.0717	0.103	0.13	0.0212	NA	NA	NA	NA	0.0717	0.103	0.13	0.0212
Sodium	12	12	100	2000	2160	2390	134	NA	NA	NA	NA	2000	2160	2390	134
Thallium	12	12	100	0.012	0.0205	0.0276	0.0042	NA	NA	NA	NA	0.012	0.0205	0.0276	0.0042
Vanadium	12	12	100	0.183	0.376	0.533	0.123	NA	NA	NA	NA	0.183	0.376	0.533	0.123
Zinc	12	12	100	19.2	21.3	23.5	1.4	NA	NA	NA	NA	19.2	21.3	23.5	1.4
Conventional Parameters (% ww)															
Total solids	12	12	100	26	30.7	34.9	2.16	NA	NA	NA	NA	26	30.7	34.9	2.16

Table 5-2a. Summary of Results for Measured and Calculated Crayfish Whole-Body Composites from Site Areas

	Count of Results		%	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Calculated Whole-Body Composites															
Metals/Metalloids (mg/kg ww except mercury)															
Aluminum	18	18	100	22.7	149	356	99.4	NA	NA	NA	NA	22.7	149	356	99.4
Antimony	18	6	33	0.0198	0.0446	0.0859	0.0231	0.004245	0.00645	0.0109	0.00175	0.004245	0.0192	0.0859	0.0224
Arsenic	18	18	100	0.19	0.335	0.49	0.082	NA	NA	NA	NA	0.19	0.335	0.49	0.082
Barium	18	18	100	21.2	66.1	136	30.1	NA	NA	NA	NA	21.2	66.1	136	30.1
Beryllium	18	17	94	0.000957	0.00534	0.0127	0.00312	0.0008	0.0008	0.0008		0.0008	0.00509	0.0127	0.00321
Cadmium	18	18	100	0.141	0.302	0.592	0.122	NA	NA	NA	NA	0.141	0.302	0.592	0.122
Calcium	18	18	100	29800	45600	58300	9170	NA	NA	NA	NA	29800	45600	58300	9170
Chromium	18	18	100	0.177	0.929	1.99	0.496	NA	NA	NA	NA	0.177	0.929	1.99	0.496
Cobalt	18	18	100	0.0576	0.144	0.268	0.0595	NA	NA	NA	NA	0.0576	0.144	0.268	0.0595
Copper	18	18	100	21.3	34.9	53.5	8.98	NA	NA	NA	NA	21.3	34.9	53.5	8.98
Iron	18	18	100	52.1	140	308	71.9	NA	NA	NA	NA	52.1	140	308	71.9
Lead	18	18	100	0.204	0.564	1.64	0.374	NA	NA	NA	NA	0.204	0.564	1.64	0.374
Magnesium	18	18	100	394	719	936	175	NA	NA	NA	NA	394	719	936	175
Manganese	18	18	100	9.53	33.1	61.6	15.8	NA	NA	NA	NA	9.53	33.1	61.6	15.8
Mercury (µg/kg ww)	18	18	100	12.6	23.5	43.1	9.12	NA	NA	NA	NA	12.6	23.5	43.1	9.12
Nickel	18	18	100	0.219	0.605	1.06	0.229	NA	NA	NA	NA	0.219	0.605	1.06	0.229
Potassium	18	18	100	1540	1800	2100	144	NA	NA	NA	NA	1540	1800	2100	144
Selenium	18	18	100	0.187	0.256	0.372	0.0542	NA	NA	NA	NA	0.187	0.256	0.372	0.0542
Silver	18	18	100	0.0417	0.0871	0.127	0.0211	NA	NA	NA	NA	0.0417	0.0871	0.127	0.0211
Sodium	18	18	100	1890	2140	2360	128	NA	NA	NA	NA	1890	2140	2360	128
Thallium	18	18	100	0.0103	0.0177	0.0232	0.0037	NA	NA	NA	NA	0.0103	0.0177	0.0232	0.0037
Vanadium	18	18	100	0.0854	0.324	0.696	0.177	NA	NA	NA	NA	0.0854	0.324	0.696	0.177
Zinc	18	18	100	17.6	24.7	30.2	3.37	NA	NA	NA	NA	17.6	24.7	30.2	3.37
Conventional Parameters (% ww)															
Total solids	18	18	100	21.7	30	35	3.15	NA	NA	NA	NA	21.7	30	35	3.15

Notes:

Field split results were averaged with the parent sample result.

Table includes measured and calculated whole-body crayfish data. Calculated whole-body concentrations in each composite sample are based on the relative weights and concentrations of the two crayfish tissue types in each sample (i.e., carapace and stomach, and the whole-body minus the carapace and stomach), as described in Appendix C.

Three significant figures were applied to the mean and standard deviation (SD).

[a] Summary statistics were calculated using half the method detection limit (MDL) for non-detected inorganic results.

[b] For non-detected results, the minimum value is half the MDL.

NA - not applicable

Table 5-2b. Summary of Results for Calculated Crayfish Whole-Body Composites from Reference Areas

Analyte	Count of Results		%	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
	Total #	# Detected	Detected	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Metals/Metalloids (mg/kg ww except mercury)															
Aluminum	12	12	100	55.2	78	112	16.9	NA	NA	NA	NA	55.2	78	112	16.9
Antimony	12	4	33	0.00347	0.00415	0.00512	0.000694	0.001115	0.00185	0.002775	0.000502	0.001115	0.00262	0.00512	0.00126
Arsenic	12	12	100	0.197	0.284	0.549	0.115	NA	NA	NA	NA	0.197	0.284	0.549	0.115
Barium	12	12	100	22.9	83.1	143	54.3	NA	NA	NA	NA	22.9	83.1	143	54.3
Beryllium	12	12	100	0.00234	0.00362	0.00499	0.000837	NA	NA	NA	NA	0.00234	0.00362	0.00499	0.000837
Cadmium	12	12	100	0.0098	0.0226	0.0425	0.0109	NA	NA	NA	NA	0.0098	0.0226	0.0425	0.0109
Calcium	12	12	100	34800	44400	53400	6450	NA	NA	NA	NA	34800	44400	53400	6450
Chromium	12	12	100	0.12	0.718	1.73	0.557	NA	NA	NA	NA	0.12	0.718	1.73	0.557
Cobalt	12	12	100	0.041	0.0935	0.178	0.04	NA	NA	NA	NA	0.041	0.0935	0.178	0.04
Copper	12	12	100	13.6	22.1	32.2	6.11	NA	NA	NA	NA	13.6	22.1	32.2	6.11
Iron	12	12	100	55.6	89.3	140	22.2	NA	NA	NA	NA	55.6	89.3	140	22.2
Lead	12	12	100	0.0369	0.0687	0.164	0.0365	NA	NA	NA	NA	0.0369	0.0687	0.164	0.0365
Magnesium	12	12	100	512	755	904	136	NA	NA	NA	NA	512	755	904	136
Manganese	12	12	100	19.7	31.2	48.2	9.62	NA	NA	NA	NA	19.7	31.2	48.2	9.62
Mercury (µg/kg ww)	12	12	100	23.5	39	74	15.5	NA	NA	NA	NA	23.5	39	74	15.5
Nickel	12	12	100	0.0862	0.361	0.807	0.251	NA	NA	NA	NA	0.0862	0.361	0.807	0.251
Potassium	12	12	100	1700	1940	2240	163	NA	NA	NA	NA	1700	1940	2240	163
Selenium	12	12	100	0.122	0.194	0.297	0.0666	NA	NA	NA	NA	0.122	0.194	0.297	0.0666
Silver	12	12	100	0.0761	0.103	0.142	0.0204	NA	NA	NA	NA	0.0761	0.103	0.142	0.0204
Sodium	12	12	100	2100	2350	2640	157	NA	NA	NA	NA	2100	2350	2640	157
Thallium	12	7	58	0.00095	0.00173	0.00257	0.000691	0.000755	0.000933	0.001075	0.000125	0.000755	0.0014	0.00257	0.00066
Vanadium	12	12	100	0.1	0.225	0.404	0.0946	NA	NA	NA	NA	0.1	0.225	0.404	0.0946
Zinc	12	12	100	16.6	21.6	24.9	2.81	NA	NA	NA	NA	16.6	21.6	24.9	2.81
Conventional Parameters (% ww)															
Total solids	12	12	100	26.8	29.8	31.8	1.45	NA	NA	NA	NA	26.8	29.8	31.8	1.45

Notes:

Field split results were averaged with the parent sample result.

Calculated whole-body concentrations in each composite sample are based on the relative weights and concentrations of the two crayfish tissue types in each sample (i.e., carapace and stomach, and the whole-body minus the carapace and stomach), as described in Appendix C.

Three significant figures were applied to the mean and standard deviation (SD).

[a] Summary statistics were calculated using half the method detection limit (MDL) for non-detected inorganic results.

[b] For non-detected results, the minimum value is half the MDL.

NA - not applicable

Table 5-3a. Summary of Results for Crayfish Partial-Body Composites from Site Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Metals/Metalloids (mg/kg ww except mercury and methyl mercury)																	
Aluminum	18	18	100	17	100	21.6	127	270	79.7	NA	NA	NA	NA	21.6	127	270	79.7
Antimony	18	6	33	0.0069	100	0.0195	0.0338	0.0612	0.0146	0.004	0.00621	0.011	0.00184	0.004	0.0154	0.0612	0.0156
Arsenic	18	18	100	0.0024	100	0.185	0.308	0.47	0.0705	NA	NA	NA	NA	0.185	0.308	0.47	0.0705
Barium	18	18	100	3.4	100	19.4	61.3	126	28	NA	NA	NA	NA	19.4	61.3	126	28
Beryllium	18	15	83	0.034	0	0.0018	0.00509	0.0099	0.00226	0.0008	0.0008	0.0008	0	0.0008	0.00438	0.0099	0.00263
Cadmium	18	18	100	0.017	100	0.126	0.299	0.557	0.123	NA	NA	NA	NA	0.126	0.299	0.557	0.123
Calcium	18	18	100	NA	NA	27300	42800	55700	9060	NA	NA	NA	NA	27300	42800	55700	9060
Chromium	18	18	100	26	0	0.171	0.755	1.43	0.355	NA	NA	NA	NA	0.171	0.755	1.43	0.355
Cobalt	18	18	100	0.0051	100	0.0577	0.128	0.208	0.0468	NA	NA	NA	NA	0.0577	0.128	0.208	0.0468
Copper	18	18	100	0.69	100	21.9	35.7	55.3	9.54	NA	NA	NA	NA	21.9	35.7	55.3	9.54
Inorganic arsenic	18	18	100	0.0024	100	0.0156	0.0637	0.154	0.0391	NA	NA	NA	NA	0.0156	0.0637	0.154	0.0391
Iron	18	18	100	12	100	49.1	116	216	50.3	NA	NA	NA	NA	49.1	116	216	50.3
Lead	18	18	100	NA	NA	0.197	0.529	1.66	0.38	NA	NA	NA	NA	0.197	0.529	1.66	0.38
Magnesium	18	18	100	NA	NA	366	684	883	167	NA	NA	NA	NA	366	684	883	167
Manganese	18	18	100	2.4	100	8.56	30.7	58.4	15.4	NA	NA	NA	NA	8.56	30.7	58.4	15.4
Mercury (µg/kg ww)	18	18	100	NA	NA	13.4	24.7	45.6	9.63	NA	NA	NA	NA	13.4	24.7	45.6	9.63
Methyl mercury (µg/kg ww)	18	17	94	1.7	100	9.6	20.5	47.8	10.5	0.3	0.3	0.3	NA	0.3	19.4	47.8	11.3
Nickel	18	18	100	0.34	89	0.21	0.497	0.734	0.142	NA	NA	NA	NA	0.21	0.497	0.734	0.142
Potassium	18	18	100	NA	NA	1560	1840	2130	146	NA	NA	NA	NA	1560	1840	2130	146
Selenium	18	18	100	0.086	100	0.19	0.25	0.34	0.0479	NA	NA	NA	NA	0.19	0.25	0.34	0.0479
Silver	18	18	100	0.086	72	0.0428	0.089	0.132	0.0218	NA	NA	NA	NA	0.0428	0.089	0.132	0.0218
Sodium	18	18	100	NA	NA	1890	2120	2330	123	NA	NA	NA	NA	1890	2120	2330	123
Thallium	18	18	100	0.00017	100	0.00995	0.0169	0.0222	0.00358	NA	NA	NA	NA	0.00995	0.0169	0.0222	0.00358
Vanadium	18	18	100	0.086	94	0.08	0.272	0.517	0.136	NA	NA	NA	NA	0.08	0.272	0.517	0.136
Zinc	18	18	100	5.1	100	18.3	25.4	31	3.47	NA	NA	NA	NA	18.3	25.4	31	3.47
Conventional Parameters (% ww)																	
Lipids	18	18	100	NA	NA	0.266	0.807	2.13	0.571	NA	NA	NA	NA	0.266	0.807	2.13	0.571
Total solids	18	18	100	NA	NA	20.9	29.1	33.3	3.08	NA	NA	NA	NA	20.9	29.1	33.3	3.08
PCB Congeners (pg/g ww)																	
PCB 1	18	18	100	NA	NA	0.084	49.9	287	97.4	NA	NA	NA	NA	0.084	49.9	287	97.4
PCB 2	18	18	100	NA	NA	0.0348	4.84	25.1	9.06	NA	NA	NA	NA	0.0348	4.84	25.1	9.06
PCB 3	18	18	100	NA	NA	0.0861	22.9	117	43.9	NA	NA	NA	NA	0.0861	22.9	117	43.9
PCB 4/10	18	17	94	NA	NA	0.92	163	877	307	0.985	0.985	0.985	NA	0.92	154	877	300
PCB 5/8	18	18	100	NA	NA	4.11	416	2220	798	NA	NA	NA	NA	4.11	416	2220	798
PCB 6	18	18	100	NA	NA	1.54	93.4	489	177	NA	NA	NA	NA	1.54	93.4	489	177
PCB 7/9	18	16	89	NA	NA	0.378	75.4	349	136	0.04975	0.133	0.216	0.118	0.04975	67	349	130
PCB 11	18	16	89	NA	NA	3.89	10.8	18.9	3.77	4.03	4.12	4.205	0.124	3.89	10	18.9	4.14
PCB 12/13	18	18	100	NA	NA	0.565	12.1	66.4	21.4	NA	NA	NA	NA	0.565	12.1	66.4	21.4
PCB 14	18	0	0	NA	NA	NA	NA	NA	NA	0.01885	0.0805	0.2755	0.0751	0.01885	0.0805	0.2755	0.0751
PCB 15	18	18	100	NA	NA	3.01	41.5	223	71.7	NA	NA	NA	NA	3.01	41.5	223	71.7
PCB 16/32	18	18	100	NA	NA	15.5	228	1250	393	NA	NA	NA	NA	15.5	228	1250	393
PCB 17	18	18	100	NA	NA	9.24	177	958	313	NA	NA	NA	NA	9.24	177	958	313
PCB 18	18	18	100	NA	NA	19	550	3310	1040	NA	NA	NA	NA	19	550	3310	1040
PCB 19	18	18	100	NA	NA	1.62	55.3	306	103	NA	NA	NA	NA	1.62	55.3	306	103
PCB 20/21/33	18	18	100	NA	NA	11.1	150	866	258	NA	NA	NA	NA	11.1	150	866	258
PCB 22	18	18	100	NA	NA	8.4	67.4	316	101	NA	NA	NA	NA	8.4	67.4	316	101
PCB 23	18	10	56	NA	NA	0.0368	0.839	2.78	1.04	0.00955	0.0544	0.155	0.0459	0.00955	0.491	2.78	0.856
PCB 24/27	18	18	100	NA	NA	2.51	31.6	167	52.9	NA	NA	NA	NA	2.51	31.6	167	52.9
PCB 25	18	18	100	NA	NA	6.82	33.5	119	34.1	NA	NA	NA	NA	6.82	33.5	119	34.1
PCB 26	18	18	100	NA	NA	9.74	62.2	267	77.5	NA	NA	NA	NA	9.74	62.2	267	77.5
PCB 28	18	18	100	NA	NA	40.1	253	1220	346	NA	NA	NA	NA	40.1	253	1220	346
PCB 29	18	17	94	NA	NA	0.129	3.49	17.9	6.14	0.1495	0.15	0.1495	NA	0.129	3.31	17.9	6.01
PCB 30	18	4	22	NA	NA	1.23	1.66	2.25	0.434	0.003245	0.0237	0.0505	0.0119	0.003245	0.387	2.25	0.722
PCB 31	18	18	100	NA	NA	32.9	269	1250	403	NA	NA	NA	NA	32.9	269	1250	403
PCB 34	18	17	94	NA	NA	0.54	2.21	8.92	2.57	0.142	0.142	0.142	NA	0.142	2.09	8.92	2.54
PCB 35	18	15	83	NA	NA	0.144	0.971	3.86	1.18	0.0124	0.114	0.2225	0.105	0.0124	0.828	3.86	1.12
PCB 36	18	2	11	NA	NA	0.102	0.21	0.317	0.152	0.0118	0.088	0.234	0.0509	0.0118	0.101	0.317	0.0721
PCB 37	18	18	100	NA	NA	2.26	13.5	59.3	15.8	NA	NA	NA	NA	2.26	13.5	59.3	15.8

Table 5-3a. Summary of Results for Crayfish Partial-Body Composites from Site Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
PCB Congeners (pg/g ww) (continued)																	
PCB 38	18	18	100	NA	NA	1.33	3.59	8.28	1.79	NA	NA	NA	NA	1.33	3.59	8.28	1.79
PCB 39	18	7	39	NA	NA	0.0566	0.192	0.37	0.0974	0.011	0.0889	0.218	0.0562	0.011	0.129	0.37	0.0887
PCB 40	18	18	100	NA	NA	2.72	11.3	47.1	12.1	NA	NA	NA	NA	2.72	11.3	47.1	12.1
PCB 41/64/71/ 72	18	18	100	NA	NA	26.2	87.4	320	78.3	NA	NA	NA	NA	26.2	87.4	320	78.3
PCB 42/59	18	18	100	NA	NA	10.2	34.5	132	32.8	NA	NA	NA	NA	10.2	34.5	132	32.8
PCB 43/49	18	18	100	NA	NA	49.7	156	530	127	NA	NA	NA	NA	49.7	156	530	127
PCB 44	18	18	100	NA	NA	14.1	108	463	122	NA	NA	NA	NA	14.1	108	463	122
PCB 45	18	18	100	NA	NA	4.85	37.3	196	57.6	NA	NA	NA	NA	4.85	37.3	196	57.6
PCB 46	18	18	100	NA	NA	1.71	12.6	67.3	19.7	NA	NA	NA	NA	1.71	12.6	67.3	19.7
PCB 47	18	18	100	NA	NA	27.9	67.6	159	31.6	NA	NA	NA	NA	27.9	67.6	159	31.6
PCB 48/75	18	18	100	NA	NA	5.55	31.5	153	42.4	NA	NA	NA	NA	5.55	31.5	153	42.4
PCB 50	18	17	94	NA	NA	0.213	1.29	5.79	1.76	0.269	0.269	0.269	NA	0.213	1.23	5.79	1.72
PCB 51	18	18	100	NA	NA	3.85	14.5	54.5	14.7	NA	NA	NA	NA	3.85	14.5	54.5	14.7
PCB 52/69	18	18	100	NA	NA	58.7	218	877	222	NA	NA	NA	NA	58.7	218	877	222
PCB 53	18	18	100	NA	NA	8.29	43.5	203	56	NA	NA	NA	NA	8.29	43.5	203	56
PCB 54	18	18	100	NA	NA	0.36	1.54	6.16	1.74	NA	NA	NA	NA	0.36	1.54	6.16	1.74
PCB 55	18	17	94	NA	NA	0.269	0.909	2.4	0.525	0.312	0.312	0.312	NA	0.269	0.876	2.4	0.528
PCB 56/60	18	18	100	NA	NA	6.47	18.9	43.2	8.78	NA	NA	NA	NA	6.47	18.9	43.2	8.78
PCB 57	18	18	100	NA	NA	0.248	0.677	1.55	0.303	NA	NA	NA	NA	0.248	0.677	1.55	0.303
PCB 58	18	15	83	NA	NA	0.0991	0.247	0.422	0.0936	0.0185	0.0807	0.1195	0.0544	0.0185	0.219	0.422	0.108
PCB 61/70	18	18	100	NA	NA	17.8	52.1	136	29.2	NA	NA	NA	NA	17.8	52.1	136	29.2
PCB 62	18	4	22	NA	NA	0.00511	0.199	0.394	0.159	0.00835	0.0598	0.105	0.0274	0.00511	0.0907	0.394	0.0927
PCB 63	18	18	100	NA	NA	1.57	3.93	7.66	1.48	NA	NA	NA	NA	1.57	3.93	7.66	1.48
PCB 65	18	4	22	NA	NA	0.0999	0.286	0.38	0.126	0.00885	0.0763	0.2645	0.0612	0.00885	0.123	0.38	0.117
PCB 66/76	18	18	100	NA	NA	21.1	53.8	87.7	19.6	NA	NA	NA	NA	21.1	53.8	87.7	19.6
PCB 67	18	18	100	NA	NA	0.5	1.89	6.18	1.46	NA	NA	NA	NA	0.5	1.89	6.18	1.46
PCB 68	18	18	100	NA	NA	0.637	1.15	1.95	0.391	NA	NA	NA	NA	0.637	1.15	1.95	0.391
PCB 73	18	15	83	NA	NA	0.247	0.645	0.983	0.239	0.0079	0.0287	0.061	0.0284	0.0079	0.543	0.983	0.321
PCB 74	18	18	100	NA	NA	11.9	35.2	79.4	16.1	NA	NA	NA	NA	11.9	35.2	79.4	16.1
PCB 77	18	18	100	NA	NA	0.645	1.61	3.14	0.691	NA	NA	NA	NA	0.645	1.61	3.14	0.691
PCB 78	18	0	0	NA	NA	NA	NA	NA	NA	0.0094	0.0532	0.104	0.0261	0.0094	0.0532	0.104	0.0261
PCB 79	18	18	100	NA	NA	0.474	1.37	2.38	0.52	NA	NA	NA	NA	0.474	1.37	2.38	0.52
PCB 80	18	1	6	NA	NA	0.11	0.11	0.11	NA	0.0174	0.0498	0.092	0.0222	0.0174	0.0531	0.11	0.0258
PCB 81	18	17	94	NA	NA	0.0841	0.311	0.653	0.172	0.0925	0.0925	0.0925	NA	0.0841	0.299	0.653	0.175
PCB 82	18	18	100	NA	NA	0.735	2.1	4.04	0.93	NA	NA	NA	NA	0.735	2.1	4.04	0.93
PCB 83	18	2	11	NA	NA	0.022	0.0234	0.0248	0.00198	0.00442	0.0353	0.057	0.0143	0.00442	0.034	0.057	0.0139
PCB 84/92	18	18	100	NA	NA	7.5	24.8	56.3	11.7	NA	NA	NA	NA	7.5	24.8	56.3	11.7
PCB 85/116	18	18	100	NA	NA	3.28	12	24.9	5.95	NA	NA	NA	NA	3.28	12	24.9	5.95
PCB 86	18	5	28	NA	NA	0.179	0.251	0.383	0.0861	0.00755	0.061	0.0975	0.0271	0.00755	0.114	0.383	0.0998
PCB 87/117/125	18	18	100	NA	NA	5.28	17.2	31.2	6.94	NA	NA	NA	NA	5.28	17.2	31.2	6.94
PCB 88/91	18	18	100	NA	NA	4.4	12.3	27.2	5.47	NA	NA	NA	NA	4.4	12.3	27.2	5.47
PCB 89	18	16	89	NA	NA	0.171	0.643	1.63	0.348	0.00665	0.0991	0.1915	0.131	0.00665	0.583	1.63	0.373
PCB 90/101	18	18	100	NA	NA	21.2	77.3	149	32.7	NA	NA	NA	NA	21.2	77.3	149	32.7
PCB 93	18	0	0	NA	NA	NA	NA	NA	NA	0.0063	0.0526	0.087	0.0214	0.0063	0.0526	0.087	0.0214
PCB 94	18	18	100	NA	NA	0.244	0.678	1.77	0.375	NA	NA	NA	NA	0.244	0.678	1.77	0.375
PCB 95/98/102	18	18	100	NA	NA	16.6	60	186	41.3	NA	NA	NA	NA	16.6	60	186	41.3
PCB 96	18	18	100	NA	NA	0.347	1.42	6.41	1.64	NA	NA	NA	NA	0.347	1.42	6.41	1.64
PCB 97	18	18	100	NA	NA	4.05	10.1	17.8	3.69	NA	NA	NA	NA	4.05	10.1	17.8	3.69
PCB 100	18	18	100	NA	NA	0.927	2.46	5.07	1.15	NA	NA	NA	NA	0.927	2.46	5.07	1.15
PCB 99	18	18	100	NA	NA	15.9	50.4	98.4	22	NA	NA	NA	NA	15.9	50.4	98.4	22
PCB 103	18	18	100	NA	NA	0.851	2.14	3.85	0.823	NA	NA	NA	NA	0.851	2.14	3.85	0.823
PCB 104	18	17	94	NA	NA	0.0638	0.138	0.284	0.0552	0.0478	0.0478	0.0478	NA	0.0478	0.133	0.284	0.0576
PCB 105	18	18	100	NA	NA	5.8	18.1	41.7	9.16	NA	NA	NA	NA	5.8	18.1	41.7	9.16
PCB 106/118	18	18	100	NA	NA	21.8	51.9	93.4	19.2	NA	NA	NA	NA	21.8	51.9	93.4	19.2
PCB 107/109	18	18	100	NA	NA	2.2	4.45	9.12	1.87	NA	NA	NA	NA	2.2	4.45	9.12	1.87
PCB 108/112	18	18	100	NA	NA	0.657	2.16	4.03	0.867	NA	NA	NA	NA	0.657	2.16	4.03	0.867
PCB 110	18	18	100	NA	NA	9.44	25.5	46.1	10.5	NA	NA	NA	NA	9.44	25.5	46.1	10.5
PCB 111/115	18	16	89	NA	NA	0.421	1.24	2.61	0.564	0.00404	0.00732	0.0106	0.00464	0.00404	1.1	2.61	0.663

Table 5-3a. Summary of Results for Crayfish Partial-Body Composites from Site Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
PCB Congeners (pg/g ww) (continued)																	
PCB 113	18	0	0	NA	NA	NA	NA	NA	NA	0.004935	0.0397	0.064	0.0159	0.004935	0.0397	0.064	0.0159
PCB 114	18	18	100	NA	NA	0.771	1.56	2.95	0.618	NA	NA	NA	NA	0.771	1.56	2.95	0.618
PCB 119	18	18	100	NA	NA	0.66	2.27	4.69	1.11	NA	NA	NA	NA	0.66	2.27	4.69	1.11
PCB 120	18	16	89	NA	NA	0.113	0.294	0.611	0.136	0.00372	0.00674	0.00975	0.00426	0.00372	0.262	0.611	0.158
PCB 121	18	0	0	NA	NA	NA	NA	NA	NA	0.00393	0.0328	0.054	0.0133	0.00393	0.0328	0.054	0.0133
PCB 122	18	8	44	NA	NA	0.174	0.443	0.784	0.211	0.01925	0.108	0.2145	0.0616	0.01925	0.257	0.784	0.223
PCB 123	18	18	100	NA	NA	0.554	1.23	2.46	0.546	NA	NA	NA	NA	0.554	1.23	2.46	0.546
PCB 124	18	18	100	NA	NA	0.361	1.79	3.48	0.879	NA	NA	NA	NA	0.361	1.79	3.48	0.879
PCB 126	18	17	94	NA	NA	0.0983	0.341	0.552	0.129	0.157	0.157	0.157	NA	0.0983	0.331	0.552	0.133
PCB 127	18	0	0	NA	NA	NA	NA	NA	NA	0.01915	0.0854	0.231	0.0583	0.01915	0.0854	0.231	0.0583
PCB 128/162	18	18	100	NA	NA	2.33	8.46	18.3	4.52	NA	NA	NA	NA	2.33	8.46	18.3	4.52
PCB 129	18	18	100	NA	NA	0.366	1.13	2.24	0.585	NA	NA	NA	NA	0.366	1.13	2.24	0.585
PCB 130	18	18	100	NA	NA	1.89	5.62	10.8	2.61	NA	NA	NA	NA	1.89	5.62	10.8	2.61
PCB 131/133	18	18	100	NA	NA	0.919	2.6	4.31	0.894	NA	NA	NA	NA	0.919	2.6	4.31	0.894
PCB 132/161	18	17	94	NA	NA	1.2	4.31	7.76	2	0.01405	0.0141	0.01405	NA	0.01405	4.07	7.76	2.18
PCB 134/143	18	18	100	NA	NA	0.432	1.5	3.11	0.731	NA	NA	NA	NA	0.432	1.5	3.11	0.731
PCB 135	18	18	100	NA	NA	1.31	5.25	10.4	2.71	NA	NA	NA	NA	1.31	5.25	10.4	2.71
PCB 136	18	18	100	NA	NA	1.33	5.45	12.4	2.61	NA	NA	NA	NA	1.33	5.45	12.4	2.61
PCB 138/163/164	18	18	100	NA	NA	33.6	96.2	169	38.1	NA	NA	NA	NA	33.6	96.2	169	38.1
PCB 137	18	18	100	NA	NA	1.96	3.79	6.82	1.54	NA	NA	NA	NA	1.96	3.79	6.82	1.54
PCB 139/149	18	18	100	NA	NA	10.8	49	94.9	24.4	NA	NA	NA	NA	10.8	49	94.9	24.4
PCB 140	18	14	78	NA	NA	0.102	0.445	0.73	0.196	0.0383	0.107	0.1425	0.0483	0.0383	0.37	0.73	0.225
PCB 141	18	18	100	NA	NA	1.55	12.3	28.6	7.17	NA	NA	NA	NA	1.55	12.3	28.6	7.17
PCB 142	18	0	0	NA	NA	NA	NA	NA	NA	0.01805	0.0808	0.1595	0.0388	0.01805	0.0808	0.1595	0.0388
PCB 144	18	18	100	NA	NA	0.701	3.03	6.29	1.49	NA	NA	NA	NA	0.701	3.03	6.29	1.49
PCB 145	18	1	6	NA	NA	0.0417	0.0417	0.0417	NA	0.00355	0.0517	0.1325	0.0294	0.00355	0.0511	0.1325	0.0286
PCB 146/165	18	18	100	NA	NA	11.9	21.4	33.2	6.58	NA	NA	NA	NA	11.9	21.4	33.2	6.58
PCB 147	18	18	100	NA	NA	0.993	2.7	5.61	1.19	NA	NA	NA	NA	0.993	2.7	5.61	1.19
PCB 148	18	17	94	NA	NA	0.0778	0.272	0.603	0.138	0.057	0.057	0.057	NA	0.057	0.26	0.603	0.143
PCB 150	18	11	61	NA	NA	0.0855	0.215	0.48	0.114	0.03225	0.0808	0.1305	0.0323	0.03225	0.163	0.48	0.112
PCB 151	18	18	100	NA	NA	3.67	14.4	27.8	7.03	NA	NA	NA	NA	3.67	14.4	27.8	7.03
PCB 152	18	6	33	NA	NA	0.0573	0.107	0.176	0.0428	0.003415	0.0504	0.1275	0.0316	0.003415	0.0693	0.176	0.0441
PCB 153	18	18	100	NA	NA	56.4	128	189	42.2	NA	NA	NA	NA	56.4	128	189	42.2
PCB 154	18	18	100	NA	NA	0.654	2.31	4.62	1.22	NA	NA	NA	NA	0.654	2.31	4.62	1.22
PCB 155	18	14	78	NA	NA	0.108	0.276	0.487	0.125	0.0575	0.0855	0.124	0.0289	0.0575	0.234	0.487	0.137
PCB 156	18	18	100	NA	NA	3.04	7.3	14.3	3.04	NA	NA	NA	NA	3.04	7.3	14.3	3.04
PCB 157	18	18	100	NA	NA	0.691	1.59	2.7	0.576	NA	NA	NA	NA	0.691	1.59	2.7	0.576
PCB 158/160	18	18	100	NA	NA	1.24	6.95	13	3.37	NA	NA	NA	NA	1.24	6.95	13	3.37
PCB 159	18	2	11	NA	NA	2.36	2.7	3.03	0.474	0.02975	0.0516	0.0965	0.02	0.02975	0.345	3.03	0.863
PCB 166	18	17	94	NA	NA	0.163	0.334	0.631	0.139	0.11	0.11	0.11	NA	0.11	0.322	0.631	0.145
PCB 167	18	18	100	NA	NA	2	4.14	7.67	1.6	NA	NA	NA	NA	2	4.14	7.67	1.6
PCB 168	18	16	89	NA	NA	0.132	0.256	0.422	0.0958	0.0352	0.0466	0.058	0.0161	0.0352	0.232	0.422	0.113
PCB 169	18	17	94	NA	NA	0.0909	0.156	0.273	0.0522	0.02965	0.0297	0.02965	NA	0.02965	0.149	0.273	0.0588
PCB 170	18	18	100	NA	NA	6.14	17.4	34.2	8.38	NA	NA	NA	NA	6.14	17.4	34.2	8.38
PCB 171	18	18	100	NA	NA	0.831	3.21	7.72	1.72	NA	NA	NA	NA	0.831	3.21	7.72	1.72
PCB 172	18	18	100	NA	NA	1.52	4.56	9.23	2.15	NA	NA	NA	NA	1.52	4.56	9.23	2.15
PCB 173	18	5	28	NA	NA	0.067	0.145	0.269	0.0758	0.0086	0.0398	0.098	0.0234	0.0086	0.0691	0.269	0.0639
PCB 174	18	18	100	NA	NA	1.91	17.4	48.1	12.4	NA	NA	NA	NA	1.91	17.4	48.1	12.4
PCB 175	18	17	94	NA	NA	0.216	0.874	1.89	0.466	0.00885	0.00885	0.00885	NA	0.00885	0.826	1.89	0.496
PCB 176	18	18	100	NA	NA	0.259	1.44	3.66	0.839	NA	NA	NA	NA	0.259	1.44	3.66	0.839
PCB 177	18	18	100	NA	NA	3.53	15.4	32.5	8.16	NA	NA	NA	NA	3.53	15.4	32.5	8.16
PCB 178	18	18	100	NA	NA	1.21	8.31	16.2	4.09	NA	NA	NA	NA	1.21	8.31	16.2	4.09
PCB 179	18	18	100	NA	NA	0.797	3.91	11.8	2.57	NA	NA	NA	NA	0.797	3.91	11.8	2.57
PCB 180	18	18	100	NA	NA	23.8	73.1	152	40.1	NA	NA	NA	NA	23.8	73.1	152	40.1
PCB 181	18	3	17	NA	NA	0.0708	0.203	0.288	0.116	0.01165	0.0324	0.0815	0.0177	0.01165	0.0607	0.288	0.0781
PCB 182/187	18	18	100	NA	NA	27.7	63.9	108	25.8	NA	NA	NA	NA	27.7	63.9	108	25.8
PCB 183	18	18	100	NA	NA	3.99	14.1	28.2	6.42	NA	NA	NA	NA	3.99	14.1	28.2	6.42
PCB 184	18	17	94	NA	NA	0.0883	0.228	0.525	0.126	0.02465	0.0247	0.02465	NA	0.02465	0.217	0.525	0.131

Table 5-3a. Summary of Results for Crayfish Partial-Body Composites from Site Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
PCB Congeners (pg/g ww) (continued)																	
PCB 185	18	18	100	NA	NA	0.302	1.78	5.09	1.34	NA	NA	NA	NA	0.302	1.78	5.09	1.34
PCB 186	18	0	0	NA	NA	NA	NA	NA	NA	0.0065	0.0254	0.058	0.0128	0.0065	0.0254	0.058	0.0128
PCB 188	18	16	89	NA	NA	0.0469	0.146	0.342	0.0771	0.03845	0.0592	0.08	0.0294	0.03845	0.136	0.342	0.078
PCB 189	18	18	100	NA	NA	0.409	1	1.85	0.45	NA	NA	NA	NA	0.409	1	1.85	0.45
PCB 190	18	18	100	NA	NA	0.815	3.17	9.27	2.16	NA	NA	NA	NA	0.815	3.17	9.27	2.16
PCB 191	18	18	100	NA	NA	0.28	0.884	1.68	0.388	NA	NA	NA	NA	0.28	0.884	1.68	0.388
PCB 192	18	0	0	NA	NA	NA	NA	NA	NA	0.00565	0.0243	0.064	0.0136	0.00565	0.0243	0.064	0.0136
PCB 193	18	18	100	NA	NA	1.92	4.64	8.11	1.91	NA	NA	NA	NA	1.92	4.64	8.11	1.91
PCB 194	18	18	100	NA	NA	2.45	9.48	19.2	5.8	NA	NA	NA	NA	2.45	9.48	19.2	5.8
PCB 195	18	18	100	NA	NA	0.95	4.01	9.44	2.5	NA	NA	NA	NA	0.95	4.01	9.44	2.5
PCB 196/203	18	18	100	NA	NA	2.36	8.71	21.2	5.24	NA	NA	NA	NA	2.36	8.71	21.2	5.24
PCB 197	18	16	89	NA	NA	0.186	0.516	1.04	0.26	0.205	0.266	0.327	0.0863	0.186	0.488	1.04	0.258
PCB 198	18	17	94	NA	NA	0.101	0.349	0.836	0.207	0.1175	0.118	0.1175	NA	0.101	0.336	0.836	0.208
PCB 199	18	18	100	NA	NA	5.65	17.3	34.8	8.39	NA	NA	NA	NA	5.65	17.3	34.8	8.39
PCB 200	18	16	89	NA	NA	0.108	0.714	2.03	0.529	0.3785	0.403	0.427	0.0343	0.108	0.679	2.03	0.507
PCB 201	18	17	94	NA	NA	0.462	1.66	3.26	0.765	0.63	0.63	0.63	NA	0.462	1.61	3.26	0.781
PCB 202	18	18	100	NA	NA	0.587	4.34	10.5	2.35	NA	NA	NA	NA	0.587	4.34	10.5	2.35
PCB 204	18	0	0	NA	NA	NA	NA	NA	NA	0.00291	0.04	0.119	0.0287	0.00291	0.04	0.119	0.0287
PCB 205	18	16	89	NA	NA	0.0527	0.284	0.909	0.221	0.0344	0.0363	0.03815	0.00265	0.0344	0.257	0.909	0.222
PCB 206	18	18	100	NA	NA	0.395	1.75	4.01	1.11	NA	NA	NA	NA	0.395	1.75	4.01	1.11
PCB 207	18	18	100	NA	NA	0.157	0.502	1.38	0.342	NA	NA	NA	NA	0.157	0.502	1.38	0.342
PCB 208	18	18	100	NA	NA	0.367	1.13	2.74	0.589	NA	NA	NA	NA	0.367	1.13	2.74	0.589
Decachlorobiphenyl	18	18	100	NA	NA	0.208	0.757	2.89	0.702	NA	NA	NA	NA	0.208	0.757	2.89	0.702
Total PCB congeners, 1/2 DL	18	18	100	NA	NA	848	4740	19700	5700	NA	NA	NA	NA	848	4740	19700	5700
Total PCB congeners, 0 DL	18	18	100	NA	NA	846	4740	19700	5700	NA	NA	NA	NA	846	4740	19700	5700
PCB TEQ, mammal, 1/2 DL	18	18	100	0.0024	100	0.0158	0.0402	0.0664	0.0155	NA	NA	NA	NA	0.0158	0.0402	0.0664	0.0155
PCB TEQ, mammal, 0 DL	18	18	100	0.0024	100	0.00814	0.0387	0.0664	0.0179	NA	NA	NA	NA	0.00814	0.0387	0.0664	0.0179
Monochlorobiphenyl homologs	18	18	100	NA	NA	0.205	77.6	426	150	NA	NA	NA	NA	0.205	77.6	426	150
Dichlorobiphenyl homologs	18	18	100	NA	NA	15.8	794	4120	1500	NA	NA	NA	NA	15.8	794	4120	1500
Trichlorobiphenyl homologs	18	18	100	NA	NA	172	1900	10100	3140	NA	NA	NA	NA	172	1900	10100	3140
Tetrachlorobiphenyl homologs	18	18	100	NA	NA	293	998	3580	877	NA	NA	NA	NA	293	998	3580	877
Pentachlorobiphenyl homologs	18	18	100	NA	NA	132	385	677	143	NA	NA	NA	NA	132	385	677	143
Hexachlorobiphenyl homologs	18	18	100	NA	NA	144	389	623	136	NA	NA	NA	NA	144	389	623	136
Heptachlorobiphenyl homologs	18	18	100	NA	NA	91.3	235	449	104	NA	NA	NA	NA	91.3	235	449	104
Octachlorobiphenyl homologs	18	18	100	NA	NA	15.6	47	95	24.6	NA	NA	NA	NA	15.6	47	95	24.6
Nonachlorobiphenyl homologs	18	18	100	NA	NA	0.642	3.37	7.2	1.87	NA	NA	NA	NA	0.642	3.37	7.2	1.87
Decachlorobiphenyl homologs	18	18	100	NA	NA	0.208	0.757	2.89	0.702	NA	NA	NA	NA	0.208	0.757	2.89	0.702
Dioxins/Furans (pg/g ww)																	
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	18	3	17	NA	NA	0.0977	0.118	0.13	0.0174	0.01345	0.0404	0.0675	0.0133	0.01345	0.0533	0.13	0.0325
1,2,3,4,6,7,8-Heptachlorodibenzofuran	18	2	11	NA	NA	0.0598	0.0999	0.14	0.0567	0.00795	0.0306	0.0765	0.0201	0.00795	0.0383	0.14	0.0324
1,2,3,4,7,8,9-Heptachlorodibenzofuran	18	0	0	NA	NA	NA	NA	NA	NA	0.0098	0.0252	0.0366	0.00752	0.0098	0.0252	0.0366	0.00752
1,2,3,4,7,8-Hexachlorodibenzodioxin	18	0	0	NA	NA	NA	NA	NA	NA	0.0182	0.0432	0.0585	0.00974	0.0182	0.0432	0.0585	0.00974
1,2,3,4,7,8-Hexachlorodibenzofuran	18	0	0	NA	NA	NA	NA	NA	NA	0.00665	0.0178	0.02835	0.00453	0.00665	0.0178	0.02835	0.00453
1,2,3,6,7,8-Hexachlorodibenzodioxin	18	0	0	NA	NA	NA	NA	NA	NA	0.01945	0.0443	0.061	0.0102	0.01945	0.0443	0.061	0.0102
1,2,3,6,7,8-Hexachlorodibenzofuran	18	0	0	NA	NA	NA	NA	NA	NA	0.00675	0.0178	0.0279	0.00437	0.00675	0.0178	0.0279	0.00437
1,2,3,7,8,9-Hexachlorodibenzodioxin	18	0	0	NA	NA	NA	NA	NA	NA	0.02015	0.0461	0.0625	0.0107	0.02015	0.0461	0.0625	0.0107
1,2,3,7,8,9-Hexachlorodibenzofuran	18	0	0	NA	NA	NA	NA	NA	NA	0.0092	0.0252	0.0366	0.00569	0.0092	0.0252	0.0366	0.00569
1,2,3,7,8-Pentachlorodibenzodioxin	18	0	0	NA	NA	NA	NA	NA	NA	0.00995	0.0301	0.0452	0.00881	0.00995	0.0301	0.0452	0.00881
1,2,3,7,8-Pentachlorodibenzofuran	18	0	0	NA	NA	NA	NA	NA	NA	0.0156	0.0292	0.0381	0.00528	0.0156	0.0292	0.0381	0.00528
2,3,4,6,7,8-Hexachlorodibenzofuran	18	0	0	NA	NA	NA	NA	NA	NA	0.00685	0.0189	0.0309	0.00497	0.00685	0.0189	0.0309	0.00497
2,3,4,7,8-Pentachlorodibenzofuran	18	0	0	NA	NA	NA	NA	NA	NA	0.01425	0.0292	0.03965	0.00562	0.01425	0.0292	0.03965	0.00562
2,3,7,8-Tetrachlorodibenzodioxin	18	0	0	NA	NA	NA	NA	NA	NA	0.0106	0.0199	0.03755	0.00696	0.0106	0.0199	0.03755	0.00696
2,3,7,8-Tetrachlorodibenzofuran	18	13	72	NA	NA	0.0925	0.246	0.551	0.123	0.0226	0.0874	0.173	0.0557	0.0226	0.202	0.551	0.13
Dioxin TEQ, mammal, 1/2 DL	18	18	100	0.0024	100	0.0615	0.105	0.144	0.0211	NA	NA	NA	NA	0.0615	0.105	0.144	0.0211
Dioxin TEQ, mammal, 0 DL	18	18	100	0.0024	72	0.000167	0.0182	0.0553	0.0153	NA	NA	NA	NA	0.000167	0.0182	0.0553	0.0153
Total TEQ, mammal, 1/2 DL	18	18	100	NA	NA	0.0998	0.145	0.2	0.0319	NA	NA	NA	NA	0.0998	0.145	0.2	0.0319
Total TEQ, mammal, 0 DL	18	18	100	NA	NA	0.00915	0.0567	0.0965	0.0277	NA	NA	NA	NA	0.00915	0.0567	0.0965	0.0277

Table 5-3a. Summary of Results for Crayfish Partial-Body Composites from Site Areas

Analyte	Count of Results: Total #	Count of Results: # Detected	% Detected	HH RBC	% Detected > HH RBC	Detected Results Only: Min	Detected Results Only: Mean	Detected Results Only: Max	Detected Results Only: SD	Non-Detected Results Only[a, b]: Min	Non-Detected Results Only[a, b]: Mean	Non-Detected Results Only[a, b]: Max	Non-Detected Results Only[a, b]: SD	All Sample Results[a, b]: Min	All Sample Results[a, b]: Mean	All Sample Results[a, b]: Max	All Sample Results[a, b]: SD
Dioxins/Furans (pg/g ww) (continued)																	
Tetrachlorodibenzodioxin (Total)	18	7	39	NA	NA	0.101	0.254	0.523	0.183	0.0106	0.0212	0.06	0.0138	0.0106	0.112	0.523	0.16
Tetrachlorodibenzofuran (Total)	18	15	83	NA	NA	0.0717	0.293	0.601	0.183	0.0226	0.059	0.0955	0.0365	0.0226	0.254	0.601	0.189
Pentachlorodibenzodioxin (Total)	18	0	0	NA	NA	NA	NA	NA	NA	0.00995	0.0317	0.04565	0.00904	0.00995	0.0317	0.04565	0.00904
Pentachlorodibenzofuran (Total)	18	6	33	NA	NA	0.0554	0.129	0.253	0.0825	0.0236	0.0408	0.105	0.0233	0.0236	0.0703	0.253	0.0647
Hexachlorodibenzodioxin (Total)	18	0	0	NA	NA	NA	NA	NA	NA	0.0192	0.0507	0.1875	0.0355	0.0192	0.0507	0.1875	0.0355
Hexachlorodibenzofuran (Total)	18	0	0	NA	NA	NA	NA	NA	NA	0.0073	0.0267	0.0665	0.015	0.0073	0.0267	0.0665	0.015
Heptachlorodibenzodioxin (Total)	18	6	33	NA	NA	0.062	0.14	0.293	0.0806	0.0265	0.0495	0.1185	0.0249	0.0265	0.0796	0.293	0.065
Heptachlorodibenzofuran (Total)	18	8	44	NA	NA	0.0598	0.146	0.255	0.0599	0.0088	0.0345	0.1625	0.0456	0.0088	0.0839	0.255	0.0762
Octachlorodibenzodioxin	18	14	78	NA	NA	0.24	0.532	0.888	0.163	0.0342	0.093	0.228	0.0909	0.0342	0.435	0.888	0.239
Octachlorodibenzofuran	18	8	44	NA	NA	0.106	0.146	0.218	0.038	0.02045	0.0519	0.0755	0.0152	0.02045	0.0937	0.218	0.055

Notes:

Field split results were averaged with the parent sample result.

Partial-body is the whole-body minus the carapace and stomach.

Three significant figures were applied to the mean and standard deviation (SD).

[a] Summary statistics were calculated using half the method detection limit (MDL) for non-detected inorganic results (including methyl mercury) and half the estimated detection limit (EDL) for non-detected organic results.

[b] For non-detected results, the minimum value is half the MDL for inorganic results and half the EDL for organic results.

DL - detection limit

HH RBC - human health risk-based concentration

NA - not applicable

PCB - polychlorinated biphenyl

TEQ - toxic equivalents

Table 5-3b. Summary of Results for Crayfish Partial-Body Composites from Reference Areas

Analyte	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Metals/Metalloids (mg/kg ww except mercury and methyl mercury)																	
Aluminum	12	12	100	17	100	31.7	63.6	89.7	18.5	NA	NA	NA	NA	31.7	63.6	89.7	18.5
Antimony	12	0	0	0.0069	NA	NA	NA	NA	NA	0.001	0.00205	0.00345	0.000774	0.001	0.00205	0.00345	0.000774
Arsenic	12	12	100	0.0024	100	0.181	0.249	0.442	0.0819	NA	NA	NA	NA	0.181	0.249	0.442	0.0819
Barium	12	12	100	3.4	100	20.6	77.5	133	50.5	NA	NA	NA	NA	20.6	77.5	133	50.5
Beryllium	12	11	92	0.034	0	0.0021	0.0031	0.0043	0.000713	0.0008	0.0008	0.0008	NA	0.0008	0.00291	0.0043	0.00095
Cadmium	12	12	100	0.017	42	0.0091	0.0199	0.0324	0.00876	NA	NA	NA	NA	0.0091	0.0199	0.0324	0.00876
Calcium	12	12	100	NA	NA	31600	42100	50900	6170	NA	NA	NA	NA	31600	42100	50900	6170
Chromium	12	12	100	26	0	0.099	0.443	1.1	0.302	NA	NA	NA	NA	0.099	0.443	1.1	0.302
Cobalt	12	12	100	0.0051	100	0.0386	0.0775	0.137	0.0291	NA	NA	NA	NA	0.0386	0.0775	0.137	0.0291
Copper	12	12	100	0.69	100	14.2	22.7	32.8	6.07	NA	NA	NA	NA	14.2	22.7	32.8	6.07
Inorganic arsenic	12	12	100	0.0024	100	0.0088	0.025	0.044	0.0135	NA	NA	NA	NA	0.0088	0.025	0.044	0.0135
Iron	12	12	100	12	100	46.7	72.9	108	16	NA	NA	NA	NA	46.7	72.9	108	16
Lead	12	12	100	NA	NA	0.0204	0.0599	0.155	0.038	NA	NA	NA	NA	0.0204	0.0599	0.155	0.038
Magnesium	12	12	100	NA	NA	466	719	841	136	NA	NA	NA	NA	466	719	841	136
Manganese	12	12	100	2.4	100	16.4	27.9	46.7	10.7	NA	NA	NA	NA	16.4	27.9	46.7	10.7
Mercury (µg/kg ww)	12	12	100	NA	NA	24.7	41.4	78	16.5	NA	NA	NA	NA	24.7	41.4	78	16.5
Methyl mercury (µg/kg ww)	12	12	100	1.7	100	17.9	41.3	74.9	19.3	NA	NA	NA	NA	17.9	41.3	74.9	19.3
Nickel	12	12	100	0.34	25	0.076	0.239	0.536	0.143	NA	NA	NA	NA	0.076	0.239	0.536	0.143
Potassium	12	12	100	NA	NA	1730	1980	2290	171	NA	NA	NA	NA	1730	1980	2290	171
Selenium	12	12	100	0.086	100	0.12	0.186	0.28	0.0591	NA	NA	NA	NA	0.12	0.186	0.28	0.0591
Silver	12	12	100	0.086	75	0.0792	0.106	0.145	0.0203	NA	NA	NA	NA	0.0792	0.106	0.145	0.0203
Sodium	12	12	100	NA	NA	2030	2320	2630	166	NA	NA	NA	NA	2030	2320	2630	166
Thallium	12	6	50	0.00017	100	0.0007	0.00163	0.0025	0.000745	0.00075	0.000892	0.00105	0.000116	0.0007	0.00126	0.0025	0.000639
Vanadium	12	12	100	0.086	100	0.097	0.169	0.3	0.0548	NA	NA	NA	NA	0.097	0.169	0.3	0.0548
Zinc	12	12	100	5.1	100	17.1	22.4	25.9	3.01	NA	NA	NA	NA	17.1	22.4	25.9	3.01
Conventional Parameters (% ww)																	
Lipids	12	12	100	NA	NA	0.25	0.967	3.05	0.758	NA	NA	NA	NA	0.25	0.967	3.05	0.758
Total solids	12	12	100	NA	NA	26.2	29	31.1	1.5	NA	NA	NA	NA	26.2	29	31.1	1.5
PCB Congeners (pg/g ww)																	
PCB 1	12	7	58	NA	NA	0.146	0.311	0.693	0.21	0.03595	0.0573	0.097	0.0245	0.03595	0.205	0.693	0.203
PCB 2	12	6	50	NA	NA	0.0857	0.124	0.155	0.0247	0.0093	0.0437	0.0715	0.0286	0.0093	0.0839	0.155	0.0491
PCB 3	12	8	67	NA	NA	0.132	0.257	0.479	0.119	0.0369	0.0506	0.07	0.0155	0.0369	0.188	0.479	0.139
PCB 4/10	12	1	8	NA	NA	1.03	1.03	1.03	NA	0.133	0.421	0.93	0.257	0.133	0.472	1.03	0.302
PCB 5/8	12	11	92	NA	NA	2.3	3.43	4.52	0.754	2.08	2.08	2.08	NA	2.08	3.32	4.52	0.819
PCB 6	12	4	33	NA	NA	1.32	1.52	1.81	0.21	0.458	0.826	1.375	0.267	0.458	1.06	1.81	0.418
PCB 7/9	12	1	8	NA	NA	0.448	0.448	0.448	NA	0.057	0.144	0.262	0.0527	0.057	0.17	0.448	0.101
PCB 11	12	11	92	NA	NA	4.8	6.67	10.8	1.83	1.545	1.55	1.545	NA	1.545	6.24	10.8	2.29
PCB 12/13	12	3	25	NA	NA	0.546	0.683	0.794	0.126	0.1095	0.251	0.45	0.117	0.1095	0.359	0.794	0.226
PCB 14	12	0	0	NA	NA	NA	NA	NA	NA	0.0322	0.076	0.113	0.0332	0.0322	0.076	0.113	0.0332
PCB 15	12	8	67	NA	NA	1.25	2.41	3.17	0.618	1.075	1.26	1.505	0.183	1.075	2.03	3.17	0.757
PCB 16/32	12	12	100	NA	NA	6.28	10.9	17.1	3.12	NA	NA	NA	NA	6.28	10.9	17.1	3.12
PCB 17	12	12	100	NA	NA	3.87	6.6	10	1.83	NA	NA	NA	NA	3.87	6.6	10	1.83
PCB 18	12	12	100	NA	NA	8.36	14.1	20.7	3.84	NA	NA	NA	NA	8.36	14.1	20.7	3.84
PCB 19	12	12	100	NA	NA	0.79	1.29	2.04	0.335	NA	NA	NA	NA	0.79	1.29	2.04	0.335
PCB 20/21/33	12	12	100	NA	NA	5.54	10.2	16.9	3.29	NA	NA	NA	NA	5.54	10.2	16.9	3.29
PCB 22	12	12	100	NA	NA	4.07	7.53	12.6	2.48	NA	NA	NA	NA	4.07	7.53	12.6	2.48
PCB 23	12	2	17	NA	NA	0.059	0.0606	0.0622	0.00226	0.0105	0.0288	0.045	0.013	0.0105	0.0341	0.0622	0.0171
PCB 24/27	12	12	100	NA	NA	1.07	1.83	2.82	0.522	NA	NA	NA	NA	1.07	1.83	2.82	0.522
PCB 25	12	12	100	NA	NA	3.94	7.18	12	2.34	NA	NA	NA	NA	3.94	7.18	12	2.34
PCB 26	12	12	100	NA	NA	6.22	11.1	18.6	3.53	NA	NA	NA	NA	6.22	11.1	18.6	3.53
PCB 28	12	12	100	NA	NA	19.5	35.9	61.6	11.7	NA	NA	NA	NA	19.5	35.9	61.6	11.7
PCB 29	12	11	92	NA	NA	0.0835	0.151	0.22	0.0424	0.0525	0.0525	0.0525	NA	0.0525	0.143	0.22	0.0495
PCB 30	12	0	0	NA	NA	NA	NA	NA	NA	0.0078	0.0165	0.0265	0.00684	0.0078	0.0165	0.0265	0.00684
PCB 31	12	12	100	NA	NA	17.4	30.7	45.9	9.56	NA	NA	NA	NA	17.4	30.7	45.9	9.56
PCB 34	12	12	100	NA	NA	0.218	0.399	0.629	0.121	NA	NA	NA	NA	0.218	0.399	0.629	0.121
PCB 35	12	11	92	NA	NA	0.121	0.2	0.328	0.0622	0.0405	0.0405	0.0405	NA	0.0405	0.187	0.328	0.0751
PCB 36	12	2	17	NA	NA	0.0298	0.0664	0.103	0.0518	0.01665	0.0312	0.0625	0.015	0.01665	0.0371	0.103	0.0248
PCB 37	12	11	92	NA	NA	1.46	2.03	3.01	0.521	0.5	0.5	0.5	NA	0.5	1.9	3.01	0.664
PCB 38	12	12	100	NA	NA	0.475	1.23	1.96	0.488	NA	NA	NA	NA	0.475	1.23	1.96	0.488

Table 5-3b. Summary of Results for Crayfish Partial-Body Composites from Reference Areas

Analyte	Count of Results Total #	Count of Results # Detected	% Detected	HH RBC	% Detected > HH RBC	Detected Results Only Min	Detected Results Only Mean	Detected Results Only Max	Detected Results Only SD	Non-Detected Results Only[a, b] Min	Non-Detected Results Only[a, b] Mean	Non-Detected Results Only[a, b] Max	Non-Detected Results Only[a, b] SD	All Sample Results[a, b] Min	All Sample Results[a, b] Mean	All Sample Results[a, b] Max	All Sample Results[a, b] SD
PCB Congeners (pg/g ww) (continued)																	
PCB 39	12	5	42	NA	NA	0.0315	0.0719	0.103	0.028	0.0155	0.0295	0.058	0.0162	0.0155	0.0471	0.103	0.0301
PCB 40	12	12	100	NA	NA	1.08	2.34	4.18	0.898	NA	NA	NA	NA	1.08	2.34	4.18	0.898
PCB 41/64/71/ 72	12	12	100	NA	NA	10.4	21.7	37.6	7.81	NA	NA	NA	NA	10.4	21.7	37.6	7.81
PCB 42/59	12	12	100	NA	NA	3.83	7.86	13.8	2.71	NA	NA	NA	NA	3.83	7.86	13.8	2.71
PCB 43/49	12	12	100	NA	NA	18.7	41.7	80.8	17.3	NA	NA	NA	NA	18.7	41.7	80.8	17.3
PCB 44	12	12	100	NA	NA	5.19	19.2	50.4	12.9	NA	NA	NA	NA	5.19	19.2	50.4	12.9
PCB 45	12	12	100	NA	NA	2.09	3.91	5.93	1.14	NA	NA	NA	NA	2.09	3.91	5.93	1.14
PCB 46	12	12	100	NA	NA	0.739	1.28	2.05	0.363	NA	NA	NA	NA	0.739	1.28	2.05	0.363
PCB 47	12	12	100	NA	NA	12.9	22.6	38.6	7.42	NA	NA	NA	NA	12.9	22.6	38.6	7.42
PCB 48/75	12	12	100	NA	NA	2.25	4.76	7.64	1.58	NA	NA	NA	NA	2.25	4.76	7.64	1.58
PCB 50	12	10	83	NA	NA	0.122	0.206	0.3	0.0558	0.0494	0.0845	0.1195	0.0496	0.0494	0.185	0.3	0.0707
PCB 51	12	12	100	NA	NA	1.65	3.18	5.08	0.96	NA	NA	NA	NA	1.65	3.18	5.08	0.96
PCB 52/69	12	12	100	NA	NA	27.2	56.8	174	39.1	NA	NA	NA	NA	27.2	56.8	174	39.1
PCB 53	12	12	100	NA	NA	4.04	7.1	11.1	2.19	NA	NA	NA	NA	4.04	7.1	11.1	2.19
PCB 54	12	12	100	NA	NA	0.164	0.309	0.499	0.0928	NA	NA	NA	NA	0.164	0.309	0.499	0.0928
PCB 55	12	12	100	NA	NA	0.134	0.265	0.644	0.145	NA	NA	NA	NA	0.134	0.265	0.644	0.145
PCB 56/60	12	12	100	NA	NA	3.11	7.1	18.5	4.01	NA	NA	NA	NA	3.11	7.1	18.5	4.01
PCB 57	12	11	92	NA	NA	0.132	0.232	0.426	0.0863	0.093	0.093	0.093	NA	0.093	0.22	0.426	0.0915
PCB 58	12	11	92	NA	NA	0.0647	0.109	0.206	0.0415	0.0455	0.0455	0.0455	NA	0.0455	0.103	0.206	0.0436
PCB 61/70	12	12	100	NA	NA	7.76	21	80.4	19.3	NA	NA	NA	NA	7.76	21	80.4	19.3
PCB 62	12	0	0	NA	NA	NA	NA	NA	NA	0.01245	0.0251	0.04205	0.0109	0.01245	0.0251	0.04205	0.0109
PCB 63	12	12	100	NA	NA	0.934	1.42	2.52	0.533	NA	NA	NA	NA	0.934	1.42	2.52	0.533
PCB 65	12	0	0	NA	NA	NA	NA	NA	NA	0.01315	0.0265	0.0445	0.0116	0.01315	0.0265	0.0445	0.0116
PCB 66/76	12	12	100	NA	NA	13.5	20.5	45.6	9.22	NA	NA	NA	NA	13.5	20.5	45.6	9.22
PCB 67	12	11	92	NA	NA	0.276	0.488	0.874	0.174	0.2445	0.245	0.2445	NA	0.2445	0.468	0.874	0.18
PCB 68	12	12	100	NA	NA	0.375	0.569	0.842	0.136	NA	NA	NA	NA	0.375	0.569	0.842	0.136
PCB 73	12	5	42	NA	NA	0.121	0.2	0.315	0.0788	0.0121	0.0259	0.061	0.0207	0.0121	0.0983	0.315	0.103
PCB 74	12	12	100	NA	NA	7.75	12.7	31.9	6.7	NA	NA	NA	NA	7.75	12.7	31.9	6.7
PCB 77	12	12	100	NA	NA	0.518	0.736	1.13	0.209	NA	NA	NA	NA	0.518	0.736	1.13	0.209
PCB 78	12	0	0	NA	NA	NA	NA	NA	NA	0.01085	0.0228	0.0389	0.0098	0.01085	0.0228	0.0389	0.0098
PCB 79	12	12	100	NA	NA	0.342	0.651	1.52	0.304	NA	NA	NA	NA	0.342	0.651	1.52	0.304
PCB 80	12	1	8	NA	NA	0.0353	0.0353	0.0353	NA	0.01035	0.0209	0.0328	0.0082	0.01035	0.0221	0.0353	0.00886
PCB 81	12	9	75	NA	NA	0.039	0.153	0.716	0.214	0.014	0.0213	0.0295	0.00778	0.014	0.12	0.716	0.192
PCB 82	12	11	92	NA	NA	0.474	1.04	2.71	0.612	0.1295	0.13	0.1295	NA	0.1295	0.96	2.71	0.639
PCB 83	12	1	8	NA	NA	0.0346	0.0346	0.0346	NA	0.01245	0.0287	0.059	0.0159	0.01245	0.0291	0.059	0.0152
PCB 84/92	12	12	100	NA	NA	5.23	10.2	37.4	8.79	NA	NA	NA	NA	5.23	10.2	37.4	8.79
PCB 85/116	12	12	100	NA	NA	2.55	5.85	19.6	4.54	NA	NA	NA	NA	2.55	5.85	19.6	4.54
PCB 86	12	2	17	NA	NA	0.0459	0.12	0.194	0.105	0.02125	0.0472	0.0875	0.026	0.02125	0.0593	0.194	0.0485
PCB 87/117/125	12	12	100	NA	NA	3.69	9.83	48.6	12.4	NA	NA	NA	NA	3.69	9.83	48.6	12.4
PCB 88/91	12	12	100	NA	NA	1.77	4.51	12.2	2.73	NA	NA	NA	NA	1.77	4.51	12.2	2.73
PCB 89	12	8	67	NA	NA	0.0946	0.206	0.378	0.0875	0.02055	0.0443	0.0565	0.0168	0.02055	0.152	0.378	0.106
PCB 90/101	12	12	100	NA	NA	15.5	37.4	136	32	NA	NA	NA	NA	15.5	37.4	136	32
PCB 93	12	0	0	NA	NA	NA	NA	NA	NA	0.0195	0.0448	0.083	0.0232	0.0195	0.0448	0.083	0.0232
PCB 94	12	8	67	NA	NA	0.144	0.23	0.346	0.0676	0.0196	0.0807	0.153	0.0549	0.0196	0.18	0.346	0.0954
PCB 95/98/102	12	12	100	NA	NA	8.38	21	83.5	20.2	NA	NA	NA	NA	8.38	21	83.5	20.2
PCB 96	12	12	100	NA	NA	0.146	0.266	0.433	0.0818	NA	NA	NA	NA	0.146	0.266	0.433	0.0818
PCB 97	12	12	100	NA	NA	1.47	5.32	25.1	6.33	NA	NA	NA	NA	1.47	5.32	25.1	6.33
PCB 100	12	12	100	NA	NA	0.534	0.997	1.75	0.356	NA	NA	NA	NA	0.534	0.997	1.75	0.356
PCB 99	12	12	100	NA	NA	12.2	23.7	62.2	12.9	NA	NA	NA	NA	12.2	23.7	62.2	12.9
PCB 103	12	12	100	NA	NA	0.532	0.857	1.52	0.293	NA	NA	NA	NA	0.532	0.857	1.52	0.293
PCB 104	12	4	33	NA	NA	0.0532	0.0641	0.0803	0.0119	0.0116	0.0247	0.04915	0.0142	0.0116	0.0378	0.0803	0.0233
PCB 105	12	12	100	NA	NA	3.66	10.9	37.5	9.58	NA	NA	NA	NA	3.66	10.9	37.5	9.58
PCB 106/118	12	12	100	NA	NA	13.9	29.6	80.1	18.6	NA	NA	NA	NA	13.9	29.6	80.1	18.6
PCB 107/109	12	12	100	NA	NA	1.14	2.34	5.21	1.19	NA	NA	NA	NA	1.14	2.34	5.21	1.19
PCB 108/112	12	10	83	NA	NA	0.548	1.23	4.75	1.26	0.2515	0.28	0.3075	0.0396	0.2515	1.07	4.75	1.2
PCB 110	12	12	100	NA	NA	3.69	15.4	72	18.2	NA	NA	NA	NA	3.69	15.4	72	18.2
PCB 111/115	12	10	83	NA	NA	0.242	0.689	2.42	0.627	0.0127	0.014	0.01535	0.00187	0.0127	0.577	2.42	0.625
PCB 113	12	0	0	NA	NA	NA	NA	NA	NA	0.0135	0.0329	0.063	0.0174	0.0135	0.0329	0.063	0.0174
PCB 114	12	11	92	NA	NA	0.453	0.829	2.36	0.573	0.175	0.175	0.175	NA	0.175	0.775	2.36	0.578

Table 5-3b. Summary of Results for Crayfish Partial-Body Composites from Reference Areas

Analyte	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
PCB Congeners (pg/g ww) (continued)																	
PCB 119	12	12	100	NA	NA	0.561	1.06	2.22	0.43	NA	NA	NA	NA	0.561	1.06	2.22	0.43
PCB 120	12	10	83	NA	NA	0.0819	0.239	0.511	0.135	0.02725	0.0859	0.1445	0.0829	0.02725	0.213	0.511	0.139
PCB 121	12	0	0	NA	NA	NA	NA	NA	NA	0.01215	0.0279	0.0515	0.0144	0.01215	0.0279	0.0515	0.0144
PCB 122	12	7	58	NA	NA	0.0996	0.282	0.916	0.295	0.02695	0.0552	0.1465	0.0514	0.02695	0.188	0.916	0.249
PCB 123	12	10	83	NA	NA	0.34	0.545	1.24	0.296	0.129	0.164	0.198	0.0488	0.129	0.482	1.24	0.307
PCB 124	12	11	92	NA	NA	0.356	1.02	3.54	0.923	0.1565	0.157	0.1565	NA	0.1565	0.946	3.54	0.915
PCB 126	12	11	92	NA	NA	0.129	0.242	0.423	0.0889	0.153	0.153	0.153	NA	0.129	0.235	0.423	0.0886
PCB 127	12	2	17	NA	NA	0.0963	0.109	0.121	0.0175	0.0221	0.0603	0.143	0.0427	0.0221	0.0684	0.143	0.0433
PCB 128/162	12	12	100	NA	NA	1.1	3.86	9.75	2.45	NA	NA	NA	NA	1.1	3.86	9.75	2.45
PCB 129	12	10	83	NA	NA	0.132	0.658	2.21	0.682	0.116	0.142	0.1675	0.0364	0.116	0.572	2.21	0.649
PCB 130	12	12	100	NA	NA	0.456	2.63	5.16	1.24	NA	NA	NA	NA	0.456	2.63	5.16	1.24
PCB 131/133	12	12	100	NA	NA	0.527	1.3	2.13	0.473	NA	NA	NA	NA	0.527	1.3	2.13	0.473
PCB 132/161	12	10	83	NA	NA	0.946	2.16	7.14	1.85	0.02045	0.162	0.303	0.2	0.02045	1.83	7.14	1.85
PCB 134/143	12	12	100	NA	NA	0.291	0.739	2.61	0.638	NA	NA	NA	NA	0.291	0.739	2.61	0.638
PCB 135	12	11	92	NA	NA	0.961	1.95	5.71	1.35	0.655	0.655	0.655	NA	0.655	1.84	5.71	1.34
PCB 136	12	12	100	NA	NA	1.02	2	5.15	1.08	NA	NA	NA	NA	1.02	2	5.15	1.08
PCB 138/163/164	12	12	100	NA	NA	14.4	41	87.7	19.4	NA	NA	NA	NA	14.4	41	87.7	19.4
PCB 137	12	12	100	NA	NA	0.678	1.82	4.35	0.982	NA	NA	NA	NA	0.678	1.82	4.35	0.982
PCB 139/149	12	12	100	NA	NA	6.87	15.9	37.5	8.42	NA	NA	NA	NA	6.87	15.9	37.5	8.42
PCB 140	12	8	67	NA	NA	0.0906	0.16	0.259	0.0565	0.0208	0.0517	0.0935	0.0317	0.0208	0.124	0.259	0.0719
PCB 141	12	12	100	NA	NA	1.03	4.72	11.3	2.92	NA	NA	NA	NA	1.03	4.72	11.3	2.92
PCB 142	12	0	0	NA	NA	NA	NA	NA	NA	0.01765	0.0419	0.07	0.0184	0.01765	0.0419	0.07	0.0184
PCB 144	12	11	92	NA	NA	0.317	1.01	2.15	0.555	0.314	0.314	0.314	NA	0.314	0.952	2.15	0.566
PCB 145	12	0	0	NA	NA	NA	NA	NA	NA	0.01345	0.0322	0.0555	0.0158	0.01345	0.0322	0.0555	0.0158
PCB 146/165	12	12	100	NA	NA	3.72	9.41	15.4	3.53	NA	NA	NA	NA	3.72	9.41	15.4	3.53
PCB 147	12	8	67	NA	NA	0.461	1.1	1.73	0.447	0.4365	0.565	0.75	0.148	0.4365	0.919	1.73	0.449
PCB 148	12	9	75	NA	NA	0.0322	0.105	0.186	0.0468	0.01875	0.0293	0.0425	0.0121	0.01875	0.0864	0.186	0.053
PCB 150	12	5	42	NA	NA	0.0884	0.116	0.149	0.024	0.01315	0.0266	0.04195	0.0121	0.01315	0.0641	0.149	0.0493
PCB 151	12	12	100	NA	NA	2.29	4.2	9.22	2.01	NA	NA	NA	NA	2.29	4.2	9.22	2.01
PCB 152	12	1	8	NA	NA	0.0915	0.0915	0.0915	NA	0.0129	0.0325	0.0535	0.0149	0.0129	0.0374	0.0915	0.0221
PCB 153	12	12	100	NA	NA	25.3	53.4	96.8	19.5	NA	NA	NA	NA	25.3	53.4	96.8	19.5
PCB 154	12	10	83	NA	NA	0.497	0.937	1.57	0.303	0.381	0.501	0.62	0.169	0.381	0.864	1.57	0.326
PCB 155	12	8	67	NA	NA	0.0522	0.128	0.188	0.0405	0.0595	0.0813	0.104	0.0214	0.0522	0.112	0.188	0.0411
PCB 156	12	12	100	NA	NA	1.65	3.62	8.27	1.74	NA	NA	NA	NA	1.65	3.62	8.27	1.74
PCB 157	12	11	92	NA	NA	0.359	0.828	1.87	0.402	0.3685	0.369	0.3685	NA	0.359	0.789	1.87	0.406
PCB 158/160	12	12	100	NA	NA	0.861	3.06	6.62	1.53	NA	NA	NA	NA	0.861	3.06	6.62	1.53
PCB 159	12	4	33	NA	NA	0.306	0.778	1.08	0.355	0.0158	0.0304	0.03985	0.00773	0.0158	0.28	1.08	0.412
PCB 166	12	11	92	NA	NA	0.103	0.177	0.4	0.0897	0.0112	0.0112	0.0112	NA	0.0112	0.163	0.4	0.098
PCB 167	12	12	100	NA	NA	0.983	2.01	4.09	0.85	NA	NA	NA	NA	0.983	2.01	4.09	0.85
PCB 168	12	2	17	NA	NA	0.0946	0.101	0.107	0.00877	0.01495	0.0326	0.066	0.0152	0.01495	0.044	0.107	0.03
PCB 169	12	11	92	NA	NA	0.139	0.283	0.476	0.124	0.0485	0.0485	0.0485	NA	0.0485	0.263	0.476	0.136
PCB 170	12	12	100	NA	NA	1.52	5.21	10.8	2.29	NA	NA	NA	NA	1.52	5.21	10.8	2.29
PCB 171	12	12	100	NA	NA	0.379	1.04	2.14	0.454	NA	NA	NA	NA	0.379	1.04	2.14	0.454
PCB 172	12	12	100	NA	NA	0.26	1.67	2.79	0.758	NA	NA	NA	NA	0.26	1.67	2.79	0.758
PCB 173	12	0	0	NA	NA	NA	NA	NA	NA	0.01995	0.0322	0.056	0.0102	0.01995	0.0322	0.056	0.0102
PCB 174	12	12	100	NA	NA	1.06	4.35	8.88	2.02	NA	NA	NA	NA	1.06	4.35	8.88	2.02
PCB 175	12	10	83	NA	NA	0.239	0.307	0.53	0.09	0.0317	0.0349	0.038	0.00445	0.0317	0.261	0.53	0.133
PCB 176	12	12	100	NA	NA	0.183	0.413	0.807	0.161	NA	NA	NA	NA	0.183	0.413	0.807	0.161
PCB 177	12	12	100	NA	NA	0.911	4.29	7.45	1.8	NA	NA	NA	NA	0.911	4.29	7.45	1.8
PCB 178	12	12	100	NA	NA	0.776	2.66	4.25	1.07	NA	NA	NA	NA	0.776	2.66	4.25	1.07
PCB 179	12	12	100	NA	NA	0.559	1.12	2.3	0.528	NA	NA	NA	NA	0.559	1.12	2.3	0.528
PCB 180	12	12	100	NA	NA	7.67	20.9	38.6	7.81	NA	NA	NA	NA	7.67	20.9	38.6	7.81
PCB 181	12	0	0	NA	NA	NA	NA	NA	NA	0.01665	0.0268	0.04655	0.00849	0.01665	0.0268	0.04655	0.00849
PCB 182/187	12	12	100	NA	NA	8.74	18.7	28.1	6.63	NA	NA	NA	NA	8.74	18.7	28.1	6.63
PCB 183	12	12	100	NA	NA	1.56	4.35	8.28	1.73	NA	NA	NA	NA	1.56	4.35	8.28	1.73
PCB 184	12	5	42	NA	NA	0.0764	0.105	0.153	0.0309	0.01535	0.0302	0.0635	0.0162	0.01535	0.0614	0.153	0.0445
PCB 185	12	12	100	NA	NA	0.129	0.426	0.769	0.212	NA	NA	NA	NA	0.129	0.426	0.769	0.212
PCB 186	12	0	0	NA	NA	NA	NA	NA	NA	0.01235	0.0197	0.03525	0.00647	0.01235	0.0197	0.03525	0.00647
PCB 188	12	9	75	NA	NA	0.0651	0.116	0.199	0.0482	0.01985	0.0384	0.072	0.0292	0.01985	0.0968	0.199	0.0555

Table 5-3b. Summary of Results for Crayfish Partial-Body Composites from Reference Areas

	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
Analyte	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
PCB Congeners (pg/g ww) (continued)																	
PCB 189	12	10	83	NA	NA	0.176	0.409	0.646	0.156	0.1075	0.112	0.1165	0.00636	0.1075	0.359	0.646	0.182
PCB 190	12	11	92	NA	NA	0.423	0.961	1.8	0.382	0.116	0.116	0.116	NA	0.116	0.891	1.8	0.439
PCB 191	12	10	83	NA	NA	0.127	0.296	0.597	0.134	0.096	0.101	0.1055	0.00672	0.096	0.263	0.597	0.143
PCB 192	12	0	0	NA	NA	NA	NA	NA	NA	0.01305	0.021	0.0365	0.00666	0.01305	0.021	0.0365	0.00666
PCB 193	12	12	100	NA	NA	0.541	1.44	2.42	0.609	NA	NA	NA	NA	0.541	1.44	2.42	0.609
PCB 194	12	12	100	NA	NA	1.03	3.68	5.42	1.4	NA	NA	NA	NA	1.03	3.68	5.42	1.4
PCB 195	12	12	100	NA	NA	0.377	1.25	2.02	0.436	NA	NA	NA	NA	0.377	1.25	2.02	0.436
PCB 196/203	12	12	100	NA	NA	0.809	2.93	5.03	1.04	NA	NA	NA	NA	0.809	2.93	5.03	1.04
PCB 197	12	11	92	NA	NA	0.091	0.215	0.331	0.0704	0.026	0.026	0.026	NA	0.026	0.199	0.331	0.0864
PCB 198	12	8	67	NA	NA	0.0742	0.14	0.208	0.0466	0.0166	0.0197	0.02425	0.00329	0.0166	0.0997	0.208	0.0698
PCB 199	12	12	100	NA	NA	2.18	6.51	9.86	2.84	NA	NA	NA	NA	2.18	6.51	9.86	2.84
PCB 200	12	10	83	NA	NA	0.138	0.216	0.264	0.0467	0.0179	0.0297	0.04155	0.0167	0.0179	0.185	0.264	0.0841
PCB 201	12	12	100	NA	NA	0.223	0.61	0.869	0.222	NA	NA	NA	NA	0.223	0.61	0.869	0.222
PCB 202	12	11	92	NA	NA	0.499	1.83	2.53	0.574	0.3045	0.305	0.3045	NA	0.3045	1.71	2.53	0.703
PCB 204	12	1	8	NA	NA	0.0435	0.0435	0.0435	NA	0.0128	0.0281	0.0525	0.0123	0.0128	0.0293	0.0525	0.0125
PCB 205	12	9	75	NA	NA	0.0806	0.13	0.185	0.0374	0.0081	0.0225	0.03995	0.0161	0.0081	0.103	0.185	0.0587
PCB 206	12	11	92	NA	NA	0.509	1.13	1.72	0.353	0.108	0.108	0.108	NA	0.108	1.04	1.72	0.447
PCB 207	12	10	83	NA	NA	0.0776	0.291	0.483	0.124	0.0935	0.13	0.1665	0.0516	0.0776	0.264	0.483	0.13
PCB 208	12	11	92	NA	NA	0.291	0.869	1.59	0.367	0.1115	0.112	0.1115	NA	0.1115	0.806	1.59	0.413
Decachlorobiphenyl	12	8	67	NA	NA	0.201	0.631	1.24	0.353	0.086	0.289	0.565	0.213	0.086	0.517	1.24	0.347
Total PCB congeners, 1/2 DL	12	12	100	NA	NA	492	815	1700	315	NA	NA	NA	NA	492	815	1700	315
Total PCB congeners, 0 DL	12	12	100	NA	NA	489	812	1700	316	NA	NA	NA	NA	489	812	1700	316
PCB TEQ, mammal, 1/2 DL	12	12	100	0.0024	100	0.015	0.0328	0.059	0.0127	NA	NA	NA	NA	0.015	0.0328	0.059	0.0127
PCB TEQ, mammal, 0 DL	12	12	100	0.0024	100	0.00777	0.0313	0.059	0.0146	NA	NA	NA	NA	0.00777	0.0313	0.059	0.0146
Monochlorobiphenyl homologs	12	8	67	NA	NA	0.159	0.617	1.31	0.387	0.0395	0.0643	0.075	0.0166	0.0395	0.433	1.31	0.412
Dichlorobiphenyl homologs	12	12	100	NA	NA	6.64	11.8	18.3	3.73	NA	NA	NA	NA	6.64	11.8	18.3	3.73
Trichlorobiphenyl homologs	12	12	100	NA	NA	77.8	141	226	43.3	NA	NA	NA	NA	77.8	141	226	43.3
Tetrachlorobiphenyl homologs	12	12	100	NA	NA	126	259	603	128	NA	NA	NA	NA	126	259	603	128
Pentachlorobiphenyl homologs	12	12	100	NA	NA	96.5	185	644	149	NA	NA	NA	NA	96.5	185	644	149
Hexachlorobiphenyl homologs	12	12	100	NA	NA	69.1	158	301	64.8	NA	NA	NA	NA	69.1	158	301	64.8
Heptachlorobiphenyl homologs	12	12	100	NA	NA	27	68.4	119	24.9	NA	NA	NA	NA	27	68.4	119	24.9
Octachlorobiphenyl homologs	12	12	100	NA	NA	4.92	17.2	23.8	6.32	NA	NA	NA	NA	4.92	17.2	23.8	6.32
Nonachlorobiphenyl homologs	12	12	100	NA	NA	0.0776	2.07	3.31	0.864	NA	NA	NA	NA	0.0776	2.07	3.31	0.864
Decachlorobiphenyl homologs	12	8	67	NA	NA	0.201	0.631	1.24	0.353	0.086	0.289	0.565	0.213	0.086	0.517	1.24	0.347
Dioxins/Furans (pg/g ww)																	
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	12	0	0	NA	NA	NA	NA	NA	NA	0.03555	0.0459	0.058	0.00731	0.03555	0.0459	0.058	0.00731
1,2,3,4,6,7,8-Heptachlorodibenzofuran	12	0	0	NA	NA	NA	NA	NA	NA	0.0176	0.0278	0.0385	0.00721	0.0176	0.0278	0.0385	0.00721
1,2,3,4,7,8,9-Heptachlorodibenzofuran	12	0	0	NA	NA	NA	NA	NA	NA	0.0215	0.0338	0.0469	0.00914	0.0215	0.0338	0.0469	0.00914
1,2,3,4,7,8-Hexachlorodibenzodioxin	12	0	0	NA	NA	NA	NA	NA	NA	0.04	0.0715	0.11	0.0208	0.04	0.0715	0.11	0.0208
1,2,3,4,7,8-Hexachlorodibenzofuran	12	0	0	NA	NA	NA	NA	NA	NA	0.0198	0.0272	0.03535	0.00478	0.0198	0.0272	0.03535	0.00478
1,2,3,6,7,8-Hexachlorodibenzodioxin	12	0	0	NA	NA	NA	NA	NA	NA	0.04375	0.0733	0.1125	0.0217	0.04375	0.0733	0.1125	0.0217
1,2,3,6,7,8-Hexachlorodibenzofuran	12	0	0	NA	NA	NA	NA	NA	NA	0.0199	0.027	0.03355	0.00457	0.0199	0.027	0.03355	0.00457
1,2,3,7,8,9-Hexachlorodibenzodioxin	12	0	0	NA	NA	NA	NA	NA	NA	0.0431	0.0748	0.119	0.0224	0.0431	0.0748	0.119	0.0224
1,2,3,7,8,9-Hexachlorodibenzofuran	12	0	0	NA	NA	NA	NA	NA	NA	0.0266	0.0352	0.04525	0.00588	0.0266	0.0352	0.04525	0.00588
1,2,3,7,8-Pentachlorodibenzodioxin	12	0	0	NA	NA	NA	NA	NA	NA	0.0289	0.0474	0.079	0.0129	0.0289	0.0474	0.079	0.0129
1,2,3,7,8-Pentachlorodibenzofuran	12	0	0	NA	NA	NA	NA	NA	NA	0.0263	0.0454	0.0725	0.0143	0.0263	0.0454	0.0725	0.0143
2,3,4,6,7,8-Hexachlorodibenzofuran	12	0	0	NA	NA	NA	NA	NA	NA	0.02055	0.0278	0.03495	0.00473	0.02055	0.0278	0.03495	0.00473
2,3,4,7,8-Pentachlorodibenzofuran	12	0	0	NA	NA	NA	NA	NA	NA	0.02585	0.0486	0.099	0.0204	0.02585	0.0486	0.099	0.0204
2,3,7,8-Tetrachlorodibenzodioxin	12	0	0	NA	NA	NA	NA	NA	NA	0.01205	0.0241	0.03185	0.00566	0.01205	0.0241	0.03185	0.00566
2,3,7,8-Tetrachlorodibenzofuran	12	0	0	NA	NA	NA	NA	NA	NA	0.0284	0.0406	0.0665	0.012	0.0284	0.0406	0.0665	0.012
Dioxin TEQ, mammal, 1/2 DL	12	3	25	0.0024	100	0.106	0.127	0.139	0.0185	0.0431	0.063	0.092	0.0159	0.0431	0.0791	0.139	0.0331
Dioxin TEQ, mammal, 0 DL	12	3	25	0.0024	0	0.000114	0.000142	0.000191	0.0000423	0	0	0	0	0	3.56E-05	0.000191	0.0000669
Total TEQ, mammal, 1/2 DL	12	12	100	NA	NA	0.121	0.161	0.219	0.0279	NA	NA	NA	NA	0.121	0.161	0.219	0.0279
Total TEQ, mammal, 0 DL	12	12	100	NA	NA	0.00777	0.0313	0.0591	0.0146	NA	NA	NA	NA	0.00777	0.0313	0.0591	0.0146
Tetrachlorodibenzodioxin (Total)	12	0	0	NA	NA	NA	NA	NA	NA	0.01205	0.0241	0.03185	0.00566	0.01205	0.0241	0.03185	0.00566
Tetrachlorodibenzofuran (Total)	12	1	8	NA	NA	0.207	0.207	0.207	NA	0.03175	0.0487	0.123	0.0273	0.03175	0.0619	0.207	0.0526
Pentachlorodibenzodioxin (Total)	12	0	0	NA	NA	NA	NA	NA	NA	0.0289	0.0591	0.1625	0.038	0.0289	0.0591	0.1625	0.038
Pentachlorodibenzofuran (Total)	12	4	33	NA	NA	0.0872	0.402	1.2	0.534	0.0332	0.062	0.099	0.0237	0.0332	0.175	1.2	0.326

Table 5-3b. Summary of Results for Crayfish Partial-Body Composites from Reference Areas

Analyte	Count of Results		%		% Detected	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
	Total #	# Detected	Detected	HH RBC	> HH RBC	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Dioxins/Furans (pg/g ww) (continued)																	
Hexachlorodibenzodioxin (Total)	12	0	0	NA	NA	NA	NA	NA	NA	0.04225	0.0731	0.114	0.0214	0.04225	0.0731	0.114	0.0214
Hexachlorodibenzofuran (Total)	12	1	8	NA	NA	1.18	1.18	1.18	NA	0.02185	0.0292	0.03665	0.00503	0.02185	0.125	1.18	0.332
Heptachlorodibenzodioxin (Total)	12	0	0	NA	NA	NA	NA	NA	NA	0.03555	0.0459	0.058	0.00731	0.03555	0.0459	0.058	0.00731
Heptachlorodibenzofuran (Total)	12	0	0	NA	NA	NA	NA	NA	NA	0.0194	0.0306	0.04175	0.0081	0.0194	0.0306	0.04175	0.0081
Octachlorodibenzodioxin	12	3	25	NA	NA	0.38	0.474	0.637	0.141	0.03845	0.0887	0.184	0.0442	0.03845	0.185	0.637	0.188
Octachlorodibenzofuran	12	0	0	NA	NA	NA	NA	NA	NA	0.0505	0.0795	0.13	0.0218	0.0505	0.0795	0.13	0.0218

Notes:

Field split results were averaged with the parent sample result.

Partial-body is the whole-body minus the carapace and stomach.

Three significant figures were applied to the mean and standard deviation (SD).

[a] Summary statistics were calculated using half the method detection limit (MDL) for non-detected inorganic results (including methyl mercury) and half the estimated detection limit (EDL) for non-detected organic results.

[b] For non-detected results, the minimum value is half the MDL for inorganic results and half the EDL for organic results.

DL - detection limit

HH RBC - human health risk-based concentration

NA - not applicable

PCB - polychlorinated biphenyl

TEQ - toxic equivalents

Table 5-4a. Summary of Results for Crayfish Carapace and Stomach Composites from Site Areas

Analyte	Count of Results		%	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
	Total #	# Detected	Detected	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Metals/Metalloids (mg/kg ww except mercury)															
Aluminum	18	18	100	15.6	398	1150	392	NA	NA	NA	NA	15.6	398	1150	392
Antimony	18	6	33	0.024	0.176	0.389	0.141	0.007	0.00942	0.0125	0.00202	0.007	0.065	0.389	0.111
Arsenic	18	18	100	0.19	0.656	1.37	0.302	NA	NA	NA	NA	0.19	0.656	1.37	0.302
Barium	18	18	100	44.6	125	235	56.7	NA	NA	NA	NA	44.6	125	235	56.7
Beryllium	18	15	83	0.0022	0.0157	0.039	0.0124	0.0008	0.00148	0.002	0.000617	0.0008	0.0133	0.039	0.0125
Cadmium	18	18	100	0.114	0.328	0.906	0.21	NA	NA	NA	NA	0.114	0.328	0.906	0.21
Calcium	18	18	100	55500	80300	119000	18100	NA	NA	NA	NA	55500	80300	119000	18100
Chromium	18	18	100	0.279	3.01	11.6	3.12	NA	NA	NA	NA	0.279	3.01	11.6	3.12
Cobalt	18	18	100	0.0565	0.335	0.818	0.239	NA	NA	NA	NA	0.0565	0.335	0.818	0.239
Copper	18	18	100	11.6	25.4	44.5	9.73	NA	NA	NA	NA	11.6	25.4	44.5	9.73
Iron	18	18	100	28.5	419	1160	379	NA	NA	NA	NA	28.5	419	1160	379
Lead	18	18	100	0.211	0.97	2.64	0.647	NA	NA	NA	NA	0.211	0.97	2.64	0.647
Magnesium	18	18	100	632	1150	1720	328	NA	NA	NA	NA	632	1150	1720	328
Manganese	18	18	100	18.9	62.6	118	29.8	NA	NA	NA	NA	18.9	62.6	118	29.8
Mercury (µg/kg ww)	18	18	100	4.2	8.43	18.3	3.21	NA	NA	NA	NA	4.2	8.43	18.3	3.21
Nickel	18	18	100	0.35	1.91	5.34	1.61	NA	NA	NA	NA	0.35	1.91	5.34	1.61
Potassium	18	18	100	980	1390	1710	206	NA	NA	NA	NA	980	1390	1710	206
Selenium	18	18	100	0.11	0.32	0.74	0.158	NA	NA	NA	NA	0.11	0.32	0.74	0.158
Silver	18	18	100	0.0243	0.0644	0.155	0.0306	NA	NA	NA	NA	0.0243	0.0644	0.155	0.0306
Sodium	18	18	100	1900	2460	2870	285	NA	NA	NA	NA	1900	2460	2870	285
Thallium	18	18	100	0.0157	0.0279	0.0423	0.0077	NA	NA	NA	NA	0.0157	0.0279	0.0423	0.0077
Vanadium	18	18	100	0.059	0.933	2.43	0.814	NA	NA	NA	NA	0.059	0.933	2.43	0.814
Zinc	18	18	100	5.95	15.9	32.8	6.99	NA	NA	NA	NA	5.95	15.9	32.8	6.99
Conventional Parameters (% ww)															
Total solids	18	18	100	31.8	41.2	51.1	5.67	NA	NA	NA	NA	31.8	41.2	51.1	5.67

Notes:

Field split results were averaged with the parent sample result.

Three significant figures were applied to the mean and standard deviation (SD).

[a] Summary statistics were calculated using half the method detection limit (MDL) for non-detected inorganic results.

[b] For non-detected results, the minimum value is half the MDL.

NA - not applicable

Table 5-4b. Summary of Results for Crayfish Carapace and Stomach Composites from Reference Areas

Analyte	Count of Results		%	Detected Results Only				Non-Detected Results Only[a, b]				All Sample Results[a, b]			
	Total #	# Detected	Detected	Min	Mean	Max	SD	Min	Mean	Max	SD	Min	Mean	Max	SD
Metals/Metalloids (mg/kg ww except mercury)															
Aluminum	12	12	100	80.5	239	471	140	NA	NA	NA	NA	80.5	239	471	140
Antimony	12	4	33	0.0155	0.0181	0.023	0.00342	0.0025	0.00456	0.0065	0.00155	0.0025	0.00908	0.023	0.00702
Arsenic	12	12	100	0.22	0.656	1.53	0.446	NA	NA	NA	NA	0.22	0.656	1.53	0.446
Barium	12	12	100	43.9	156	314	110	NA	NA	NA	NA	43.9	156	314	110
Beryllium	12	12	100	0.0027	0.0116	0.0255	0.00755	NA	NA	NA	NA	0.0027	0.0116	0.0255	0.00755
Cadmium	12	12	100	0.0143	0.0522	0.151	0.0385	NA	NA	NA	NA	0.0143	0.0522	0.151	0.0385
Calcium	12	12	100	51300	72600	109000	17700	NA	NA	NA	NA	51300	72600	109000	17700
Chromium	12	12	100	0.37	3.84	10.8	3.71	NA	NA	NA	NA	0.37	3.84	10.8	3.71
Cobalt	12	12	100	0.0704	0.269	0.619	0.198	NA	NA	NA	NA	0.0704	0.269	0.619	0.198
Copper	12	12	100	7.17	15	24.3	5.85	NA	NA	NA	NA	7.17	15	24.3	5.85
Iron	12	12	100	47.4	269	605	215	NA	NA	NA	NA	47.4	269	605	215
Lead	12	12	100	0.0601	0.175	0.34	0.0872	NA	NA	NA	NA	0.0601	0.175	0.34	0.0872
Magnesium	12	12	100	933	1200	1920	282	NA	NA	NA	NA	933	1200	1920	282
Manganese	12	12	100	44.6	68.1	104	20.7	NA	NA	NA	NA	44.6	68.1	104	20.7
Mercury (µg/kg ww)	12	12	100	6.1	10.7	29.3	6.22	NA	NA	NA	NA	6.1	10.7	29.3	6.22
Nickel	12	12	100	0.199	1.74	4.69	1.6	NA	NA	NA	NA	0.199	1.74	4.69	1.6
Potassium	12	12	100	1290	1490	1780	147	NA	NA	NA	NA	1290	1490	1780	147
Selenium	12	12	100	0.11	0.27	0.49	0.154	NA	NA	NA	NA	0.11	0.27	0.49	0.154
Silver	12	12	100	0.044	0.0719	0.106	0.0201	NA	NA	NA	NA	0.044	0.0719	0.106	0.0201
Sodium	12	12	100	2400	2730	2950	188	NA	NA	NA	NA	2400	2730	2950	188
Thallium	12	7	58	0.0031	0.00413	0.0053	0.000754	0.00085	0.00123	0.00145	0.000249	0.00085	0.00292	0.0053	0.0016
Vanadium	12	12	100	0.139	0.845	1.92	0.736	NA	NA	NA	NA	0.139	0.845	1.92	0.736
Zinc	12	12	100	8.26	10.7	14	1.85	NA	NA	NA	NA	8.26	10.7	14	1.85
Conventional Parameters (% ww)															
Total solids	12	12	100	33.2	39.4	48	3.58	NA	NA	NA	NA	33.2	39.4	48	3.58

Notes:

Field split results were averaged with the parent sample result.

Three significant figures were applied to the mean and standard deviation (SD).

[a] Summary statistics were calculated using half the method detection limit (MDL) for non-detected inorganic results.

[b] For non-detected results, the minimum value is half the-MDL.

NA - not applicable

Table 5-5. Results for Clam Composite

Analyte	Count of Results		%		% Detected		Non-Detected
	Total #	# Detected	Detected	HH RBC	> HH RBC	Detected Result	Result
Metals/Metalloids (mg/kg ww except mercury and methyl mercury)							
Aluminum	1	1	100	17	100	515	NA
Antimony	1	0	0	0.0069	NA	NA	0.0092
Arsenic	1	1	100	0.0024	100	1.12	NA
Barium	1	1	100	3.4	100	6.52	NA
Beryllium	1	1	100	0.034	0	0.0176	NA
Cadmium	1	1	100	0.017	100	0.694	NA
Calcium	1	1	100	NA	NA	999	NA
Chromium	1	1	100	26	0	1.32	NA
Cobalt	1	1	100	0.0051	100	0.223	NA
Copper	1	1	100	0.69	100	3.62	NA
Inorganic arsenic	1	1	100	0.0024	100	0.164	NA
Iron	1	1	100	12	100	375	NA
Lead	1	1	100	NA	NA	0.961	NA
Magnesium	1	1	100	NA	NA	222	NA
Manganese	1	1	100	2.4	100	8.07	NA
Mercury (µg/kg ww)	1	1	100	NA	NA	6.33	NA
Methyl mercury (µg/kg ww)	1	1	100	1.7	100	3.5	NA
Nickel	1	1	100	0.34	100	0.616	NA
Potassium	1	1	100	NA	NA	259	NA
Selenium	1	1	100	0.086	100	0.5	NA
Silver	1	1	100	0.086	0	0.0203	NA
Sodium	1	1	100	NA	NA	305	NA
Thallium	1	1	100	0.00017	100	0.0248	NA
Vanadium	1	1	100	0.086	100	0.836	NA
Zinc	1	1	100	5.1	100	52.8	NA
Conventional Parameters (% ww)							
Lipids	1	1	100	NA	NA	1.58	NA
Total solids	1	1	100	NA	NA	13.1	NA
PCB Congeners (pg/g ww)							
PCB 1	1	1	100	NA	NA	0.461	NA
PCB 2	1	1	100	NA	NA	0.211	NA
PCB 3	1	1	100	NA	NA	0.366	NA
PCB 4/10	1	1	100	NA	NA	3.42	NA
PCB 5/8	1	1	100	NA	NA	9.59	NA
PCB 6	1	1	100	NA	NA	3.79	NA
PCB 7/9	1	1	100	NA	NA	0.459	NA
PCB 11	1	1	100	NA	NA	12	NA
PCB 12/13	1	1	100	NA	NA	1.42	NA
PCB 14	1	0	0	NA	NA	NA	0.0458
PCB 15	1	1	100	NA	NA	5	NA
PCB 16/32	1	1	100	NA	NA	37.9	NA
PCB 17	1	1	100	NA	NA	23.3	NA
PCB 18	1	1	100	NA	NA	50.9	NA
PCB 19	1	1	100	NA	NA	5.35	NA
PCB 20/21/33	1	1	100	NA	NA	30.1	NA
PCB 22	1	1	100	NA	NA	22.2	NA
PCB 23	1	1	100	NA	NA	0.12	NA
PCB 24/27	1	1	100	NA	NA	6.75	NA
PCB 25	1	1	100	NA	NA	20.9	NA
PCB 26	1	1	100	NA	NA	32.7	NA
PCB 28	1	1	100	NA	NA	99.2	NA
PCB 29	1	1	100	NA	NA	0.385	NA
PCB 30	1	0	0	NA	NA	NA	0.02125
PCB 31	1	1	100	NA	NA	89.7	NA
PCB 34	1	1	100	NA	NA	1.12	NA

Table 5-5. Results for Clam Composite

Analyte	Count of Results: Total #	Count of Results: # Detected	% Detected	HH RBC	% Detected > HH RBC	Detected Result	Non-Detected Result
PCB Congeners (pg/g ww) (continued)							
PCB 35	1	1	100	NA	NA	0.449	NA
PCB 36	1	0	0	NA	NA	NA	0.096
PCB 37	1	1	100	NA	NA	7.2	NA
PCB 38	1	1	100	NA	NA	3.48	NA
PCB 39	1	0	0	NA	NA	NA	0.0895
PCB 40	1	1	100	NA	NA	8.37	NA
PCB 41/64/71/ 72	1	1	100	NA	NA	77.8	NA
PCB 42/59	1	1	100	NA	NA	28.8	NA
PCB 43/49	1	1	100	NA	NA	152	NA
PCB 44	1	1	100	NA	NA	84.7	NA
PCB 45	1	1	100	NA	NA	14.3	NA
PCB 46	1	1	100	NA	NA	4.58	NA
PCB 47	1	1	100	NA	NA	71.8	NA
PCB 48/75	1	1	100	NA	NA	18.1	NA
PCB 50	1	1	100	NA	NA	0.628	NA
PCB 51	1	1	100	NA	NA	12	NA
PCB 52/69	1	1	100	NA	NA	164	NA
PCB 53	1	1	100	NA	NA	29.1	NA
PCB 54	1	1	100	NA	NA	1.48	NA
PCB 55	1	1	100	NA	NA	0.857	NA
PCB 56/60	1	1	100	NA	NA	23.1	NA
PCB 57	1	1	100	NA	NA	0.733	NA
PCB 58	1	1	100	NA	NA	0.254	NA
PCB 61/70	1	1	100	NA	NA	61.5	NA
PCB 62	1	0	0	NA	NA	NA	0.0615
PCB 63	1	1	100	NA	NA	4.19	NA
PCB 65	1	0	0	NA	NA	NA	0.065
PCB 66/76	1	1	100	NA	NA	61.2	NA
PCB 67	1	1	100	NA	NA	1.83	NA
PCB 68	1	1	100	NA	NA	1.52	NA
PCB 73	1	1	100	NA	NA	0.875	NA
PCB 74	1	1	100	NA	NA	34.9	NA
PCB 77	1	1	100	NA	NA	2.31	NA
PCB 78	1	0	0	NA	NA	NA	0.066
PCB 79	1	1	100	NA	NA	1.52	NA
PCB 80	1	0	0	NA	NA	NA	0.056
PCB 81	1	1	100	NA	NA	0.314	NA
PCB 82	1	1	100	NA	NA	5.47	NA
PCB 83	1	0	0	NA	NA	NA	0.0468
PCB 84/92	1	1	100	NA	NA	34.1	NA
PCB 85/116	1	1	100	NA	NA	14.8	NA
PCB 86	1	0	0	NA	NA	NA	0.08
PCB 87/117/125	1	1	100	NA	NA	23.4	NA
PCB 88/91	1	1	100	NA	NA	17.9	NA
PCB 89	1	1	100	NA	NA	0.782	NA
PCB 90/101	1	1	100	NA	NA	92.9	NA
PCB 93	1	0	0	NA	NA	NA	0.071
PCB 94	1	1	100	NA	NA	0.862	NA
PCB 95/98/102	1	1	100	NA	NA	64.5	NA
PCB 96	1	1	100	NA	NA	1.05	NA
PCB 97	1	1	100	NA	NA	19.9	NA
PCB 100	1	1	100	NA	NA	4.02	NA
PCB 99	1	1	100	NA	NA	55.2	NA
PCB 103	1	1	100	NA	NA	3.18	NA
PCB 104	1	1	100	NA	NA	0.244	NA

Table 5-5. Results for Clam Composite

Analyte	Count of Results: Total #	Count of Results: # Detected	% Detected	HH RBC	% Detected > HH RBC	Detected Result	Non-Detected Result
PCB Congeners (pg/g ww) (continued)							
PCB 105	1	1	100	NA	NA	20.8	NA
PCB 106/118	1	1	100	NA	NA	50.2	NA
PCB 107/109	1	1	100	NA	NA	5.77	NA
PCB 108/112	1	1	100	NA	NA	3.37	NA
PCB 110	1	1	100	NA	NA	67.5	NA
PCB 111/115	1	1	100	NA	NA	1.24	NA
PCB 113	1	0	0	NA	NA	NA	0.054
PCB 114	1	1	100	NA	NA	1.44	NA
PCB 119	1	1	100	NA	NA	2.99	NA
PCB 120	1	0	0	NA	NA	NA	0.0394
PCB 121	1	0	0	NA	NA	NA	0.04435
PCB 122	1	1	100	NA	NA	0.439	NA
PCB 123	1	1	100	NA	NA	1.19	NA
PCB 124	1	1	100	NA	NA	2.13	NA
PCB 126	1	1	100	NA	NA	0.278	NA
PCB 127	1	0	0	NA	NA	NA	0.116
PCB 128/162	1	1	100	NA	NA	12.4	NA
PCB 129	1	1	100	NA	NA	0.798	NA
PCB 130	1	1	100	NA	NA	7.82	NA
PCB 131/133	1	1	100	NA	NA	3.69	NA
PCB 132/161	1	1	100	NA	NA	15.6	NA
PCB 134/143	1	1	100	NA	NA	4.01	NA
PCB 135	1	1	100	NA	NA	12	NA
PCB 136	1	1	100	NA	NA	9.33	NA
PCB 138/163/164	1	1	100	NA	NA	91.2	NA
PCB 137	1	1	100	NA	NA	1.14	NA
PCB 139/149	1	1	100	NA	NA	72.7	NA
PCB 140	1	1	100	NA	NA	1	NA
PCB 141	1	1	100	NA	NA	3.41	NA
PCB 142	1	0	0	NA	NA	NA	0.082
PCB 144	1	1	100	NA	NA	3.42	NA
PCB 145	1	0	0	NA	NA	NA	0.0645
PCB 146/165	1	1	100	NA	NA	19.1	NA
PCB 147	1	1	100	NA	NA	3.05	NA
PCB 148	1	1	100	NA	NA	0.347	NA
PCB 150	1	1	100	NA	NA	0.418	NA
PCB 151	1	1	100	NA	NA	22.3	NA
PCB 152	1	1	100	NA	NA	0.126	NA
PCB 153	1	1	100	NA	NA	98.8	NA
PCB 154	1	1	100	NA	NA	3.4	NA
PCB 155	1	0	0	NA	NA	NA	0.178
PCB 156	1	1	100	NA	NA	2.59	NA
PCB 157	1	1	100	NA	NA	1.04	NA
PCB 158/160	1	1	100	NA	NA	7.01	NA
PCB 159	1	0	0	NA	NA	NA	0.0525
PCB 166	1	1	100	NA	NA	0.329	NA
PCB 167	1	1	100	NA	NA	2.27	NA
PCB 168	1	0	0	NA	NA	NA	0.0515
PCB 169	1	1	100	NA	NA	0.156	NA
PCB 170	1	1	100	NA	NA	4.21	NA
PCB 171	1	1	100	NA	NA	6.22	NA
PCB 172	1	1	100	NA	NA	0.817	NA
PCB 173	1	1	100	NA	NA	0.324	NA
PCB 174	1	1	100	NA	NA	5.75	NA
PCB 175	1	1	100	NA	NA	0.819	NA

Table 5-5. Results for Clam Composite

Analyte	Count of Results: Total #	Count of Results: # Detected	% Detected	HH RBC	% Detected > HH RBC	Detected Result	Non-Detected Result
PCB Congeners (pg/g ww) (continued)							
PCB 176	1	1	100	NA	NA	3.48	NA
PCB 177	1	1	100	NA	NA	22.2	NA
PCB 178	1	1	100	NA	NA	11.1	NA
PCB 179	1	1	100	NA	NA	16.8	NA
PCB 180	1	1	100	NA	NA	10.2	NA
PCB 181	1	0	0	NA	NA	NA	0.04045
PCB 182/187	1	1	100	NA	NA	53.2	NA
PCB 183	1	1	100	NA	NA	10.3	NA
PCB 184	1	1	100	NA	NA	0.374	NA
PCB 185	1	1	100	NA	NA	1.81	NA
PCB 186	1	0	0	NA	NA	NA	0.02765
PCB 188	1	1	100	NA	NA	0.199	NA
PCB 189	1	0	0	NA	NA	NA	0.051
PCB 190	1	1	100	NA	NA	3.63	NA
PCB 191	1	1	100	NA	NA	0.39	NA
PCB 192	1	0	0	NA	NA	NA	0.0317
PCB 193	1	1	100	NA	NA	3.01	NA
PCB 194	1	1	100	NA	NA	0.894	NA
PCB 195	1	1	100	NA	NA	2.53	NA
PCB 196/203	1	1	100	NA	NA	5.93	NA
PCB 197	1	1	100	NA	NA	0.454	NA
PCB 198	1	1	100	NA	NA	0.372	NA
PCB 199	1	1	100	NA	NA	4.58	NA
PCB 200	1	1	100	NA	NA	0.513	NA
PCB 201	1	1	100	NA	NA	2.39	NA
PCB 202	1	1	100	NA	NA	8.45	NA
PCB 204	1	0	0	NA	NA	NA	0.04805
PCB 205	1	1	100	NA	NA	0.434	NA
PCB 206	1	0	0	NA	NA	NA	0.815
PCB 207	1	1	100	NA	NA	0.286	NA
PCB 208	1	1	100	NA	NA	0.823	NA
Decachlorobiphenyl	1	1	100	NA	NA	0.688	NA
Total PCB congeners, 1/2 DL	1	1	100	NA	NA	2360	NA
Total PCB congeners, 0 DL	1	1	100	NA	NA	2350	NA
PCB TEQ, mammal, 1/2 DL	1	1	100	0.0024	Yes	0.0352	NA
PCB TEQ, mammal, 0 DL	1	1	100	0.0024	Yes	0.0352	NA
Monochlorobiphenyl homologs	1	1	100	NA	NA	1.04	NA
Dichlorobiphenyl homologs	1	1	100	NA	NA	35.6	NA
Trichlorobiphenyl homologs	1	1	100	NA	NA	432	NA
Tetrachlorobiphenyl homologs	1	1	100	NA	NA	863	NA
Pentachlorobiphenyl homologs	1	1	100	NA	NA	495	NA
Hexachlorobiphenyl homologs	1	1	100	NA	NA	399	NA
Heptachlorobiphenyl homologs	1	1	100	NA	NA	155	NA
Octachlorobiphenyl homologs	1	1	100	NA	NA	26.5	NA
Nonachlorobiphenyl homologs	1	1	100	NA	NA	1.11	NA
Decachlorobiphenyl homologs	1	1	100	NA	NA	0.688	NA
Dioxins/Furans (pg/g ww)							
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	1	0	0	NA	NA	NA	0.081
1,2,3,4,6,7,8-Heptachlorodibenzofuran	1	0	0	NA	NA	NA	0.02995
1,2,3,4,7,8,9-Heptachlorodibenzofuran	1	0	0	NA	NA	NA	0.03685
1,2,3,4,7,8-Hexachlorodibenzodioxin	1	0	0	NA	NA	NA	0.0449
1,2,3,4,7,8-Hexachlorodibenzofuran	1	0	0	NA	NA	NA	0.0181
1,2,3,6,7,8-Hexachlorodibenzodioxin	1	0	0	NA	NA	NA	0.04685
1,2,3,6,7,8-Hexachlorodibenzofuran	1	0	0	NA	NA	NA	0.01785
1,2,3,7,8,9-Hexachlorodibenzodioxin	1	0	0	NA	NA	NA	0.04575

Table 5-5. Results for Clam Composite

Analyte	Count of Results Total #	Count of Results # Detected	% Detected	HH RBC	% Detected > HH RBC	Detected Result	Non-Detected Result
Dioxins/Furans (pg/g ww) (continued)							
1,2,3,7,8,9-Hexachlorodibenzofuran	1	0	0	NA	NA	NA	0.02455
1,2,3,7,8-Pentachlorodibenzodioxin	1	0	0	NA	NA	NA	0.03465
1,2,3,7,8-Pentachlorodibenzofuran	1	0	0	NA	NA	NA	0.02575
2,3,4,6,7,8-Hexachlorodibenzofuran	1	0	0	NA	NA	NA	0.0185
2,3,4,7,8-Pentachlorodibenzofuran	1	0	0	NA	NA	NA	0.0241
2,3,7,8-Tetrachlorodibenzodioxin	1	0	0	NA	NA	NA	0.02545
2,3,7,8-Tetrachlorodibenzofuran	1	1	100	NA	NA	0.218	NA
Dioxin TEQ, mammal, 1/2 DL	1	1	100	0.0024	Yes	0.113	NA
Dioxin TEQ, mammal, 0 DL	1	1	100	0.0024	Yes	0.0221	NA
Total TEQ, mammal, 1/2 DL	1	1	100	NA	NA	0.149	NA
Total TEQ, mammal, 0 DL	1	1	100	NA	NA	0.0573	NA
Tetrachlorodibenzodioxin (Total)	1	1	100	NA	NA	0.17	NA
Tetrachlorodibenzofuran (Total)	1	1	100	NA	NA	0.443	NA
Pentachlorodibenzodioxin (Total)	1	0	0	NA	NA	NA	0.03465
Pentachlorodibenzofuran (Total)	1	0	0	NA	NA	NA	0.0249
Hexachlorodibenzodioxin (Total)	1	0	0	NA	NA	NA	0.04585
Hexachlorodibenzofuran (Total)	1	1	100	NA	NA	0.0538	NA
Heptachlorodibenzodioxin (Total)	1	0	0	NA	NA	NA	0.141
Heptachlorodibenzofuran (Total)	1	0	0	NA	NA	NA	0.03325
Octachlorodibenzodioxin	1	1	100	NA	NA	0.911	NA
Octachlorodibenzofuran	1	0	0	NA	NA	NA	0.0825

Notes:

For non-detected results, the value is half the method detection limit (MDL) for inorganic results (including methyl mercury) and half the estimated detection limit (EDL) for organic results.

DL - detection limit

HH RBC - human health risk-based concentration

NA - not applicable

PCB - polychlorinated biphenyl

SD - standard deviation

TEQ - toxic equivalents

Table 5-6. Comparison of ACGs to MDLs for Non-Detected Metals, Methyl Mercury, and Inorganic Arsenic

Analyte	ACG[a]	Minimum MDL for Non-Detected Results	Maximum MDL for Non-Detected Results	# of Non-Detected Results	# of Non-Detected Results Exceeding ACG
Mussels (mg/kg ww)					
Antimony	0.01	0.001	0.014	30	6
Inorganic arsenic	0.004	0.0058	0.0088	6	6
Thallium	0.004	0.0004	0.0044	15	2
Crayfish (mg/kg ww except methyl mercury)					
Antimony	0.01	0.002	0.025	62	31
Beryllium	0.034	0.0016	0.004	9	0
Methyl mercury (µg/kg ww)	2	0.6	0.6	1	0
Thallium	0.004	0.0015	0.0029	13	0
Clams (mg/kg ww)					
Antimony	0.01	0.0184	0.0184	1	1

Notes:

Number of non-detected results exceeding the analytical concentration goal (ACG) are highlighted.

[a] ACGs were presented in the QAPP and are based on the reporting limits provided by the laboratory (Exponent et al. 2016).

MDL - method detection limit

Table 5-7. Comparison of ACGs to EDLs for Non-Detected Organic Compounds

Analyte	ACG[a]	Minimum EDL for Non-Detected Results	Maximum EDL for Non-Detected Results	# of Non-Detected Results	# of Non-Detected Results Exceeding ACG
Mussels					
PCB Congeners (pg/g ww)					
PCB 1	0.5	0.0219	0.265	5	0
PCB 2	0.5	0.0158	0.0858	12	0
PCB 3	0.5	0.018	0.204	8	0
PCB 4/10	2	0.111	0.519	9	0
PCB 5/8	2	3.32	3.49	2	2
PCB 6	1	0.21	1.41	4	2
PCB 7/9	2	0.0681	0.431	16	0
PCB 11	1	2.2	5.99	6	6
PCB 12/13	2	0.186	0.865	9	0
PCB 14	1	0.044	0.39	22	0
PCB 15	1	1.34	2.55	2	2
PCB 23	0.5	0.0113	0.0983	13	0
PCB 29	0.5	0.0391	0.094	3	0
PCB 30	0.5	0.00457	0.0512	16	0
PCB 34	0.5	0.235	0.235	1	0
PCB 35	0.5	0.0534	0.0569	2	0
PCB 36	0.5	0.0155	0.14	18	0
PCB 39	0.5	0.0145	0.23	12	0
PCB 50	0.5	0.03	0.104	3	0
PCB 54	0.5	0.0501	0.192	3	0
PCB 55	0.5	0.2	0.2	1	0
PCB 57	0.5	0.233	0.233	1	0
PCB 58	0.5	0.0313	0.117	4	0
PCB 62	0.5	0.00929	0.11	16	0
PCB 65	0.5	0.00983	0.117	16	0
PCB 73	0.5	0.00909	0.132	16	0
PCB 77	0.5	0.231	0.231	1	0
PCB 78	0.5	0.00992	0.122	24	0
PCB 80	0.5	0.00849	0.128	25	0
PCB 81	0.5	0.0622	0.109	2	0
PCB 82	0.5	1.45	1.45	1	1
PCB 83	0.5	0.00499	0.115	21	0
PCB 86	0.5	0.00851	0.183	13	0
PCB 89	0.5	0.087	0.252	4	0
PCB 93	0.5	0.00745	0.17	25	0
PCB 96	0.5	0.152	0.212	4	0
PCB 100	0.5	0.74	0.74	1	1
PCB 104	0.5	0.0134	0.106	11	0
PCB 107/109	1	0.864	0.864	1	0
PCB 108/112	1	1.51	1.51	1	1
PCB 111/115	1	0.00456	1.11	6	1
PCB 113	0.5	0.00567	0.126	25	0
PCB 114	0.5	0.302	0.302	1	0
PCB 120	0.5	0.0042	0.0904	12	0
PCB 121	0.5	0.00464	0.106	25	0
PCB 122	0.5	0.0388	0.231	6	0
PCB 123	0.5	0.185	0.185	1	0
PCB 124	0.5	0.457	0.457	1	0
PCB 126	0.5	0.025	0.162	6	0
PCB 127	0.5	0.0238	0.321	25	0

Table 5-7. Comparison of ACGs to EDLs for Non-Detected Organic Compounds

Analyte	ACG[a]	Minimum EDL for Non-Detected Results	Maximum EDL for Non-Detected Results	# of Non-Detected Results	# of Non-Detected Results Exceeding ACG
Mussels (continued)					
PCB Congeners (pg/g ww) (continued)					
PCB 130	0.5	0.587	0.587	1	1
PCB 131/133	0.5	0.38	0.502	2	1
PCB 132/161	1	2.26	2.26	1	1
PCB 137	0.5	0.404	0.404	1	0
PCB 140	0.5	0.0607	0.281	11	0
PCB 142	1	0.0174	0.161	23	0
PCB 144	0.5	0.303	0.746	2	1
PCB 145	0.5	0.00579	0.179	20	0
PCB 147	0.5	0.548	1.61	4	4
PCB 148	0.5	0.00765	0.237	17	0
PCB 150	0.5	0.0202	0.199	9	0
PCB 152	0.5	0.00557	0.173	13	0
PCB 154	0.5	0.582	0.846	2	2
PCB 155	0.5	0.0412	0.164	10	0
PCB 156	0.5	0.537	0.537	1	1
PCB 158/160	1	0.447	0.473	2	0
PCB 159	0.5	0.0181	0.545	19	1
PCB 166	0.5	0.0149	0.094	7	0
PCB 167	0.5	0.289	0.289	1	0
PCB 168	0.5	0.0109	0.106	17	0
PCB 169	0.5	0.0289	0.0472	2	0
PCB 170	0.5	0.709	0.709	1	1
PCB 173	0.5	0.0272	0.184	9	0
PCB 175	0.5	0.031	0.198	4	0
PCB 177	0.5	0.948	0.948	1	1
PCB 181	0.5	0.00632	0.0786	25	0
PCB 183	0.5	0.751	0.751	1	1
PCB 184	0.5	0.0168	0.103	9	0
PCB 185	0.5	0.561	0.561	1	1
PCB 186	0.5	0.00497	0.0571	25	0
PCB 188	0.5	0.00496	0.0709	13	0
PCB 189	0.5	0.0322	0.23	5	0
PCB 190	0.5	0.267	0.267	1	0
PCB 191	0.5	0.0167	0.256	9	0
PCB 192	0.5	0.00495	0.0616	25	0
PCB 194	0.5	0.315	0.315	1	0
PCB 195	0.5	0.146	0.206	3	0
PCB 196/203	1	0.624	0.624	1	0
PCB 197	0.5	0.0318	0.211	7	0
PCB 198	0.5	0.0203	0.209	6	0
PCB 200	0.5	0.161	1.11	5	2
PCB 201	0.5	0.0362	0.126	5	0
PCB 204	0.5	0.0138	0.161	23	0
PCB 205	0.5	0.0374	0.0616	3	0
PCB 206	0.5	0.255	0.255	1	0
PCB 207	0.5	0.00764	0.0442	7	0
PCB 208	0.5	0.24	0.24	1	0
Decachlorobiphenyl	0.5	0.0671	0.0671	1	0

Table 5-7. Comparison of ACGs to EDLs for Non-Detected Organic Compounds

Analyte	ACG[a]	Minimum EDL for Non-Detected Results	Maximum EDL for Non-Detected Results	# of Non-Detected Results	# of Non-Detected Results Exceeding ACG
Mussels (continued)					
Dioxins/Furans (pg/g ww)					
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	2.5	0.0555	0.483	19	0
1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.5	0.0118	0.164	21	0
1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.5	0.0132	0.248	23	0
1,2,3,4,7,8-Hexachlorodibenzodioxin	2.5	0.0407	0.295	23	0
1,2,3,4,7,8-Hexachlorodibenzofuran	2.5	0.0108	0.147	23	0
1,2,3,6,7,8-Hexachlorodibenzodioxin	2.5	0.0396	0.325	23	0
1,2,3,6,7,8-Hexachlorodibenzofuran	2.5	0.0106	0.156	23	0
1,2,3,7,8,9-Hexachlorodibenzodioxin	2.5	0.0396	0.31	22	0
1,2,3,7,8,9-Hexachlorodibenzofuran	2.5	0.0154	0.203	22	0
1,2,3,7,8-Pentachlorodibenzodioxin	2.5	0.0174	0.159	23	0
1,2,3,7,8-Pentachlorodibenzofuran	2.5	0.0116	0.216	23	0
2,3,4,6,7,8-Hexachlorodibenzofuran	2.5	0.0119	0.178	23	0
2,3,4,7,8-Pentachlorodibenzofuran	2.5	0.0101	0.239	23	0
2,3,7,8-Tetrachlorodibenzodioxin	0.5	0.00996	0.142	23	0
2,3,7,8-Tetrachlorodibenzofuran	0.5	0.0142	0.175	23	0
Octachlorodibenzodioxin	5	0.35	0.896	11	0
Octachlorodibenzofuran	5	0.0372	0.449	21	0
Crayfish					
PCB Congeners (pg/g ww)					
PCB 1	0.5	0.0719	0.194	5	0
PCB 2	0.5	0.0186	0.143	8	0
PCB 3	0.5	0.0738	0.14	4	0
PCB 4/10	2	0.266	1.97	13	0
PCB 5/8	2	4.16	4.16	1	1
PCB 6	1	0.916	2.75	9	8
PCB 7/9	2	0.0995	0.524	14	0
PCB 11	1	3.09	8.41	4	4
PCB 12/13	2	0.215	0.9	10	0
PCB 14	1	0.0377	0.551	34	0
PCB 15	1	2.15	3.01	4	4
PCB 23	0.5	0.0191	0.31	20	0
PCB 29	0.5	0.105	0.299	3	0
PCB 30	0.5	0.00649	0.101	29	0
PCB 34	0.5	0.284	0.284	1	0
PCB 35	0.5	0.0248	0.445	5	0
PCB 36	0.5	0.0236	0.468	30	0
PCB 37	0.5	1	1	1	1
PCB 39	0.5	0.022	0.436	21	0
PCB 50	0.5	0.0988	0.538	3	1
PCB 55	0.5	0.624	0.624	1	1
PCB 57	0.5	0.186	0.186	1	0
PCB 58	0.5	0.037	0.239	4	0
PCB 62	0.5	0.0167	0.21	30	0
PCB 65	0.5	0.0177	0.529	29	1
PCB 67	0.5	0.489	0.489	1	0
PCB 68	0.5	0.566	0.566	1	1
PCB 73	0.5	0.0158	0.122	11	0
PCB 78	0.5	0.0188	0.208	34	0
PCB 80	0.5	0.0207	0.184	32	0
PCB 81	0.5	0.028	0.185	5	0

Table 5-7. Comparison of ACGs to EDLs for Non-Detected Organic Compounds

Analyte	ACG[a]	Minimum EDL for Non-Detected Results	Maximum EDL for Non-Detected Results	# of Non-Detected Results	# of Non-Detected Results Exceeding ACG
Crayfish (continued)					
PCB Congeners (pg/g ww) (continued)					
PCB 82	0.5	0.259	0.259	1	0
PCB 83	0.5	0.00884	0.118	31	0
PCB 86	0.5	0.0151	0.195	26	0
PCB 89	0.5	0.0133	0.383	8	0
PCB 93	0.5	0.0126	0.174	34	0
PCB 94	0.5	0.0392	0.306	5	0
PCB 104	0.5	0.0232	0.0983	10	0
PCB 108/112	1	0.503	0.711	3	0
PCB 111/115	1	0.00808	0.0307	5	0
PCB 113	0.5	0.00987	0.128	34	0
PCB 114	0.5	0.35	0.35	1	0
PCB 120	0.5	0.00744	0.289	4	0
PCB 121	0.5	0.00786	0.108	34	0
PCB 122	0.5	0.0385	0.429	19	0
PCB 123	0.5	0.258	0.396	2	0
PCB 124	0.5	0.313	0.313	1	0
PCB 126	0.5	0.135	0.314	4	0
PCB 127	0.5	0.0383	0.462	32	0
PCB 129	0.5	0.232	0.335	2	0
PCB 132/161	1	0.0281	0.606	3	0
PCB 135	0.5	1.31	1.31	1	1
PCB 140	0.5	0.0416	0.285	10	0
PCB 142	1	0.0353	0.319	34	0
PCB 144	0.5	0.628	0.628	1	1
PCB 145	0.5	0.0071	0.265	33	0
PCB 147	0.5	0.873	1.5	4	4
PCB 148	0.5	0.0375	0.114	5	0
PCB 150	0.5	0.0263	0.261	17	0
PCB 152	0.5	0.00683	0.255	26	0
PCB 154	0.5	0.762	1.99	3	3
PCB 155	0.5	0.0874	0.248	10	0
PCB 157	0.5	0.737	0.737	1	1
PCB 159	0.5	0.0267	0.193	28	0
PCB 166	0.5	0.0224	0.22	3	0
PCB 168	0.5	0.0271	0.132	15	0
PCB 169	0.5	0.0593	0.21	4	0
PCB 173	0.5	0.0172	0.196	28	0
PCB 175	0.5	0.0177	0.249	4	0
PCB 181	0.5	0.0233	0.163	30	0
PCB 184	0.5	0.0271	0.127	10	0
PCB 186	0.5	0.013	0.116	34	0
PCB 188	0.5	0.0397	0.16	8	0
PCB 189	0.5	0.215	0.233	2	0
PCB 190	0.5	0.232	0.232	1	0
PCB 191	0.5	0.192	0.211	2	0
PCB 192	0.5	0.0113	0.128	34	0
PCB 194	0.5	1.75	1.75	1	1
PCB 197	0.5	0.052	0.654	3	1
PCB 198	0.5	0.0332	0.246	8	0
PCB 200	0.5	0.0358	0.854	5	2

Table 5-7. Comparison of ACGs to EDLs for Non-Detected Organic Compounds

Analyte	ACG[a]	Minimum EDL for Non-Detected Results	Maximum EDL for Non-Detected Results	# of Non-Detected Results	# of Non-Detected Results Exceeding ACG
Crayfish (continued)					
PCB Congeners (pg/g ww) (continued)					
PCB 201	0.5	1.26	1.26	1	1
PCB 202	0.5	0.527	0.609	2	2
PCB 204	0.5	0.00582	0.238	33	0
PCB 205	0.5	0.0162	0.214	8	0
PCB 206	0.5	0.216	0.299	2	0
PCB 207	0.5	0.0962	0.333	3	0
PCB 208	0.5	0.223	0.223	1	0
Decachlorobiphenyl	0.5	0.172	1.13	4	2
Dioxins/Furans (pg/g ww)					
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	2.5	0.0269	0.135	31	0
1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.5	0.0159	0.153	32	0
1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.5	0.0196	0.0938	34	0
1,2,3,4,7,8-Hexachlorodibenzodioxin	2.5	0.0364	0.22	34	0
1,2,3,4,7,8-Hexachlorodibenzofuran	2.5	0.0133	0.0707	34	0
1,2,3,6,7,8-Hexachlorodibenzodioxin	2.5	0.0389	0.225	34	0
1,2,3,6,7,8-Hexachlorodibenzofuran	2.5	0.0135	0.0671	34	0
1,2,3,7,8,9-Hexachlorodibenzodioxin	2.5	0.0403	0.238	34	0
1,2,3,7,8,9-Hexachlorodibenzofuran	2.5	0.0184	0.0905	34	0
1,2,3,7,8-Pentachlorodibenzodioxin	2.5	0.0199	0.158	34	0
1,2,3,7,8-Pentachlorodibenzofuran	2.5	0.0312	0.145	34	0
2,3,4,6,7,8-Hexachlorodibenzofuran	2.5	0.0137	0.0699	34	0
2,3,4,7,8-Pentachlorodibenzofuran	2.5	0.0285	0.198	34	0
2,3,7,8-Tetrachlorodibenzodioxin	0.5	0.0212	0.0751	34	0
2,3,7,8-Tetrachlorodibenzofuran	0.5	0.0452	0.346	20	0
Octachlorodibenzodioxin	5	0.0684	0.456	16	0
Octachlorodibenzofuran	5	0.0409	0.26	26	0
Clams					
PCB Congeners (pg/g ww)					
PCB 14	1	0.0916	0.0916	1	0
PCB 30	0.5	0.0425	0.0425	1	0
PCB 36	0.5	0.192	0.192	1	0
PCB 39	0.5	0.179	0.179	1	0
PCB 62	0.5	0.123	0.123	1	0
PCB 65	0.5	0.13	0.13	1	0
PCB 78	0.5	0.132	0.132	1	0
PCB 80	0.5	0.112	0.112	1	0
PCB 83	0.5	0.0936	0.0936	1	0
PCB 86	0.5	0.16	0.16	1	0
PCB 93	0.5	0.142	0.142	1	0
PCB 113	0.5	0.108	0.108	1	0
PCB 120	0.5	0.0788	0.0788	1	0
PCB 121	0.5	0.0887	0.0887	1	0
PCB 127	0.5	0.232	0.232	1	0
PCB 142	1	0.164	0.164	1	0
PCB 145	0.5	0.129	0.129	1	0
PCB 155	0.5	0.356	0.356	1	0
PCB 159	0.5	0.105	0.105	1	0
PCB 168	0.5	0.103	0.103	1	0
PCB 181	0.5	0.0809	0.0809	1	0
PCB 186	0.5	0.0553	0.0553	1	0

Table 5-7. Comparison of ACGs to EDLs for Non-Detected Organic Compounds

Analyte	ACG[a]	Minimum EDL for Non-Detected Results	Maximum EDL for Non-Detected Results	# of Non-Detected Results	# of Non-Detected Results Exceeding ACG
Clams (continued)					
PCB Congeners (pg/g ww) (continued)					
PCB 189	0.5	0.102	0.102	1	0
PCB 192	0.5	0.0634	0.0634	1	0
PCB 204	0.5	0.0961	0.0961	1	0
PCB 206	0.5	1.63	1.63	1	1
Dioxins/Furans (pg/g ww)					
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	2.5	0.162	0.162	1	0
1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.5	0.0599	0.0599	1	0
1,2,3,4,7,8,9-Heptachlorodibenzofuran	2.5	0.0737	0.0737	1	0
1,2,3,4,7,8-Hexachlorodibenzodioxin	2.5	0.0898	0.0898	1	0
1,2,3,4,7,8-Hexachlorodibenzofuran	2.5	0.0362	0.0362	1	0
1,2,3,6,7,8-Hexachlorodibenzodioxin	2.5	0.0937	0.0937	1	0
1,2,3,6,7,8-Hexachlorodibenzofuran	2.5	0.0357	0.0357	1	0
1,2,3,7,8,9-Hexachlorodibenzodioxin	2.5	0.0915	0.0915	1	0
1,2,3,7,8,9-Hexachlorodibenzofuran	2.5	0.0491	0.0491	1	0
1,2,3,7,8-Pentachlorodibenzodioxin	2.5	0.0693	0.0693	1	0
1,2,3,7,8-Pentachlorodibenzofuran	2.5	0.0515	0.0515	1	0
2,3,4,6,7,8-Hexachlorodibenzofuran	2.5	0.037	0.037	1	0
2,3,4,7,8-Pentachlorodibenzofuran	2.5	0.0482	0.0482	1	0
2,3,7,8-Tetrachlorodibenzodioxin	0.5	0.0509	0.0509	1	0
Octachlorodibenzofuran	5	0.165	0.165	1	0

Notes:

Number of non-detected results exceeding the analytical concentration goal (ACG) are highlighted.

[a] ACGs were presented in the QAPP and are based on the quantitation limits provided by the laboratory for the target sample mass (Exponent et al. 2016).

EDL - estimated detection limit

PCB - polychlorinated biphenyl

Table 5-8. Comparison of ACGs to TEF-Adjusted EDLs for Non-Detected Dioxin/Furan Congeners and Dioxin-Like PCB Congeners

Analyte	ACG[a]	TEF[b] (unitless)	Minimum TEF-Adjusted EDL for Non-Detected Results	Maximum TEF-Adjusted EDL for Non-Detected Results	# of Non-Detected Results	# of Non-Detected Results Exceeding ACG
Mussels						
PCB Congeners (pg/g ww)						
PCB 77	0.00005	0.0001	0.0000231	0.0000231	1	0
PCB 81	0.00015	0.0003	0.00001866	0.0000327	2	0
PCB 114	0.000015	0.00003	0.00000906	0.00000906	1	0
PCB 123	0.000015	0.00003	0.00000555	0.00000555	1	0
PCB 126	0.05	0.1	0.0025	0.0162	6	0
PCB 156	0.000015	0.00003	0.00001611	0.00001611	1	1
PCB 167	0.000015	0.00003	0.00000867	0.00000867	1	0
PCB 169	0.015	0.03	0.000867	0.001416	2	0
PCB 189	0.000015	0.00003	0.000000966	0.0000069	5	0
Dioxins/Furans (pg/g ww)						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	0.025	0.01	0.000555	0.00483	19	0
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.025	0.01	0.000118	0.00164	21	0
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.025	0.01	0.000132	0.00248	23	0
1,2,3,4,7,8-Hexachlorodibenzodioxin	0.25	0.1	0.00407	0.0295	23	0
1,2,3,4,7,8-Hexachlorodibenzofuran	0.25	0.1	0.00108	0.0147	23	0
1,2,3,6,7,8-Hexachlorodibenzodioxin	0.25	0.1	0.00396	0.0325	23	0
1,2,3,6,7,8-Hexachlorodibenzofuran	0.25	0.1	0.00106	0.0156	23	0
1,2,3,7,8,9-Hexachlorodibenzodioxin	0.25	0.1	0.00396	0.031	22	0
1,2,3,7,8,9-Hexachlorodibenzofuran	0.25	0.1	0.00154	0.0203	22	0
1,2,3,7,8-Pentachlorodibenzodioxin	2.5	1	0.0174	0.159	23	0
1,2,3,7,8-Pentachlorodibenzofuran	0.075	0.03	0.000348	0.00648	23	0
2,3,4,6,7,8-Hexachlorodibenzofuran	0.25	0.1	0.00119	0.0178	23	0
2,3,4,7,8-Pentachlorodibenzofuran	0.75	0.3	0.00303	0.0717	23	0
2,3,7,8-Tetrachlorodibenzodioxin	0.5	1	0.00996	0.142	23	0
2,3,7,8-Tetrachlorodibenzofuran	0.05	0.1	0.00142	0.0175	23	0
Octachlorodibenzodioxin	0.0015	0.0003	0.000105	0.0002688	11	0
Octachlorodibenzofuran	0.0015	0.0003	0.00001116	0.0001347	21	0
Crayfish						
PCB Congeners (pg/g ww)						
PCB 81	0.00015	0.0003	0.0000084	0.0000555	5	0
PCB 114	0.000015	0.00003	0.0000105	0.0000105	1	0
PCB 123	0.000015	0.00003	0.00000774	0.00001188	2	0
PCB 126	0.05	0.1	0.0135	0.0314	4	0
PCB 157	0.000015	0.00003	0.00002211	0.00002211	1	1
PCB 169	0.015	0.03	0.001779	0.0063	4	0
PCB 189	0.000015	0.00003	0.00000645	0.00000699	2	0
Dioxins/Furans (pg/g ww)						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	0.025	0.01	0.000269	0.00135	31	0
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.025	0.01	0.000159	0.00153	32	0
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.025	0.01	0.000196	0.000938	34	0
1,2,3,4,7,8-Hexachlorodibenzodioxin	0.25	0.1	0.00364	0.022	34	0
1,2,3,4,7,8-Hexachlorodibenzofuran	0.25	0.1	0.00133	0.00707	34	0
1,2,3,6,7,8-Hexachlorodibenzodioxin	0.25	0.1	0.00389	0.0225	34	0
1,2,3,6,7,8-Hexachlorodibenzofuran	0.25	0.1	0.00135	0.00671	34	0
1,2,3,7,8,9-Hexachlorodibenzodioxin	0.25	0.1	0.00403	0.0238	34	0
1,2,3,7,8,9-Hexachlorodibenzofuran	0.25	0.1	0.00184	0.00905	34	0
1,2,3,7,8-Pentachlorodibenzodioxin	2.5	1	0.0199	0.158	34	0
1,2,3,7,8-Pentachlorodibenzofuran	0.075	0.03	0.000936	0.00435	34	0

Table 5-8. Comparison of ACGs to TEF-Adjusted EDLs for Non-Detected Dioxin/Furan Congeners and Dioxin-Like PCB Congeners

Analyte	ACG[a]	TEF[b] (unitless)	Minimum TEF-Adjusted EDL for Non-Detected Results	Maximum TEF-Adjusted EDL for Non-Detected Results	# of Non-Detected Results	# of Non-Detected Results Exceeding ACG
Crayfish (continued)						
Dioxins/Furans (pg/g ww) (continued)						
2,3,4,6,7,8-Hexachlorodibenzofuran	0.25	0.1	0.00137	0.00699	34	0
2,3,4,7,8-Pentachlorodibenzofuran	0.75	0.3	0.00855	0.0594	34	0
2,3,7,8-Tetrachlorodibenzodioxin	0.5	1	0.0212	0.0751	34	0
2,3,7,8-Tetrachlorodibenzofuran	0.05	0.1	0.00452	0.0346	20	0
Octachlorodibenzodioxin	0.0015	0.0003	0.00002052	0.0001368	16	0
Octachlorodibenzofuran	0.0015	0.0003	0.00001227	0.000078	26	0
Clams						
PCB Congeners (pg/g ww)						
PCB 189	0.000015	0.00003	0.00000306	0.00000306	1	0
Dioxins/Furans (pg/g ww)						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	0.025	0.01	0.00162	0.00162	1	0
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.025	0.01	0.000599	0.000599	1	0
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.025	0.01	0.000737	0.000737	1	0
1,2,3,4,7,8-Hexachlorodibenzodioxin	0.25	0.1	0.00898	0.00898	1	0
1,2,3,4,7,8-Hexachlorodibenzofuran	0.25	0.1	0.00362	0.00362	1	0
1,2,3,6,7,8-Hexachlorodibenzodioxin	0.25	0.1	0.00937	0.00937	1	0
1,2,3,6,7,8-Hexachlorodibenzofuran	0.25	0.1	0.00357	0.00357	1	0
1,2,3,7,8,9-Hexachlorodibenzodioxin	0.25	0.1	0.00915	0.00915	1	0
1,2,3,7,8,9-Hexachlorodibenzofuran	0.25	0.1	0.00491	0.00491	1	0
1,2,3,7,8-Pentachlorodibenzodioxin	2.5	1	0.0693	0.0693	1	0
1,2,3,7,8-Pentachlorodibenzofuran	0.075	0.03	0.001545	0.001545	1	0
2,3,4,6,7,8-Hexachlorodibenzofuran	0.25	0.1	0.0037	0.0037	1	0
2,3,4,7,8-Pentachlorodibenzofuran	0.75	0.3	0.01446	0.01446	1	0
2,3,7,8-Tetrachlorodibenzodioxin	0.5	1	0.0509	0.0509	1	0
Octachlorodibenzofuran	0.0015	0.0003	0.0000495	0.0000495	1	0

Notes:

Number of non-detected results exceeding the analytical concentration goal (ACG) are highlighted.

[a] ACGs were presented in the QAPP and are based on TEF-adjusted quantitation limits for the target sample mass (Exponent et al. 2016).

[b] TEFs are for mammals from Van den Berg et al. (2006).

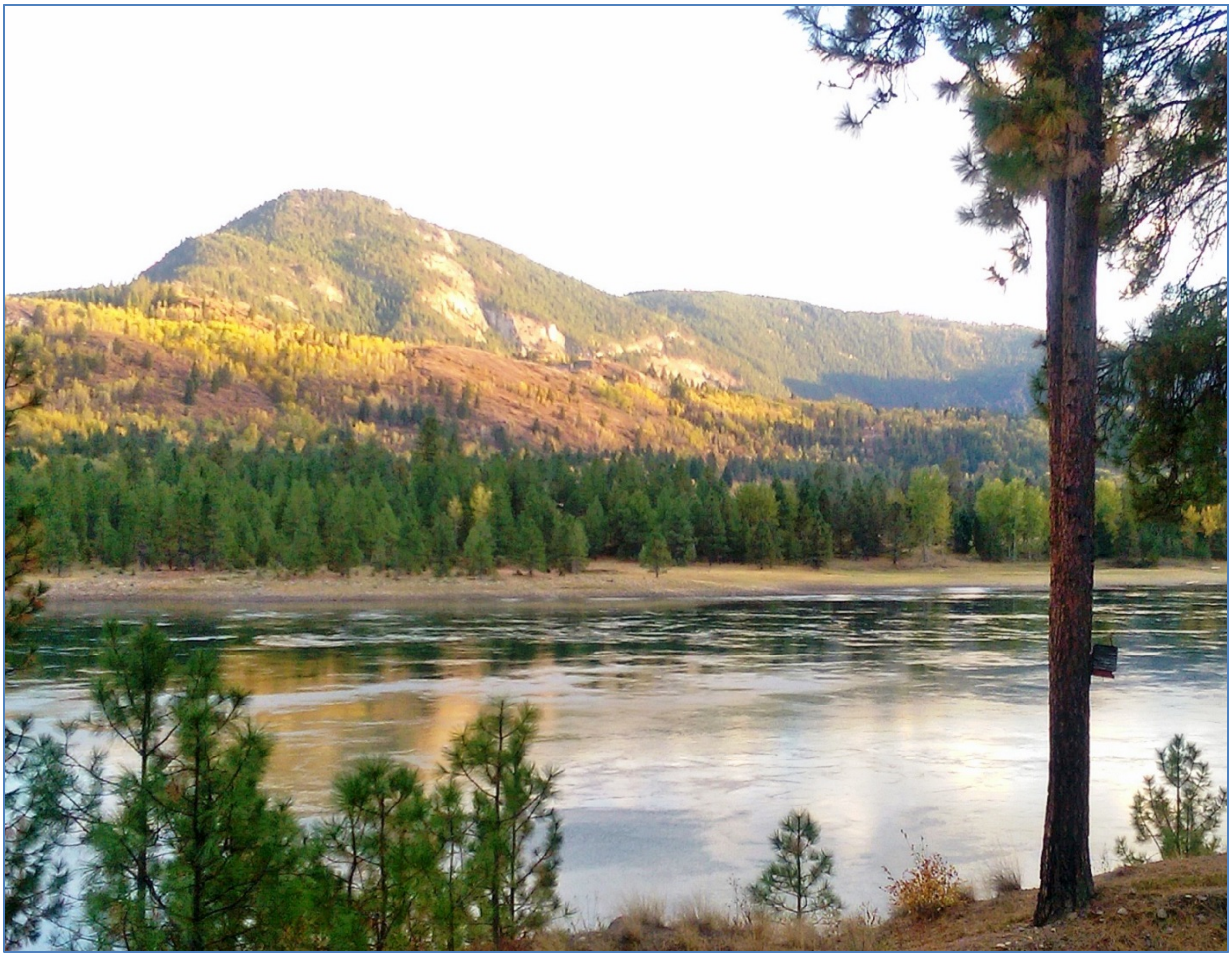
EDL - estimated detection limit

PCB - polychlorinated biphenyl

TEF - toxic equivalence factors

APPENDIX A

FIELD SUMMARY REPORT



Sampling Area 1 near Northport

Field Summary Report

Upper Columbia River
Macroinvertebrate Tissue Study
Okanogan, Stevens, and Ferry Counties, Washington

Project Number: 60517029

January 2017

Teck American Incorporated
501 North Riverpoint Blvd, Suite 300
Spokane, WA 99202

Field Summary Report

Upper Columbia River

Macroinvertebrate Tissue Study

Okanogan, Stevens, and Ferry Counties, Washington

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January 2017

Executive Summary

Between September 7 and October 5, 2016, freshwater mussels and crayfish were collected on the Upper Columbia River (hereafter, the Site[1]), Washington, as part of the Macroinvertebrate Tissue Study. This sampling event supplements sampling conducted in the spring of 2016 because the target number of samples could not be collected during the spring effort. This study represents one of the tasks being completed as part of a remedial investigation and feasibility study for the Site. Data collected during this study will contribute to a human health risk assessment and baseline ecological risk assessment.

Mussels were collected by hand from shore in wadeable waters and by divers in non-wadeable waters. Mussel collection occurred in five sampling areas (A1 and A3 through A6) and one reference area (Sanpoil River). Crayfish trapping occurred from research vessels in four sampling areas (A1 through A4) and from the shore in one reference area (Sanpoil River). Fall 2016 mussel and crayfish sampling activities are summarized as follows:

- 156 mussels were collected from 6 of 24 beach locations and 11 of 11 dive locations, including 23 western pearlshell (*Margaritifera falcata*) and 133 *Anodonta* sp.
- 86 crayfish were collected from 42 of 165 trap locations, including 6 signal crayfish (*Pacifastacus leniusculus*) and 80 northern crayfish (*Orconectes virilis*).

The spring 2016 sampling resulted in collections of 186 mussels (17 western pearlshell and 169 *Anodonta* sp.), 127 clams (*Corbicula fluminea*), and 114 crayfish (8 signal crayfish and 106 northern crayfish).

As a result of the combined spring and fall 2016 sampling, the target number of mussel composites specified in the quality assurance project plan (Exponent et al. 2016) was achieved at all of the sampling areas except Buffalo Lake, which did not have suitable mussel habitat. For crayfish, the target number of composites was achieved except at sampling area 1.

[1] The Site, as defined within the June 2, 2006, Settlement Agreement, is the areal extent of hazardous substances contamination within the United States (U.S.) in or adjacent to the Upper Columbia River, including Franklin D. Roosevelt Lake, from the U.S.–Canada border to the Grand Coulee Dam and those areas in proximity to the contamination that are suitable and necessary for implementation of response actions.

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Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
ALS	ALS Environmental Laboratory
BERA	baseline ecological risk assessment
CCT	Confederated Tribes of the Colville Reservation
DGPS	differential global positioning system
EDGE	EQuIS Data Gathering Engine
GIS	geographic information system
GPS	global positioning system
HHRA	human health risk assessment
m	meter(s)
NPS	National Park Service
QAPP	quality assurance project plan
RI/FS	remedial investigation and feasibility study
RV	research vessel
SOP	Standard Operating Procedure
STI	Spokane Tribe of Indians
TAI	Teck American, Incorporated
U.S.	United States
UCR	Upper Columbia River
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife

1.0 Introduction

This Field Summary Report provides information for the Upper Columbia River (UCR; hereafter, the Site[2]) (Figure 1) macroinvertebrate tissue study (Study) field sampling that was conducted by AECOM Technical Services, Inc. (AECOM), from September 7 to October 5, 2016 (fall 2016 sampling). This was the second sampling effort for 2016. The first collections occurred in spring 2016, from April 26 to May 19. This study represents one of the tasks being completed as part of the remedial investigation and feasibility study (RI/FS) and baseline ecological risk assessment (BERA) by Teck American Incorporated (TAI), under U.S. Environmental Protection Agency (USEPA) oversight, and the human health risk assessment (HHRA) by USEPA. The objective of the RI/FS is to investigate the nature and extent of contamination and unacceptable risk at the Site to humans and the environment. Details of the Study are provided in the quality assurance project plan (QAPP), which describes the organization, data quality objectives, study design, analytical procedures, and quality assurance and quality control procedures (Exponent et al. 2016). A QAPP Addendum was prepared to address specific changes to methodology for the fall 2016 sampling (Windward Environmental LLC 2016).

1.1 Project Background

Chemicals present in mussel and crayfish tissue may have the potential to adversely affect both people and ecological receptors through ingestion. Consistent with the USEPA-approved QAPP (Exponent et al. 2016), the primary goal of this study is to collect data to characterize the concentrations of chemicals in tissues of representative mussel and crayfish taxa from the Site. The preliminary conceptual site model, as presented in the BERA work plan (Parametrix et al. 2011), provides a framework for considering the relationships among chemical sources and mechanisms for transport and uptake into people and ecological receptors. The target populations of primary interest are crayfish and freshwater mussels that live in or on Site sediment.

A recent survey of dietary and food consumption habits of the Confederated Tribes of the Colville Reservation (CCT) (Westat 2012; EI 2012) identified the Sanpoil River vicinity as a local source of mussels and crayfish; however, Rebecca Lake, Buffalo Lake, and other nearby lakes in the vicinity of the Site were reported most frequently as the local source of crayfish (Westat 2012; EI 2012). The consumption of shellfish by recreational visitors to the Site is expected to be rare and was therefore not evaluated in the recent recreational fish survey (IEc 2010; IEc 2013).

Benthic invertebrates, such as mussels and crayfish, may be an important food source for aquatic-dependent wildlife at the Site. In particular, ecological receptors such as river otter (*Lontra canadensis*) and mink (*Neovison vison*) are likely to consume both mussels and crayfish as a portion of their diet. In addition, invertebrate-eating fish such as white sturgeon (*Acipenser transmontanus*) are known to consume crayfish and bivalves (Muir et al. 1986; Semakula 1963).

The U.S. Fish and Wildlife Service (USFWS) conducted mussel and crayfish surveys throughout the Site in 2012 and 2013 (USFWS, unpublished). Crayfish tissue samples collected by the USFWS in 2012 were

[2] The Site, as defined within the June 2, 2006, Settlement Agreement, is the areal extent of hazardous substances contamination within the United States (U.S.) in or adjacent to the UCR, including Franklin D. Roosevelt Lake, from the U.S.-Canada border to the Grand Coulee Dam and those areas in proximity to the contamination that are suitable and necessary for implementation of response actions.

analyzed for arsenic, cadmium, copper, mercury, lead, and zinc. Although the results of these studies have not been published, the data have been made available to TAI, and information on locations and numbers of mussels and crayfish collected was presented in Appendix D of the QAPP (Exponent et al. 2016).

In summary, 348 crayfish were collected from 42 locations by the USFWS between July and October 2013. The majority caught were non-native northern crayfish (*Orconectes virilis*). For mussels, in 2012, 24 beach areas were surveyed, and no live mussels were located. In 2013, 46 beach areas were surveyed, and very few live mussels were found. No chemistry analyses were conducted on any mussels surveyed by the USFWS.

AECOM conducted initial sampling efforts in spring 2016 at the Site (Figure 1). From April 26 to May 19, 2016, freshwater mussels, clams, and crayfish were collected. Mussels and clams were collected from shore in wadeable waters, and crayfish trapping occurred from research vessels in six sampling areas (A1 through A6) and two reference areas (Buffalo Lake and Sanpoil River).[3] Spring field sampling activities are summarized as follows:

- 186 mussels were collected from 26 of 109 beach locations, including 17 western pearlshell (*Margaritifera falcata*) and 169 *Anodonta* sp.
- 127 clams were collected from 7 of 109 beach locations (all *Corbicula fluminea*).
- 114 crayfish were collected from 50 of 135 trap locations, including 8 signal crayfish (*Pacifastacus leniusculus*) and 106 northern crayfish (*Orconectes virilis*).

Although the level of effort specified in the QAPP was achieved during the spring 2016 sampling, the targeted tissue mass, individuals per composite, and/or number of composites were not met in all areas; therefore additional sampling was conducted during the fall 2016. Targets for each category varied based on the results from each sampling area in the spring.

1.2 Site and Sampling Area Description

The Site consists of the UCR, including Franklin D. Roosevelt Lake, from the U.S.–Canada border to the Grand Coulee Dam (Figure 1). The UCR is subject to controlled fluctuations in water levels at Grand Coulee Dam (Figure 2), with the lowest levels generally observed in late April to early May, when spring sampling was conducted.

Mussel and crayfish were collected during the spring and/or fall of 2016 from six sampling areas in the Site and two reference areas that are not part of the Site (Figures 3-10). One of the reference sites, Buffalo Lake, was not part of the fall 2016 sampling effort because no mussel habitat was observed during the spring sampling. The following characteristics were used to identify specific sampling locations within each sampling area:

- Mussel—Where beach transects were conducted (A1 and Sanpoil River), flat or gently sloping beaches, preferably with finer sediments (e.g., silt) were selected to improve the chances of finding mussels. Previous successful sampling was also used to determine sampling locations. At locations where scientific divers were used to collected mussels, underwater camera

[3] Rebecca Lake Reference Sampling Area not used due to lack of suitable mussel habitat, as described in the Spring 2016 Field Summary Report.

reconnaissance was used to pinpoint sampling locations (described further in Section 1.6 and 2.3.1).

- Crayfish—Crayfish traps were placed in areas identified by the field crew as providing good crayfish habitat (e.g., areas with loose cobbles and boulders and tree or plant debris).

Details regarding the number of traps deployed and the number of beaches surveyed follow guidance outlined in Standard Operating Procedure (SOP)-3, SOP-4, Section 2.2.4.1 (mussels), and Section 2.2.4.2 (crayfish) of the QAPP (Exponent et al. 2016), and as modified by the QAPP Addendum (Windward Environmental LLC 2016).

1.3 Sampling Overview

Field sampling was conducted using techniques described in the Field Sampling Plan contained in Appendix A of the QAPP (Exponent et al. 2016) and the QAPP Addendum (Windward Environmental LLC 2016). Field teams utilized research boats to mobilize between sampling locations within each sampling area.

The QAPP Addendum (Windward Environmental LLC 2016) was prepared to identify modifications to the QAPP needed to address new sampling methods and/or differences in methods between the spring and fall events, including sampling areas and number of samples (Section A4.1.2), sample labelling (Section A4.2.6), underwater camera reconnaissance for mussels (Section A4.4.2), scientific diving for mussels (Section A4.4.2), and crayfish sampling bait, trap placement, and trap checking (Section A4.4.3).

The fall 2016 effort employed a USEPA scientific dive team to collect mussels in waters that were too deep to wade. To increase the efficiency of the time allotted for diving, underwater camera reconnaissance was first conducted to determine the dive locations that would be most productive. The camera was towed on an underwater sled along meandering transects. The water depth of the transects was primarily less than 70 feet (the depth limit for the dive team).

The mussel and crayfish sampling areas for the fall event were all previously sampled in the spring. Only the Site and reference areas with fewer than six composite samples collected during spring 2016 were resampled in the fall. Mussels were targeted from within Areas 1, 3, 4, 5, 6, and the Sanpoil River. Crayfish were targeted from within Areas 1, 2, 3, and 4 and the Sanpoil River. Detailed information about targets can be found in the QAPP Addendum (Windward Environmental LLC 2016).

1.4 Project Staffing

The staffing structure for the overall Study is provided in Section A4.2, Task Organization, of the QAPP and includes a description of the responsibilities of USEPA, TAI, and key task personnel. This section describes field staff deployed for the fall 2016 sampling effort. Except for sampling at the Sanpoil River and mussel sampling in Area 1, all work conducted by AECOM was done from the research vessel (RV) Tieton. Work at the Sanpoil River was conducted from shore, as was mussel collection from beaches in Area 1.

Additional support was provided by the following staff:

- Project Manager – Dr. Jennifer Pretare
- Field Coordinator – Dr. Jennifer Pretare, Dave Hose

- Cultural Resource Coordinator/Principal Archaeologist – Sarah McDaniel
- Database Manager – Bradley Handziuk
- Geographic Information System (GIS)/global positioning system (GPS) Manager – Cary Kindberg
- Laboratory Coordinator – Christine Gebel

On-Shore Sampling Crew: An AECOM biologist and an AECOM archaeologist worked together to sample mussels from shore and support crayfish sampling. The biologist was responsible for communicating with the field supervisor, interacting with the USEPA-approved oversight personnel, and ensuring that all sampling was conducted in accordance with the QAPP, QAPP Addendum, and all research permits and permissions as detailed in Appendix A of this report. The archaeologist provided cultural resources monitoring support in conjunction with biological sampling and acted as the safety lead. On-shore sampling crew staff is listed in Table 1.

Table 1: On-shore sampling crews

Team	Biologist	Archaeologist
RV Tieton	Jeff Walker, Linda Howard	Russ Bevill

In-Water Sampling Crew: A captain and one field scientist/deckhand operated the research vessel. The in-water sampling crew was responsible for setting and checking crayfish traps. The boats maneuvered in the shallows, close to the shoreline of the Site, to safely deliver the on-shore sampling crew directly to the beach. In-water sampling crew staff is listed in Table 2.

Table 2: In-water sampling crews

Team	Boat Captain	Field Scientist/Deck Hand	Biologist/Archaeologist
RV Tieton	Mike Duffield	Shawn Hinz, Rene Trudeau, John Schaefer, Chad Furulie, Ed Sloan	Jeff Walker, Linda Howard, Glen Mejia, Russ Bevill, Michelle Stegner

Safety Boat Crew: Another captain and one crew operated a second smaller vessel from Columbia Navigation, Inc., as a designated safety boat, to shadow the sampling boat for on-water safety. This boat was also used to shuttle the mussel sampling crew or conduct site reconnaissance when not needed as a safety boat. The safety boat provided redundancy in the event of a mechanical failure of the primary boat, rescue capabilities for a person falling overboard, or emergency evacuation for injuries incurred during sampling activities. The safety boat crew staff is listed in Table 3.

Table 3: Safety boat crews

Team	Boat Captain	Deck Hand
Columbia Navigation, Inc.	Eric Weatherman	Josh Weatherman, Dan Smith

1.5 Cultural Resources Monitoring

In accordance with the protocols outlined in the Cultural Resources Coordination Plan (Appendix D of the QAPP and Section A4.5 of the QAPP Addendum), and as required by the National Park Service

(NPS) Special Use Permit and CCT Research Permit (Appendix A), cultural resources monitors were present during implementation of the study. Cultural resources monitoring for the fall 2016 sampling effort was conducted by AECOM archaeologists, as pre-approved by the USEPA through consultation with additional participating parties including the NPS, Washington State Department of Archaeology and Historic Preservation, Spokane Tribe of Indians (STI), and CCT. The on-shore sampling crew was staffed with a cultural resource monitor for the duration of the field sampling activities. In addition, a cultural resources monitor was present during dive sampling.

The cultural resources monitors cleared the area surrounding the mussel sampling locations prior to any collection activities and ensured avoidance of culturally sensitive areas. Locations passing the cultural resources monitoring inspection were then subject to sample collection. During diving, the cultural resource monitor was in radio contact with the USEPA dive team at all times and was the first to open the mussel collection bag ("goodie" bag) provided by the divers.

Consistent with the Cultural Resources Coordination Plan, a confidential report presenting the results of cultural resources monitoring activities and findings will be submitted by TAI to USEPA under separate cover. To avoid vandalism and to restrict information about the locations of archaeological sites, the Cultural Resources Monitoring Report is confidential pursuant to Section 304 of the National Historic Preservation Act, Section 9(a) of the Archaeological Resources Protection Act, and Washington State laws RCW 27.53.070 and RCW 42.56.300.

1.6 Technical Oversight and Observers

Technical oversight of the sampling activities was provided by the USEPA or their designated subcontractor (CH2M) throughout the project. Technical oversight personnel were present with both field sampling teams each day and were given the opportunity to observe all field tasks. AECOM personnel were available for discussions and to answer questions regarding field activities to ensure consistency with the QAPP. USEPA observers are listed in Table 4.

Table 4: USEPA observers

Team	USEPA Observers
RV Tieton	Matt Mayry, Kathy Cerise, Rachel Zajac-Fay

1.7 USEPA Scientific Dive Team

A scientific dive team was provided by the USEPA to collect mussels in water too deep to wade. The dive team operated a separate vessel, the RV Wooldive, which tied up to the RV Tieton to conduct dives. The RV Tieton deployed a down line for the divers off their stern davit. USEPA divers are listed in Table 5.

Table 5: USEPA divers

Team	USEPA Dive Team
RV Wooldive	Rob Pedersen (divemaster), Kris Leefers, Rob Rau, Brent Richmond

2.0 Sampling Activities and Documentation

The following sections summarize the scope of work, sampling activities, and documentation associated with the Study.

2.1 Scope of Work

The scope of work for the fall 2016 sampling effort was to collect mussels from five sampling areas, crayfish specimens from four sampling areas, and both mussels and crayfish from one reference area. Tasks included the following:

- Collection of mussel and crayfish samples.
  - For mussels, the field crew sampled in each area where the target was not met in spring until sufficient tissue for six composite samples had been collected (combined with mussels collected during the spring).
  - For crayfish, 30 traps were deployed in each area where the target was not met in spring for at least three overnight periods (equivalent to 90 trap nights), or until sufficient tissue for six composite samples had been collected (combined with crayfish collected during the spring).
- Underwater camera reconnaissance in preparation for USEPA dive team participation in mussel sampling.
- Communication and coordination with property owners or land managers to schedule sampling activities. TAI contacted property owner(s) and land managers to obtain permission to access and conduct mussel and crayfish sampling. TAI also obtained the Special Use Permit from the NPS, the Research Permit from CCT, and permissions from the STI and Washington Department of Natural Resources. AECOM obtained a Washington Department of Fish and Wildlife (WDFW) Scientific Collection Permit.
- Maintenance of field records including field logbooks, photographic documentation, and field data forms.
- Positioning (i.e., x, y, and z coordinates) for each sampling location.
- Decontamination of sampling equipment in accordance with the QAPP.
- Sample labeling, storage, packaging, and transport to ALS Environmental (ALS) laboratory in Kelso, Washington, using defined chain of custody procedures. ALS was selected and contracted by TAI.
- Close coordination with TAI and ALS to ensure proper storage and transportation procedures were followed and chain of custody documented.
- Preparation and submittal of this field investigation summary report to document field activities, modifications (changes) to the QAPP, and associated justifications.

2.2 Training and Preparation

Prior to field work, AECOM biologists prepared for mussel and crayfish sampling and identification in several ways. On April 22, 2016, two AECOM biologists (Glen Mejia and Jeff Walker) visited the freshwater mussel collection at the University of Washington Burke Museum (Photo 1). They met with Melissa Frey, curator, to study and photograph the mussel museum specimens. Glen and Jeff shared their information with all of the other AECOM biologists, and Glen created a "quick identification guide" pamphlet for the team to use in the field. The entire team of biologists reviewed the protocol together in the office in a stepwise fashion on April 21, 2016.

Photo 1: Mussel specimens at the University of Washington Burke Museum.

No formal project kick-off meeting was held for the fall 2016 sampling event. However, all of the biologists and archaeologists selected for the fall 2016 sampling event also participated in the spring sampling and therefore had previous training and experience with sample identification and field SOPs.

2.3 Sample Collection

Samples were collected from September 7 to October 5, 2016. A total of 242 organisms were collected from 60 locations, as follows:

- 156 mussels were collected from 6 of 24 beach locations and 11 of 11 dive locations, including 23 western pearlshell and 133 *Anodonta* sp.
- 86 crayfish were collected from 42 of 165 trap locations, including 6 signal crayfish and 80 northern crayfish.

The locations of all samples collected (both spring and fall) are shown on Figures 11-18. Only live organisms were collected in the fall, per the QAPP Addendum. Appendix B provides all of the results of the sample collection. An overview of mussel and crayfish sampling methodology, results, and habitat observations are provided in the sections that follow.

2.3.1 Mussels

Mussel Sampling Methodology

The mussel sample collection methodology for the Study is provided in Appendix A (Attachment A2, SOP-3) of the QAPP (Exponent et al. 2016) and Section A4.4.2 of the QAPP Addendum (Windward Environmental LLC 2016). During the fall 2016 sampling, mussels were collected by both shore searches (Sanpoil River only; A1 beaches were searched but no mussels were found) and by diving (A1, A3, A4, A5, and A6). Both methods are described below.

At a given on-shore sampling beach, the field crew searched a maximum of 150 meters (m) of shoreline, from approximately 10 m above the waterline to the maximum wadeable water depth. Samples were collected from the shore by hand (or by using a grabber) and placed in buckets containing site water prior to processing.

The mussel dive locations were prioritized based on the results of underwater camera reconnaissance. The underwater camera was a passive (non-motorized) unit mounted to a sled towed behind the RV Tieton (Photo 2). The camera was connected to the RV Tieton via an electronic cable, which connected to a video display unit on the boat. A winch controlled the up and down movement of the sled, but the speed of the sled through the water was controlled by the boat. The RV Tieton was operated into the wind or current at the lowest possible motor speed to limit the speed of the imagery to the extent feasible. The video feed from the underwater camera was viewed in real time by two pairs of people: the boat captain and deckhand on one screen in the captain's pilot room and on a second screen by the biologist and archaeologist/field supervisor in the main boat cabin (Photo 3). Both pairs made note of mussel occurrence in separate GPS systems and compared notes on the results daily. A log was also kept of the duration, approximate depth, and location of each underwater camera transect, summarized in Table 6.

The duration of individual dives was determined by the USEPA dive team (Photo 4). Divers followed a meandering transect based on general compass bearings provided by the field sampling team and conditions encountered underwater. Dives were conducted from a stationary point (where RV Tieton anchored) and extended no farther than 100 m from that point, based on the length of the tether. At the completion of each dive, the "goodie bag" of mussels collected by the diver was handed to the cultural resources monitors at the stern of the RV Tieton prior to processing (Photo 5).

Photo 2: Underwater camera sled being deployed from the rear of RV Tieton.

Photo 3: Mussel in Sample Area 4, as seen on the underwater camera video feed.

Photo 4: USEPA scientific dive team completing pre-dive checklist.

Photo 5: Cultural resource monitor inspecting mussels provided by USEPA diver.

After mussel collection (either on shore or by divers), mussels were processed according to the QAPP. Mussels were held in site water until processing (Photo 6). They were weighed, measured, and photographed; wrapped in foil; bagged; and labeled. Labeled samples were stored in wet ice in coolers for the remainder of the sampling day and then transferred to a locked freezer for storage until transport to the laboratory. AECOM personnel transported samples to ALS at a later date in coolers packed with dry ice.

Photo 6: Mussels awaiting processing.

Mussel Field Data

The field sampling data consisted of information collected during underwater camera reconnaissance and mussel collection. The underwater camera work is summarized in Table 6. One or 2 days of camera reconnaissance was planned for each dive sampling area. Approximately 4 hours of underwater camera observations constituted 1 day for planning purposes. Four hours of reconnaissance were spent in sampling areas where relatively large numbers of mussels were observed; 8 hours were spent in sampling areas where few mussels were observed.

Underwater camera transects varied in length, depth, distance from shore, and substrate and did not follow a predetermined route or bearing. Although they ranged from 5 feet to 75 feet in depth, most were less than 70 feet in depth. Due to wind, some transects veered temporarily into slightly deeper water. Some transects were short and perpendicular to shore to examine a range of depths, while other transects were long and followed a specific elevation. Substrates ranged from silt and sand to rounded cobbles to large angular rocks.

Table 6: Underwater camera reconnaissance summary

Sampling Area	Sampling Dates (Fall 2016)	Minutes/Hours	Number of Transects
A1	September 13, 14, 15	249/4.2	10
A3	September 10, 11, 12	285/4.8	12
A4	September 7, 8, 9	490/8.2	12
A5	September 22, 23	498/8.3	11
A6	September 15, 21	483/8.0	20
Totals	**-**	**2,005/33.5**	**65**

The date and duration of each dive is summarized by sampling area in Table 7. At total of approximately 4.7 hours of diving was completed. Eleven dives were completed to reach the target goal. Each dive location had a corresponding sample location assigned for purposes of processing and labelling each sample. Table 7 contains the details of each dive.

Table 7: Dive summary

Sampling Area	Mussel Collection Dates (Fall 2016)	Dive Identification Number	Corresponding Sample Location	Length of Dive (minutes)
A1	September 28	A1-Dive1	A1-MB43	7
A3	September 29	A3-Dive1	A3-MB14	20
A3	September 29	A3-Dive2	A3-MB14	26
A4	September 30	A4-Dive1	A4-MB18	20
A4	September 30	A4-Dive2	A4-MB19	39

Sampling Area	Mussel Collection Dates (Fall 2016)	Dive Identification Number	Corresponding Sample Location	Length of Dive (minutes)
A5	October 2	A5-Dive1	A5-MB21	31
A5	October 2	A5-Dive2	A5-MB22	30
A5	October 2	A5-Dive3	A5-MB23	34
A5	October 2	A5-Dive4	A5-MB24	13
A6	October 1	A6-Dive1	A6-MB11	40
A6	October 1	A6-Dive2	A6-MB12	23
Totals				**283 (4.7 hours)**

Table 8 provides a summary of mussel sampling results by sampling area. The collections were made by land-based survey and by USEPA dive team. The length, breadth, width, and weight of each sample (mussel and crayfish) are provided in Appendix B. The number of mussels collected by areas and specific mussel beach or dive location are provided in Appendix C. The Dive Report for mussel collection is provided in Appendix D.

Mussels were collected at Areas A1 and A3 through A6. In the reference areas, mussels were only collected at the Sanpoil River reference sampling area. Mussels collected for this study included the following species:

- *Anodonta* species (floaters)
- *Margaritifera falcata* – Western pearlshell

All of the mussels collected at the Site were clades in the genus *Anodonta*; however, the clades could not be distinguished in the field. At the Sanpoil River sampling area, all were western pearlshells.

Since the fall 2016 survey effort supplemented the spring collections, differing amounts of time were spent at each sampling or reference area. Time was spent at each sampling area until targets for the compositing plan were met (i.e., mass and number for each composite). Most of the mussels were collected by divers; dive information is shown in Tables 7 and 8.

Table 8: Mussel collection summary, by sampling area

Sampling Area	Sample Dates (Fall 2016)	Number of Mussel Shore Searches	Number of Dives for Mussels	Number of Mussels Collected
A1	September 13, 14, 15, 16, 28	12	1	20
A2	No Sampling	-	-	-
A3	September 29	-	2	22
A4	September 30	-	2	30
A5	October 2	-	4	36
A6	October 1	-	2	25
BL	No Sampling	-	-	-
SR	September 18, 19, 20	12	-	23
Totals	**-**	**24**	**11**	**156**

Notes:
BL = Buffalo Lake
SR = Sanpoil River
Locations shown on Figures 11-18

Mussel Habitat Observations and Sampling Success

Sampling Area 1

Sampling Area 1 (Figure 3) included the town of Northport, which has a moderate amount of shoreline development and a historic smelter site. In addition, much of shoreline included steep rock embankments with little beach habitat. In fall 2016, no mussels were found during 12 terrestrial beach surveys. Mussels were observed in the area around Deadman's Eddy during previous sampling by the USFWS, so underwater camera reconnaissance was conducted in this location. The underwater camera reconnaissance revealed the presence of mussels with a relatively slack water cover directly south of Deadman's Eddy. The USEPA dive team collected enough samples in one dive at the area south of Deadman's Eddy to meet targets. The substrate in this location was river cobble.

Sampling Area 2

Sampling Area 2 (Figure 4) was not surveyed in fall 2016 because sampling targets for mussels at this location were met in the spring.

Sampling Area 3

No terrestrial beach surveys were conducted in A3 during the fall 2016 sampling effort. Underwater camera reconnaissance identified mussels near the historic location of Kettle Falls (now submerged by Lake Roosevelt), also called Hayes Island. The USEPA dive team met collection targets with two dives at this location. The substrate in the dive sites at A3 included rocky outcrops with silty-bottomed depressions in places. A3 locations are shown in Figure 5.

Sampling Area 4

No terrestrial beach surveys were conducted in A4 during the fall 2016 sampling effort. Underwater camera reconnaissance was conducted in two discrete areas (Bissell Island and Inchelium) as specified in the QAPP Addendum. The USEPA dive team met collection targets with two dives in this sampling area, one at each of the discrete areas mentioned above. The substrate at dive locations in A4 was flat and silty. A4 locations are shown in Figure 6.

Sampling Area 5

No terrestrial beach surveys were conducted in A5 during the fall 2016 sampling effort. Underwater camera reconnaissance was conducted across the sampling area because the QAPP Addendum did not identify particular areas of focus. Mussels were only observed in one small area during the camera reconnaissance at Abraham Cove (Figure 7). The USEPA dive team completed three dives in this cove and an additional dive in a cove farther north. Collection targets were met with these four dives. The bottom substrate at A5 was silty.

Sampling Area 6

No terrestrial beach surveys were conducted in A6 during the fall 2016 sampling effort. Underwater camera reconnaissance was conducted at Covington Cove (Figure 8), as specified in the QAPP Addendum, and additional areas, as determined in consultation with USEPA. Mussels were only observed in one area at the upstream end of A6 during the underwater camera reconnaissance. The USEPA dive team sampled this area and met collection targets with two dives. The bottom substrate at A6 was reported by divers to be more sandy than silty.

Buffalo Lake Reference Sampling Area

This area was not visited in the fall 2016 sampling effort because it did not contain suitable mussel habitat. The general location of Buffalo Lake Reference sampling area is shown in Figure 9.

Sanpoil River Reference Sampling Area

The Sanpoil River (Figure 10) was much shallower during the fall 2016 sampling effort than initial sampling in spring 2016. Twelve mussel beach survey locations were searched; all of them were upstream of the influence of Lake Roosevelt inundation. Mussels were collected at six beaches, with the majority of the samples coming from an area just downstream of the Silver Creek Road bridge over the Sanpoil River. The largest mussels were observed and collected in shallow water (between 1 and 3 feet deep) near the shore in a mixture of sand and cobble substrate.

2.3.2 Crayfish

Crayfish Sampling Methodology

The crayfish sample collection methodology for the Study is provided in Appendix A (Attachment A2, SOP-4) of the QAPP (Exponent et al. 2016) and the QAPP Addendum (SOP-4) (Windward 2016). All but one crayfish were captured via the deployment of baited traps with escape guards (e.g., minnow traps) placed in areas with potential crayfish habitat; one sample at A1 was collected by hand without a trap. In all traps, the bait was contained within a bait canister so that crayfish could not actually eat the bait. Salmon was the only bait used in crayfish traps during fall 2016 sampling.

Within each sampling area, field crews placed crayfish traps with bait in at least 30 locations. Crayfish collected in traps were transferred to collection buckets; weighed, measured, and photographed; wrapped in foil; bagged; and labeled. Labeled samples were stored on ice in coolers for the remainder of the sampling day and then transferred to a locked freezer for storage until transport to the laboratory. AECOM personnel transported samples to ALS at a later date in coolers packed with dry ice.

Crayfish Field Data

Table 9 provides a summary of crayfish sampling results. The total length, carapace length, and weight of each crayfish are provided in Appendix B. The number of samples collected by location (sampling area and trap location) is shown in Figures 11-18 and provided in Appendix C. Crayfish targets were met in all sampling areas except A1.

Table 9: Crayfish collection summary

Sampling Area	Sampling Dates (Fall 2016) [1]	Number of Trap Nights	Number of Crayfish Trap Locations	Number of Crayfish
A1	September 14, 15, 16	94	35	1
A2	October 5	33	33	23
A3	September 11, 12	60	33	23
A4	September 8, 9	38	31	28
A5	No Sampling	-	-	-
A6	No Sampling	-	-	-
BL	No Sampling	-	-	-
SR	September 19, 20	65	33	11
Totals		**290**	**165**	**86**

Notes:
1 – Sampling dates are days that traps are checked, not deployed.
BL = Buffalo Lake
SR = Sanpoil River

Two species of crayfish were trapped at the Site: signal crayfish (Photo 7) and northern crayfish (Photo 8). Most of the crayfish collected were northern crayfish; only six of the 86 specimens collected were signal crayfish (three from A2 and three from the Sanpoil River).

Photo 7: Signal crayfish.

Photo 8: Northern crayfish.

Crayfish Sampling Success

Observations of crayfish habitat were limited to what could be seen at the surface of the water. Traps were placed underwater at a depth that precluded any detailed habitat notes relating to substrate, cover, or microhabitat.

At crayfish trap locations, the sample crews deployed traps along areas of the shoreline from approximately 2 feet to 30 feet deep. Traps were set in areas with crayfish habitat features when feasible, including small inlets and bays that were more sheltered in comparison to the main stem of the river, locations with large woody debris such as stumps, areas with freshwater input, and/or rocky outcrops.

In A1, three nights of crayfish trapping were completed. The only crayfish collected from A1 was collected during a mussel beach survey. This crayfish was found in wadeable waters during a mussel beach transect. The crayfish was immobile and appeared to have a hole in the side of its carapace. Mussel collection by divers finished after one dive at A1, so three additional dives were made to look for crayfish at Deadman's Eddy. None were observed.

Crayfish targets for A2 were met after one night of crayfish trapping. Crayfish traps were deployed at A3 for 2 nights to meet crayfish targets. Most crayfish traps at A4 were deployed for one night and retrieved after samples had been collected and the team confirmed that targets had been met. However, weather precluded the checking and retrieval of seven traps after the first night of deployment. These traps were in place for two nights before they were checked and removed. There were so many crayfish collected at A4 that several were released back to the lake.

Crayfish traps were deployed for two nights in the Sanpoil River. One of the traps appeared to be opened and emptied by a bear on the second night.

2.4 Recording Macroinvertebrate Collection Locations

A handheld differential global positioning system (DGPS) unit was used to delineate the upstream and downstream boundaries of each sampling area and record sampling collection locations (crayfish traps and mussel beaches) using the procedures detailed in SOP-1 (Recording Macroinvertebrate Collection Locations) of the QAPP (Exponent et al. 2016). Two DGPS systems were used. One consisted of a Trimble R1 Global Navigation Satellite System receiver and a tablet running ESRI ArcPad 10.2 collection software. The other consisted of a Trimble GeoExplorer XH 6000 running Trimble TerraSync 5.3 collection software. Both used satellite-based augmentation by accessing the Wide Area Augmentation System to get a real-time correction signal in the field, which improved accuracies to less than 1 meter. As specified in the QAPP, the standard projection method that was used during field activities was the horizontal datum of World Geodetic System of 1984. GPS features collected were exported to a folder on OneDrive that was synced each night. The GIS/GPS manager then imported the data to a local server.

2.5 Database and Electronic Data Collection

AECOM used EQuIS Data Gathering Engine (EDGE) software as an integrated tool for field data collection. The software was used to create a customized electronic data form that was installed on Microsoft Surface Pro 3 tablets. The EDGE software was used to exchange data between the electronic data forms and spatial data in ArcPad (see Section 2.4). Crews used the tablets in the field and entered collection data in real time. Field data collected on the tablet in EDGE were exported to a folder on

OneDrive that was synced each night. The database manager then imported the data to a local server. If for some reason the tablets were not working correctly, hardcopy data forms were used and entered into EDGE in the office and then entered into the database by the database manager. Data quality was verified in the office by checking that 1) data were recorded completely, 2) data were recorded once, and 3) data were internally consistent.

2.6 Sample Holding and Transport

Tissue samples were stored on wet ice immediately after being weighed, measured, and packaged in the field. At the end of each day, samples were transferred to a chest freezer located in the hotel rooms of field staff. The freezers were kept locked. A maximum/minimum thermometer was kept inside each freezer and checked daily to ensure the freezers were functioning properly.

Samples were packaged for transport in coolers with dry ice. All samples were driven to the laboratory (ALS) in Kelso, Washington, and transferred using defined chain of custody procedures. Samples were stored at -20 degrees Celsius during transport.

2.7 Project Documentation

Field sampling methods and associated collection of field data were completed in accordance with the QAPP and QAPP Addendum and are not repeated in this report. Field documentation and records are provided in the Appendices. Following is a brief description of what is contained in each appendix.

- Appendix A Project Permits
- Appendix B Sampling Data
- Appendix C Mussel and Crayfish Samples by Location
- Appendix D USEPA Dive Report - October 24, 2016
- Appendix E QAPP Change Requests
- Appendix F QAPP Modifications
- Appendix G Chain of Custody Forms
- Appendix H ALS Confirmation of Sample Receipt Forms
- Appendix I Sample Information Sheets
- Appendix J Daily Tailgate Health and Safety Meeting Attendance Forms
- Appendix K Daily Logbook Entries

2.7.1 Appendix A – Project Permits

The following permits and/or approvals for the project can be found in Appendix A:

- USEPA Final UCR Macroinvertebrate Tissue Study QAPP approval letter
- WDFW Scientific Collection Permit No. MEJIA 16-184a (amended from the spring)
  - All Scientific Collection Permit conditions were satisfied as part of the project.
  - The fall field sampling effort collected a total of 242 mussel and crayfish, fewer than the 300 specified in the permit.
- NPS Special Use Permit No. PWR LARO TCAI-011
  - All Special Use Permit conditions were satisfied as part of the project.
- CCT Permit No. 2016-05

- Washington Department of Natural Resources access permission for Deadman's Eddy, Stevens County Parcel No. 8092837
- STI Consultation Letter

2.7.2 Appendix B – Sampling Data

Appendix B contains the data for all weights and measurements of mussels and crayfish samples collected during the fall sampling event.

2.7.3 Appendix C – Mussel and Crayfish Samples by Location

Appendix C contains the number of samples tallied by mussel beach and crayfish trap location. It also includes a detailed tally of the number of crayfish trap nights in each sampling area.

2.7.4 Appendix D – USEPA Dive Report

Appendix D contains the Dive Report, dated October 24, 2016, that was prepared by Rob Pedersen, USEPA project divemaster. The report describes the objectives, daily activities, and hazard management of the dive work.

2.7.5 Appendix E – QAPP Change Requests

One change request was proposed and subsequently approved by USEPA Project Manager Dustan Bott. A copy of the change request can be found in Appendix E and is summarized here.

Change Request 1 modified the sample labelling nomenclature. The field computers were inadvertently programmed to be consistent with the spring sampling QAPP, rather than the QAPP Addendum written for fall sampling. All of the field notes, logbooks, pictures, sample labels, and chain of custody paperwork are consistent with the QAPP. The change request applies to the QAPP Addendum.

2.7.6 Appendix F – QAPP Modifications

Detailed descriptions of all modifications to the QAPP and the circumstances that necessitated such changes were recorded in the logbooks and protocol modification forms. These changes were reviewed for compliance with data quality objectives. Five modifications to the QAPP, documented as protocol modifications, were processed for the study (Table 10). Protocol modification forms are provided in Appendix F.

Table 10: Summary of modifications

No.	Sample	QAPP Procedure	Applicable Sample Identification Nos.	Description of Modification	Reason for Modification	Comments
1	Crayfish	SOP-4 (Section A.4.4.3 of QAPP Addendum)	n/a	Crayfish traps checked once daily instead of twice.	Lack of time.	Modification applies to A1 on 9-14-15, A1 on 9-15-16, A3 on 9-11-16 and Sanpoil River on 9-19-16.

No.	Sample	QAPP Procedure	Applicable Sample Identification Nos.	Description of Modification	Reason for Modification	Comments
2	Crayfish	SOP-4 (Section A4.4.3 of QAPP Addendum)	n/a	Crayfish traps left for two overnight soaking periods rather than one	On the afternoon of September 8, 2016, the wind increased to the point where work was stopped for safety reasons.	A4-CT45, A4-CT46, A4-CT47, A4-CT48, A4-CT49, A4-CT50, and A4-CT51 were going to be retrieved the afternoon of September 8 after the target crayfish mass had been met. Due to high wind, they had to be left one additional night, and were retrieved the morning of September 9.
3	Mussels and Crayfish	SOP-7	n/a	Used plastic coolers instead of boxes and styrofoam inserts for delivering samples to laboratory	Lab requested plastic coolers instead of cardboard boxes outlined in SOP-7.	
4	Crayfish	SOP-9	A1-CT60	No photo for Location A1-CT60	Inadvertently did not take a picture of this location.	
5	Crayfish	SOP-4	A1-CT61-CR-01	No photo for Location A1-CT61	Crayfish collected in shallow water during mussel beach survey.	Collected crayfish by hand instead of trap, therefore no trap location to photograph was established.

2.7.7 Appendix G – Chain of Custody Forms

Final chain of custody forms, including several with revisions, are included in Appendix G.

2.7.8 Appendix H – ALS Confirmation of Sample Receipt Forms

Final sample receipt forms from ALS laboratory are included in Appendix H.

2.7.9 Appendix I – Sample and Location Information Sheets

Sample information sheets are included in Appendix I. There is one information sheet for each of the 242 mussel and crayfish samples. There is also one location information sheet for each sampling location that includes a picture, the spatial coordinates, and/or the sample measurements.

2.7.10 Appendix J – Daily Tailgate H&S Meeting Attendance Forms

Appendix J contains the AECOM Task Hazard Assessment form, which was completed and signed daily by all crews.

2.7.11 Appendix K – Daily Logbook Entries

Appendix K contains Table K-1 which summarizes the field personnel on the Macroinvertebrate Tissue Study, by date and a full copy of the fall 2016 logbook entries, from September 7 to October 5, 2016.

3.0 References

EI (EI Ltd.). 2012. Food questionnaire data report: Upper Columbia River resources survey. Prepared for Confederated Tribes of the Colville Reservation, Nespelem, WA.

Exponent, HDR, Parametrix Inc., Cardwell Consulting LLC, Windward Environmental LLC, and Ramboll Environ. 2016. Final Quality Assurance Project Plan for the Macroinvertebrate Tissue Study. Prepared for Teck American Incorporated. April 2016.

IEc (Industrial Economics, Inc.). 2010. Recreational consumption and resource use survey sampling and analysis plan for the Upper Columbia River site human health risk assessment and remedial investigation/feasibility study. Industrial Economics, Inc., Cambridge, MA.

IEc. 2013. Recreational consumption and resource use survey for the Upper Columbia River site human health risk assessment and remedial investigation/feasibility study: data summary report. Final report.

Muir, W.D., R.L. Emmett, and R.J. McConnell. 1986. Diet of juvenile and subadult white sturgeon in the Lower Columbia River and its estuary. National Oceanic and Atmospheric Administration, Seattle, WA.

Parametrix, Exponent, and HydroQual I. 2011. Upper Columbia River Baseline Ecological Risk Assessment Work Plan. Prepared for: Teck American Incorporated, Spokane, WA.

Semakula, S.N. 1963. The age and growth of the white sturgeon *(Acipenser transmontanus* Richardson) of the Fraser River, British Columbia, Canada. Master of Science Thesis, University of British Columbia.

USEPA (U.S. Environmental Protection Agency) 2013. Expected level of effort for sampling and analysis of benthic macroinvertebrate tissue—Upper Columbia River. Developed by the USEPA Technical Team, with consideration of comments provided by the Participating Parties. July 16, 2013.

USFWS (U.S. Fish and Wildlife Service). Unpublished. Data files containing results from 2012 and 2013 surveys of mussels and crayfish in the Upper Columbia River Site. Sent to John Toll, Windward Environmental, by Dustan Bott, USEPA Region 10, on December 15, 2015.

Westat. 2012. Upper Columbia River Site Remedial Investigation and Feasibility Study Tribal Consumption and Resource Use Survey. Final Report. Prepared for the USEPA, Region 10. June 22, 2012.

Windward Environmental LLC. 2016. Final Quality Assurance Project Plan for the Macroinvertebrate Tissue Study, Addendum No. 1. Prepared for Teck American Incorporated. September 2016.

Figures

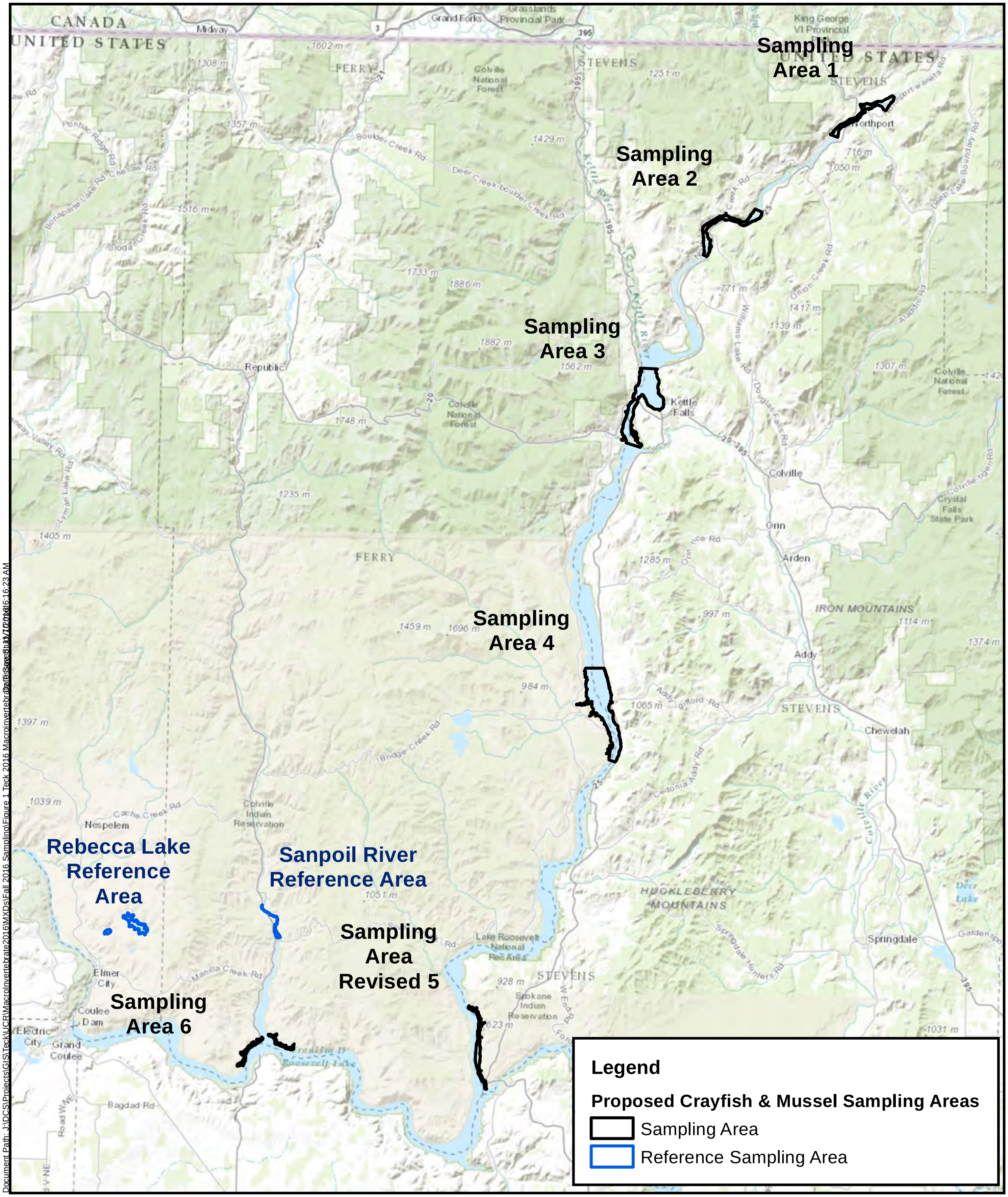
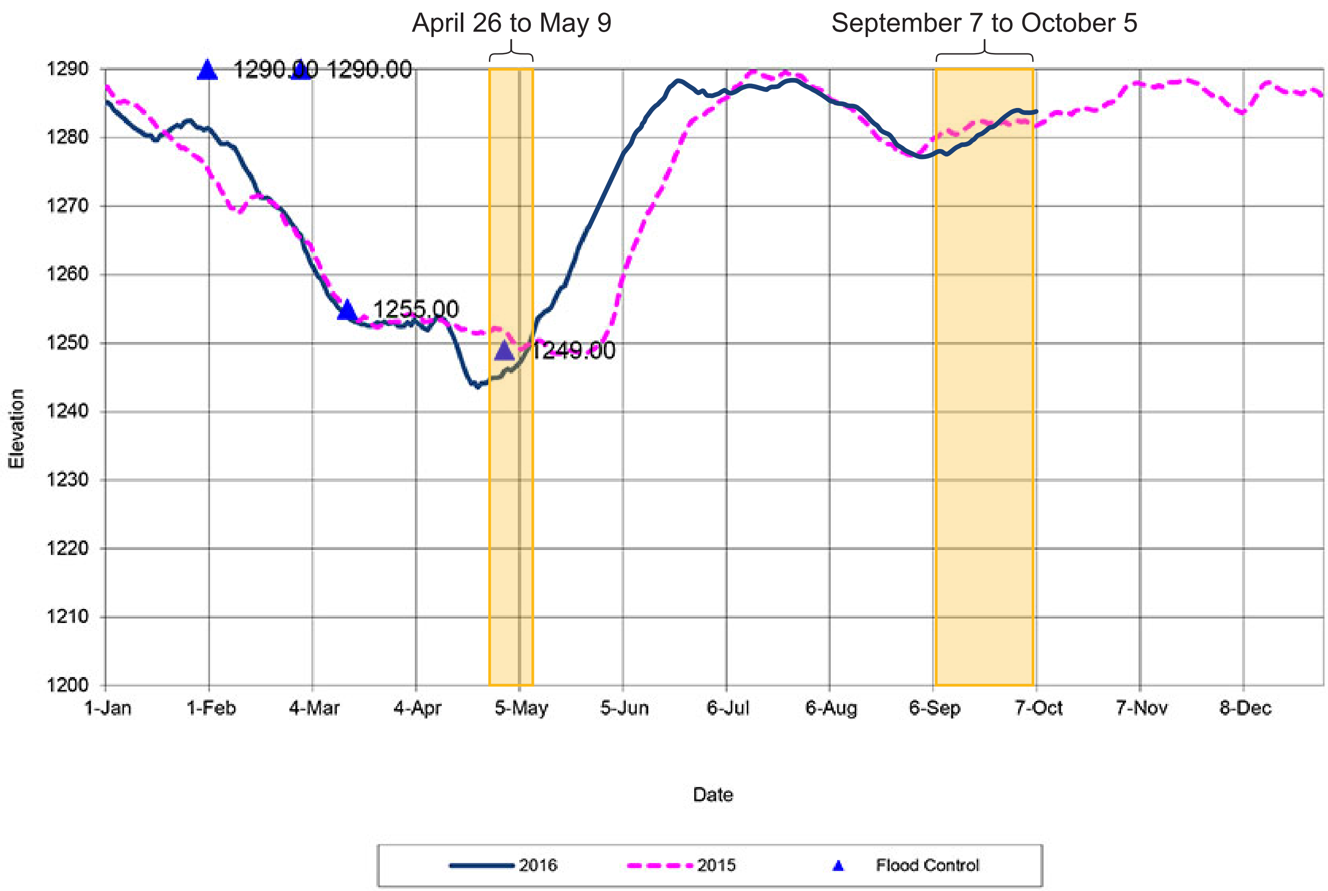


Figure 1

AECOM

Project Location Map
Teck American Incorporated
2016 Macroinvertebrate Tissue Study



Source: Bureau of Reclamation, accessed 6/10/2016, http://www.usbr.gov/pn/grandcoulee/lakelevel/

Figure 2

Lake Roosevelt Water Levels, 2015-2016

AECOM

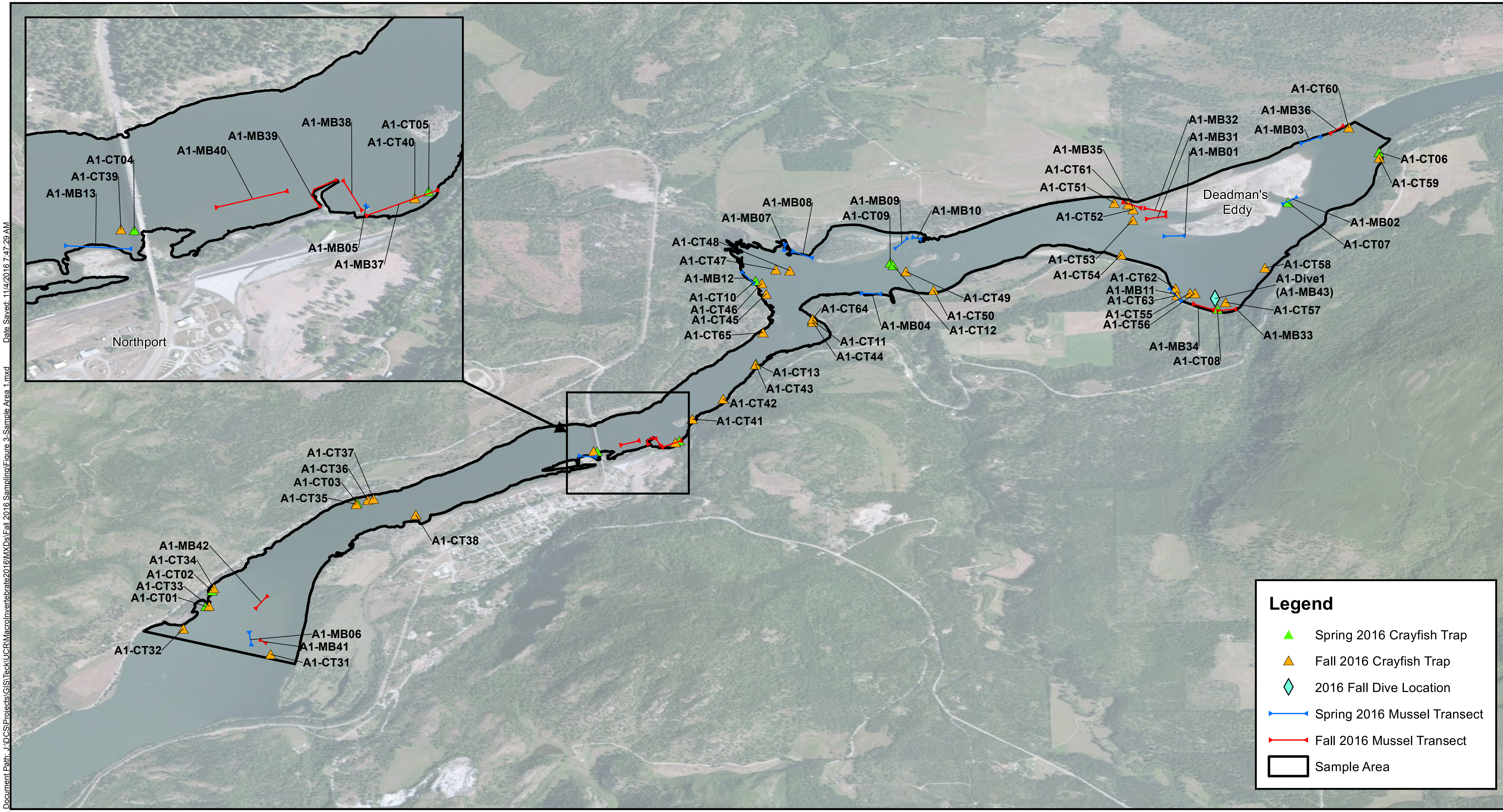


Figure 3

AECOM

0 1,000 2,000 3,000 4,000 5,000 6,000 Feet

0 500 1,000 1,500 2,000 Meters

N

Sampling Area 1 Location
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

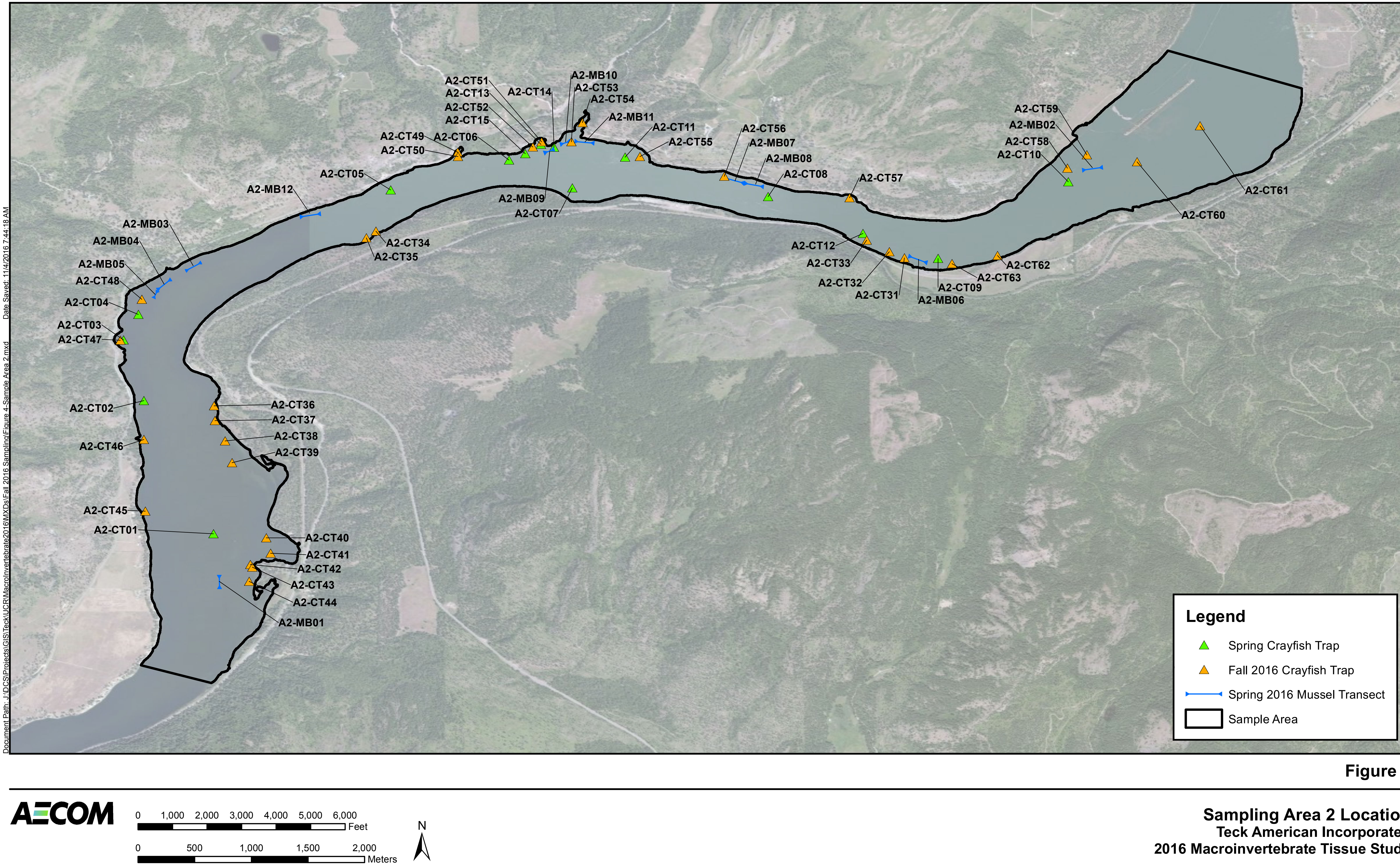


Figure 4

AECOM

Sampling Area 2 Location
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

Document Path: J:\DCS\Projects\GIS\Teck\UCR\MacroInvertebrate2016\MXDs\Fall 2016 Sampling\Figure 5-Sample Area 3.mxd   Date Saved: 11/4/2016 7:46:42 AM

Figure 5

AECOM

0 1,000 2,000 3,000 4,000 5,000 Feet

0 500 1,000 1,500 Meters

N

Sampling Area 3 Location
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

Figure 6

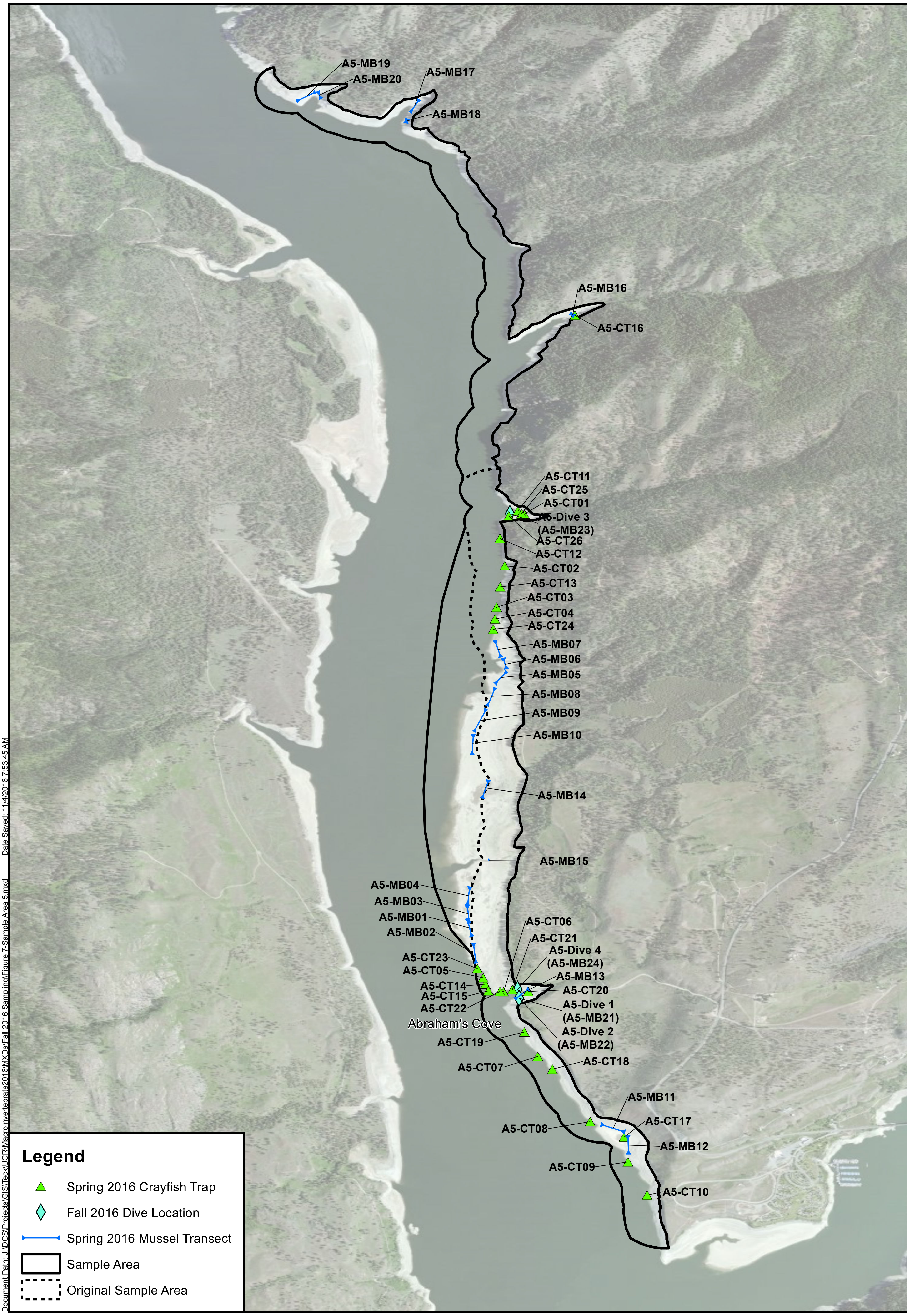
AECOM

0 1,000 2,000 3,000 4,000 5,000 Feet

0 500 1,000 1,500 Meters

N

Sampling Area 4 Location
Teck American Incorporated
2016 Macroinvertebrate Tissue Study



Document Path: J:\DCS\Projects\GIS\Teck\UCR\MacroInvertebrate2016\MXDs\Fall 2016 Sampling\Figure 7-Sample Area 5.mxd Date Saved: 11/4/2016 7:53:45 AM

Figure 7

AECOM

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0 500 1,000 1,500 Meters

N

Sampling Area 5 Location
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

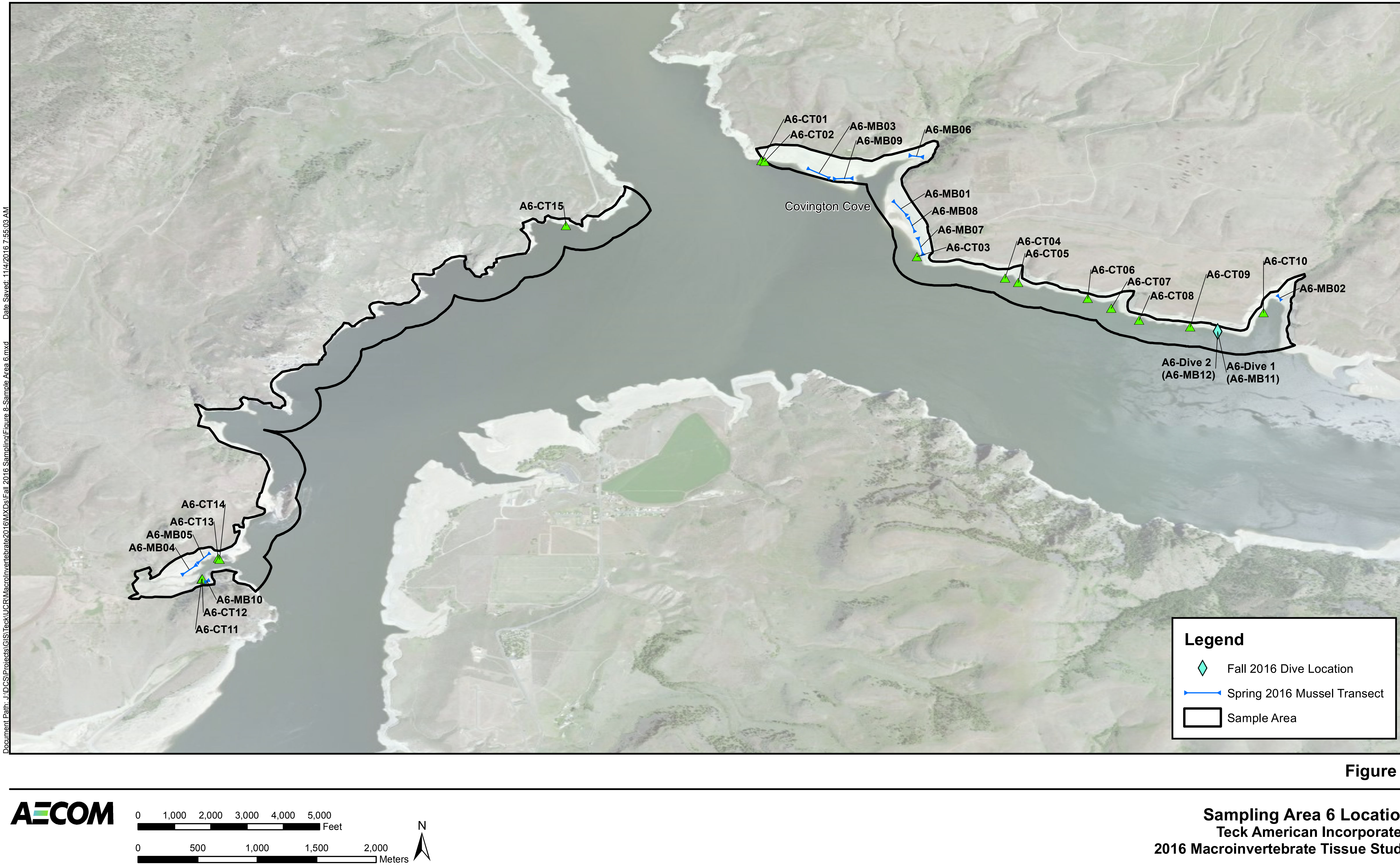


Figure 8

AECOM

Sampling Area 6 Location
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

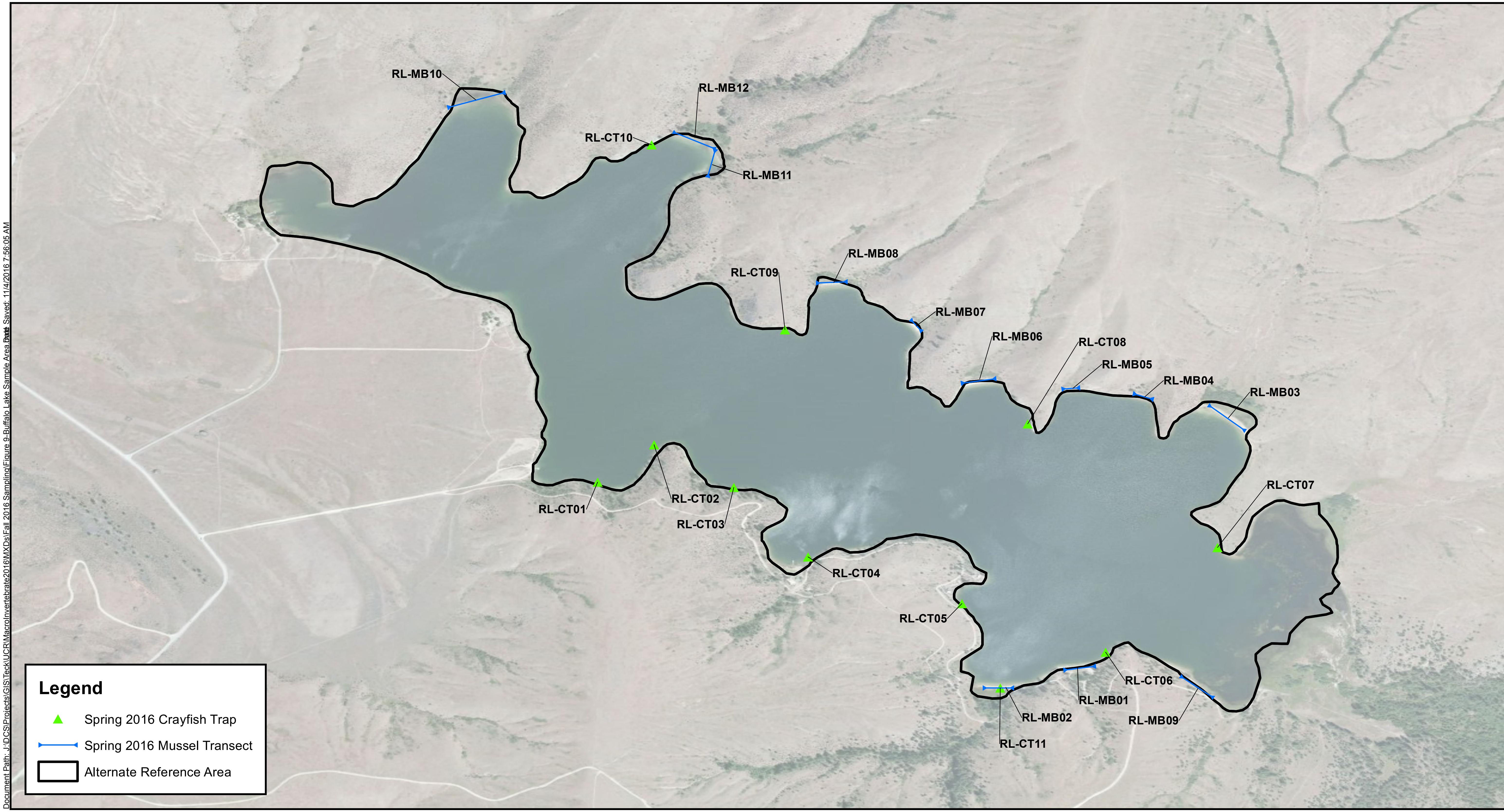


Figure 9

AECOM

0 1,000 2,000 3,000 Feet

0 500 1,000 Meters

N

Buffalo Lake Alternate Reference Area Location
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

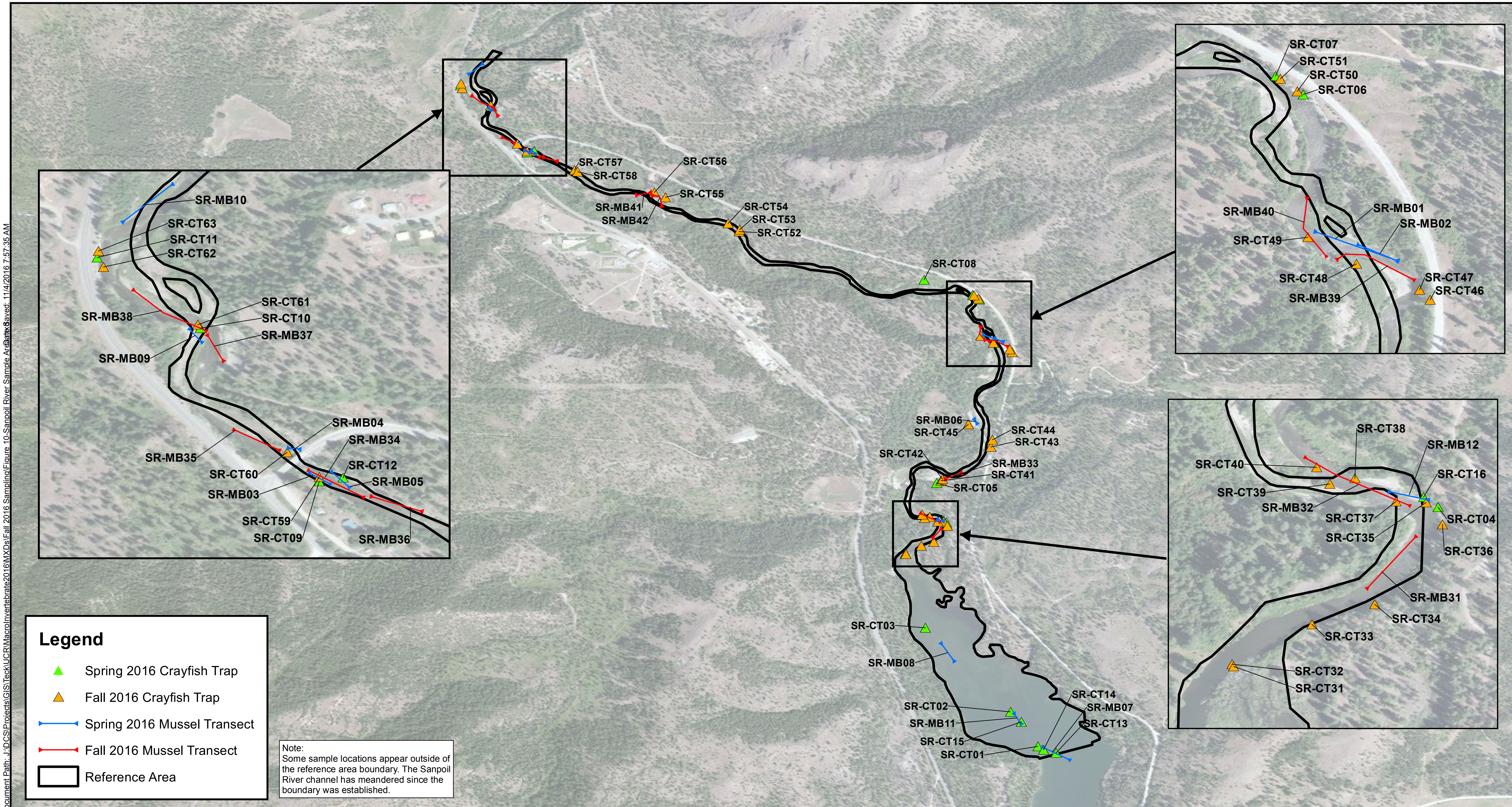


Figure 10

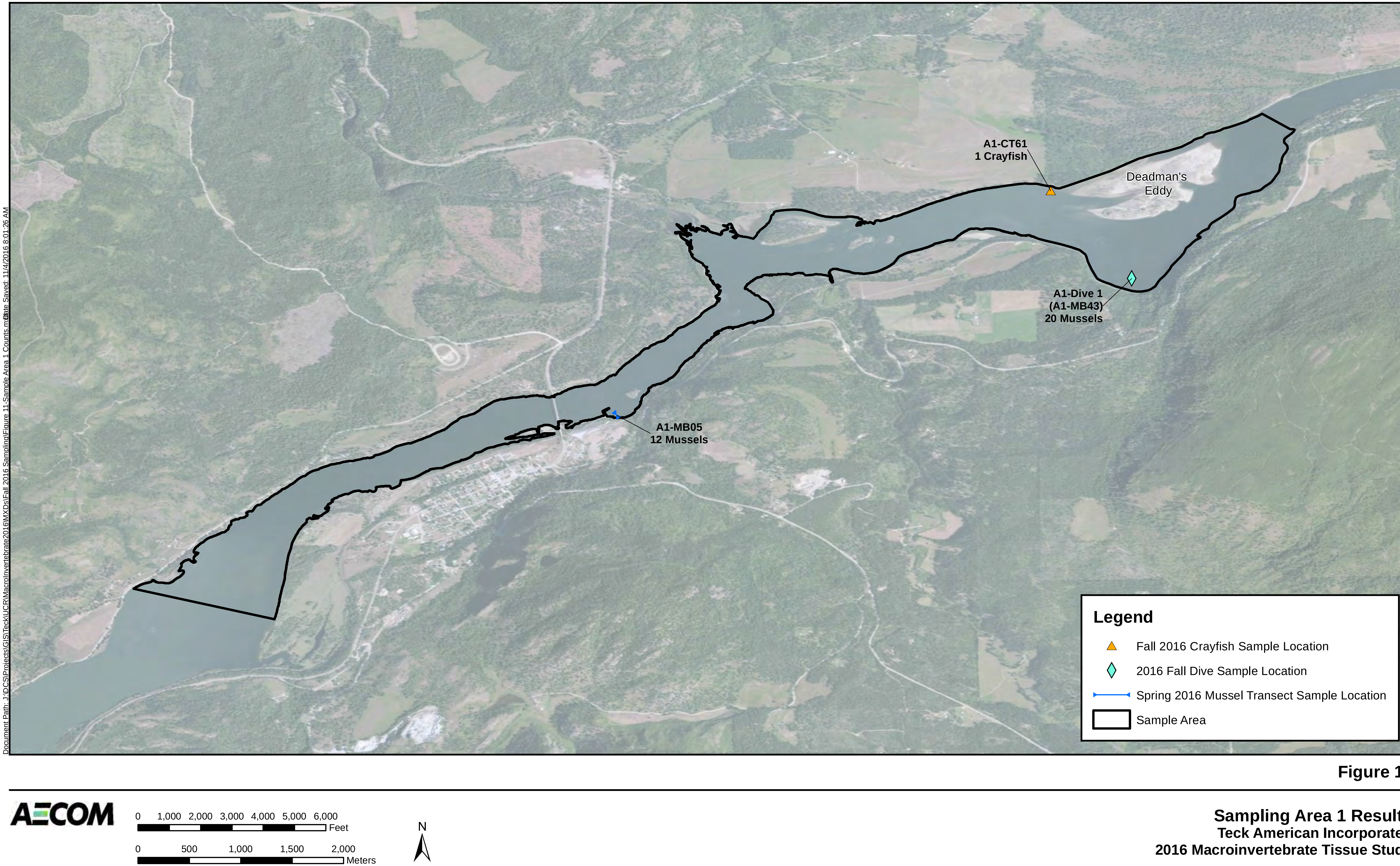
AECOM

0 1,000 2,000 Feet

0 500 1,000 Meters

N

Sanpoil River Reference Area Location
Teck American Incorporated
2016 Macroinvertebrate Tissue Study



Document Path: J:\DCS\Projects\GIS\Teck\UCR\MacroInvertebrate2016\MXDs\Fall 2016 Sampling\Figure 11-Sample Area 1 Counts.mxd Date Saved: 11/4/2016 8:01:26 AM

Figure 11

AECOM

Sampling Area 1 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

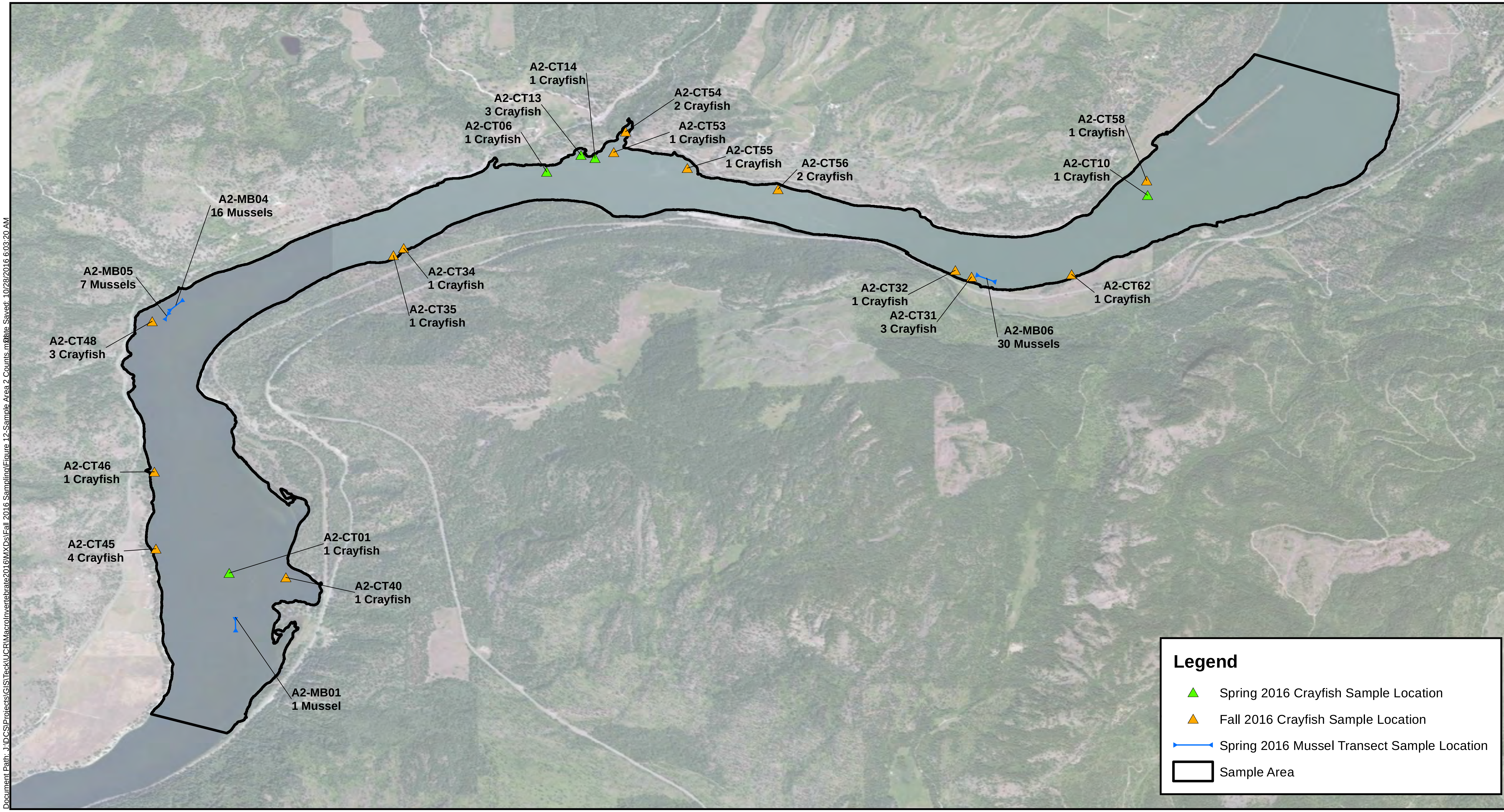


Figure 12

AECOM

0 1,000 2,000 3,000 4,000 5,000 6,000 Feet

0 500 1,000 1,500 2,000 Meters

N

Sampling Area 2 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

Figure 13

AECOM

0 1,000 2,000 3,000 4,000 5,000 Feet

0 500 1,000 1,500 Meters

N

Sampling Area 3 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

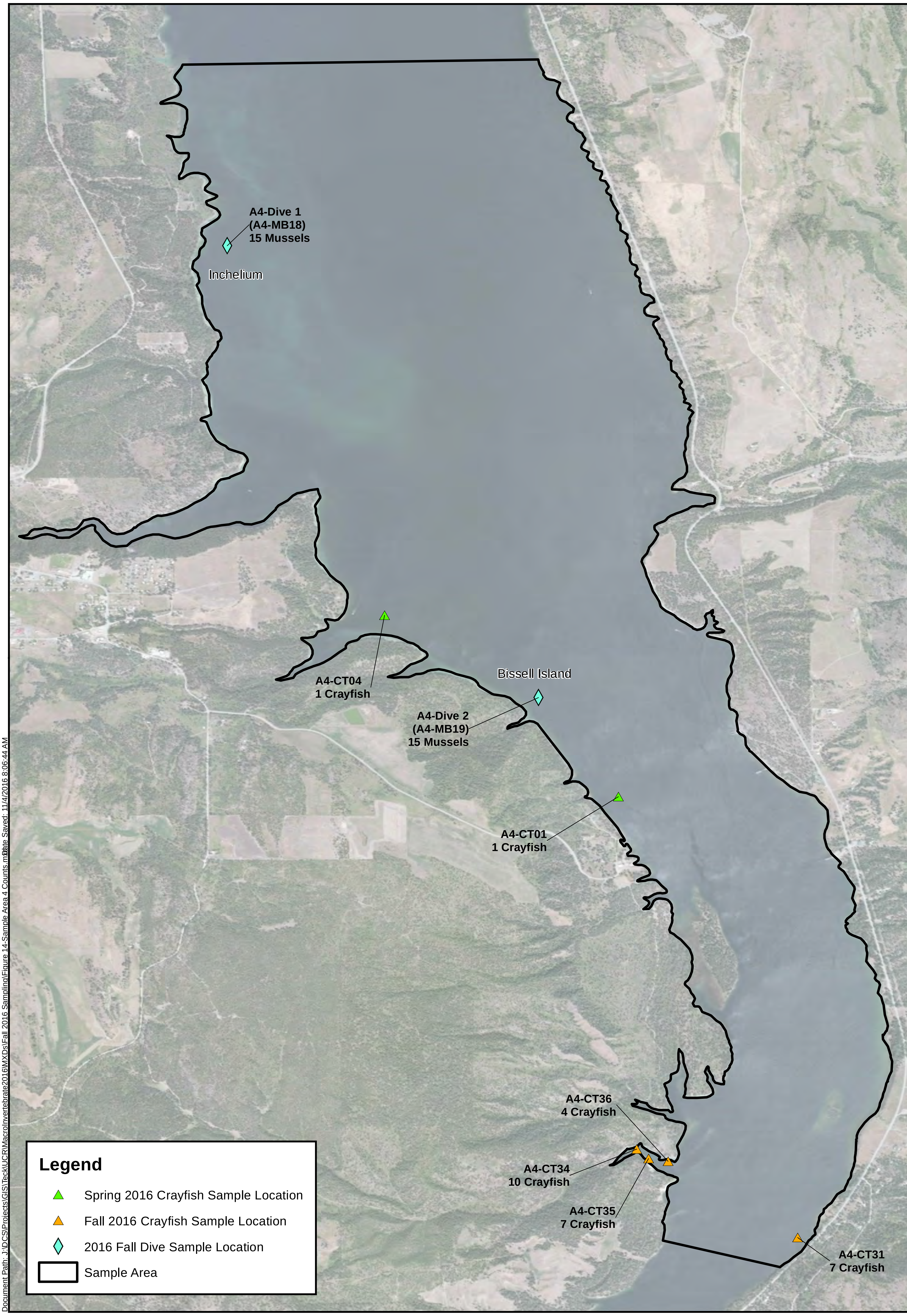
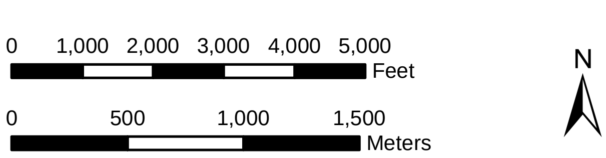


Figure 14



Sampling Area 4 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

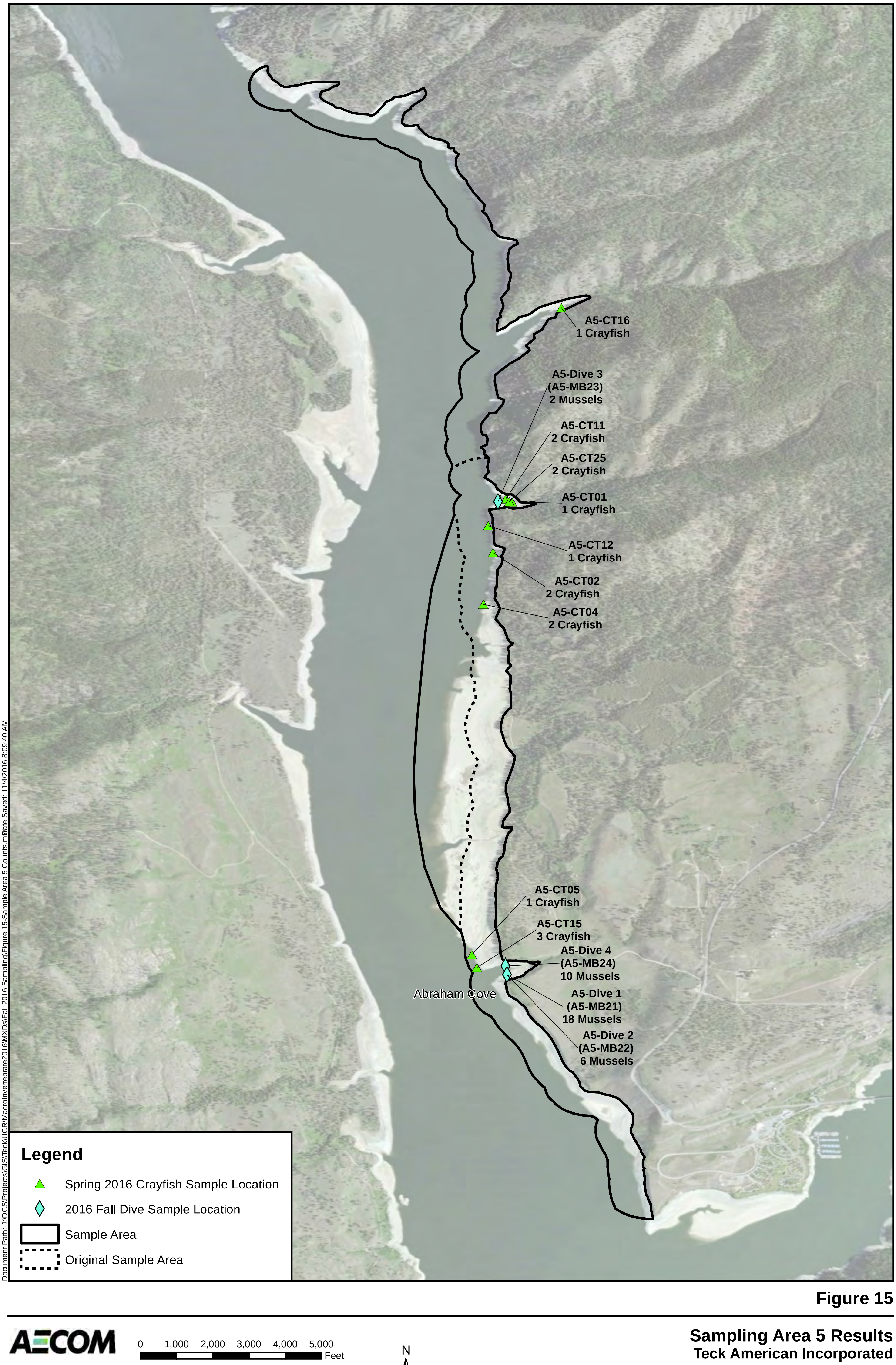
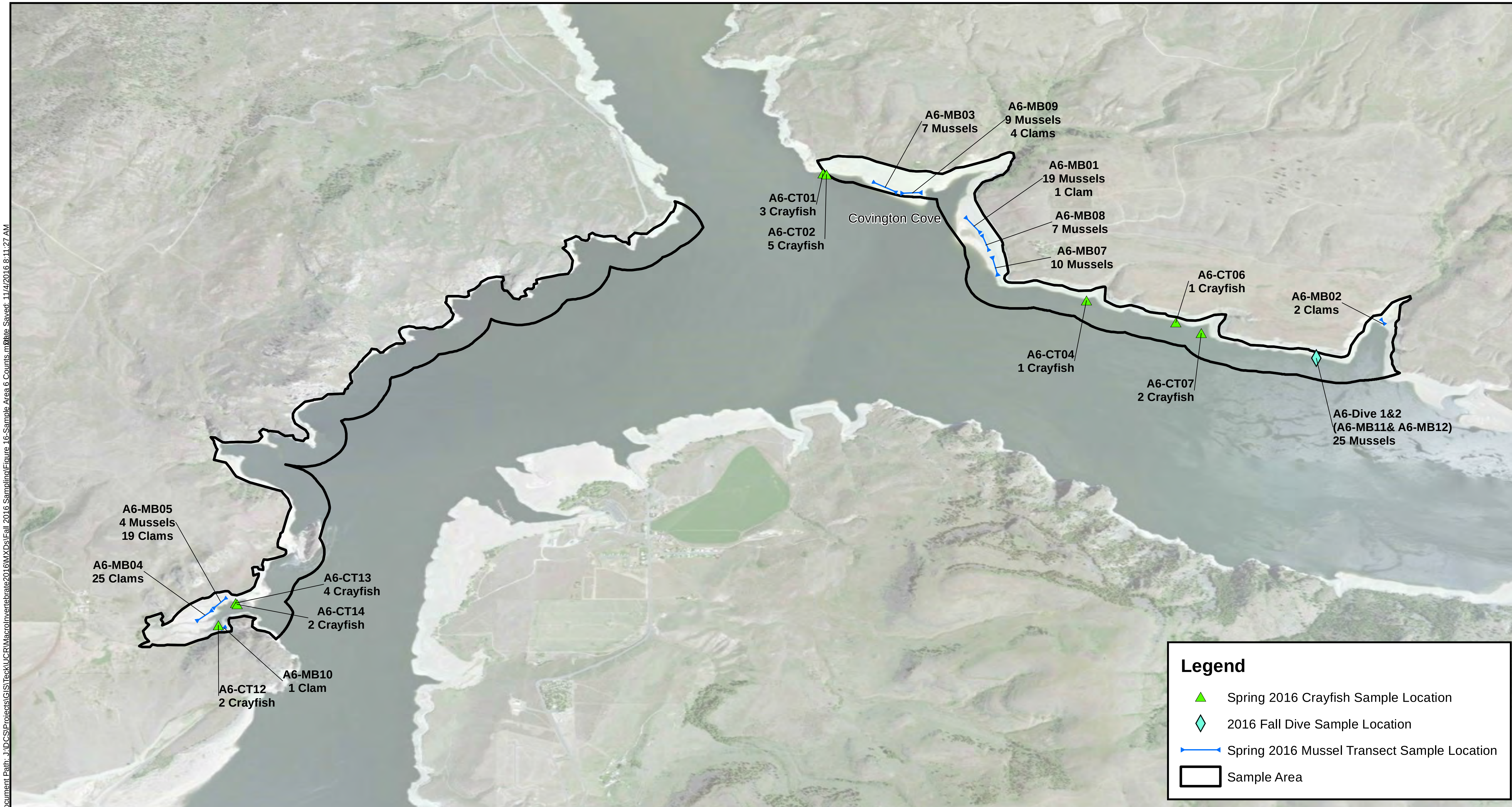


Figure 15

AECOM

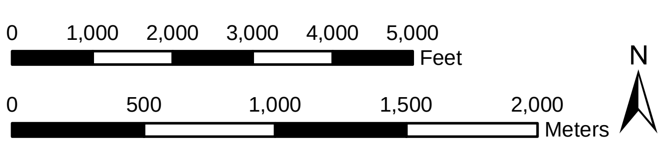
Sampling Area 5 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study



Document Path: J:\DCS\Projects\GIS\Teck\UCR\MacroInvertebrate2016\MXDs\Fall 2016 Sampling\Figure 16-Sample Area 6 Counts.mxd Date Saved: 11/4/2016 8:11:27 AM

Figure 16

AECOM



Sampling Area 6 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

Figure 17

0 1,000 2,000 3,000 Feet

0 500 1,000 Meters

N

Buffalo Lake Alternate Reference Area Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

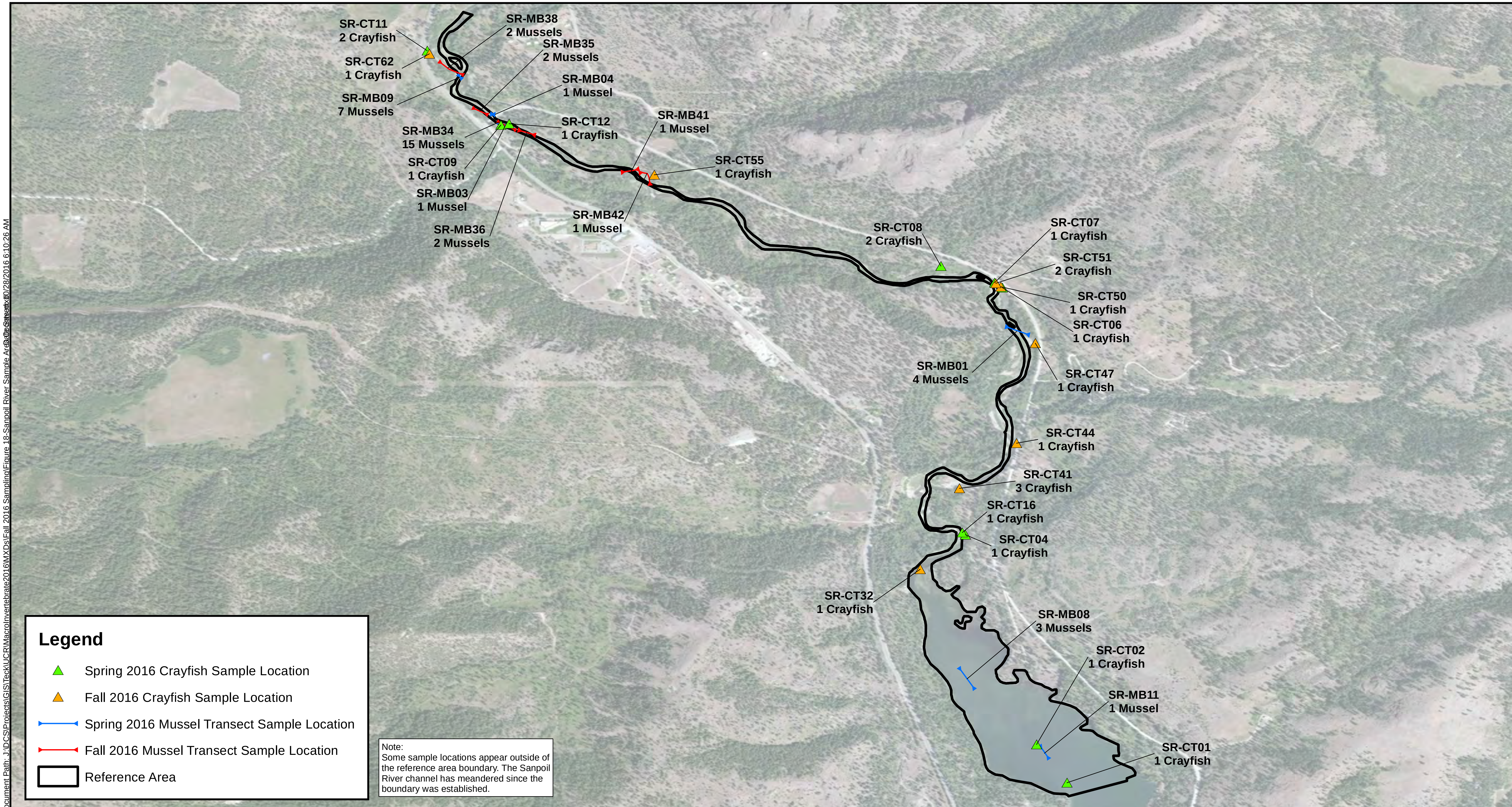


Figure 18

AECOM

0 1,000 2,000 Feet

0 500 1,000 Meters

N

Sanpoil River Reference Area Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

Appendix A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10

1200 6th Avenue, Suite 900 MS ECL-122
Seattle, Washington 98101

September 2, 2016

Kris McCaig
Project Manager
Teck American Incorporated
501 North Riverpoint Boulevard, Suite 300
Spokane, Washington 99202

VIA ELECTRONIC MAIL ONLY

Re: Upper Columbia River Remedial Investigation Feasibility Study – Final Quality Assurance Project Plan for the Macroinvertebrate Tissue Study Addendum No. 1 (August 2016)

Dear Ms. McCaig,

This letter provides EPA's approval of the Final Quality Assurance Project Plan for the Macroinvertebrate Tissue Study Addendum No. 1 (August 2016).

Please direct any questions to me at bott.dustan@epa.gov, (206) 553-5502.

Sincerely,

Dustan Bott

Dustan Bott
Project Manager

Enclosure

cc: Dan Audet, U.S. Department of Interior
Patti Bailey, Confederated Tribes of the Colville Reservation
Randy Connolly, Spokane Tribe of Indians
John Roland, Washington Department of Ecology

WASHINGTON STATE
SCIENTIFIC COLLECTION PERMIT
Washington Department of Fish and Wildlife

Washington Department of FISH and WILDLIFE

*Please see **SCIENTIFIC/EDUCATION COLLECTION PERMIT (SCP) INSTRUCTIONS***
Attach a brief Study Plan, Applicant Qualifications and $117. Allow 60 days for processing.

Applications and annual reports can be submitted via e-mail to scp@dfw.wa.gov or standard mail to:

WDFW Licensing SCP
600 Capitol Way North
Olympia, WA 98504-3150

If you have questions please contact:
***phone:** (360) 902-2464, Option 4*
***e-mail:** scp@dfw.wa.gov*

Permit Number (WDFW Use Only): **MEJIA 16-184a**

1. APPLICANT INFORMATION			
Name:	**Glen Mejia**	Agency:	**AECOM**
Number:	**503-962-9007**	Address:	**1111 3rd Avenue, Suite 1600**
E-mail:	**Glen.Mejia@aecom.com**		**Seattle WA 98101**

2. SUB-PERMIT HOLDERS					
Name	Number	Name	Number	Name	Number
Kimberly Anderson	206-439-2337	Ragan Driver	208-386-5000	Mark Hale	415-243-3826
Dave Hose	206-438-2154	Shawn Hinz	425-281-1471	Linda Howard	206-438-2340
Jennifer Pretare	206-438-2175	Michelle Stegner	503-948-7216	Jeff Walker	206-438-2351
Mike Duffield	206-794-4994	Chad Furulie	425.922.0955	Russ Bevill	530-828-8045

3. THIS APPLICATION IS:	
☐ New	☐ Renewal of Permit #:
☒ Amendment to Permit # **MEJIA 16-184**	☐ SALVAGE PERMIT ONLY

4. PURPOSE OF COLLECTION OR HANDLING (check both if applicable)	
☐ Instruction/Education Display	☒ Research/Scientific Investigation (includes electrofishing)

5. RESEARCH OBJECTIVES (check all that apply):			
☐ Aging	☐ Behavior	☐ Physiology	☐ Artificial Propagation
☐ Census	☐ Presence/Absence	☐ Population Distribution	☐ Life History
☐ Lab Use	☐ Pathology	☒ Tissue Sampling	☐ Genetic
☐ Stream Typing	☐ Other: ____________		

6. PERMIT TIMELINE*:	
Project Start Date: 4-25-2016	Project End Date: 10-31-2016
Permit Expiration Date (WDFW Use Only): **10-31-2016**	*SCPs are valid for a maximum of 12months.

7. TYPE OF ANIMALS TO BE COLLECTED OR HANDLED:				
☐ Wildlife*	☐ Fish	☒ Aquatic Invertebrates – specify:	☐ Marine	☒ Freshwater

8. SPECIFIC TYPE(S) (check all that apply):		
☐ Non-Raptor Birds	☐ Marine Fishes	☐ State and/or Federal Threatened or Endangered Species Detail:
☐ Raptors	☐ Freshwater Fishes	
☐ Mammals	☐ Reptiles/Amphibians	____________
☐ Bats	☐ Terrestrial Invertebrates	

9. COLLECTION INFORMATION:			
Species Requested –	Specific Location & County	Max # of Lethal take or Live Permanent Removal	Max # of Non-lethal take or Salvage
Anodonta clade 1 – winged/California floater *Anodonta* clade 2 – Oregon/western floater *Anodonta beringiana* – Yukon floater *Margaritifera falcata* – Western pearlshell *Gonidea angulata* – Western ridged mussel *Corbicula fluminea* – an invasive clam *Orconectes virilis* – northern/virile crayfish *Pacifastacus leniusculus* – signal crayfish	See attached maps A1-A11 and Table A-1 **Upper Columbia River:** RM 733-739, **Stevens** RM 718-725, **Stevens** RM 700-706, **Stevens & Ferry** RM 671-678, **Stevens &Ferry** RM 639-643, **Stevens** RM 613-618, **Ferry** Sanpoil River – **Ferry** Rebecca Lake/Buffalo Lake – **Okanogan County**	300 combined live specimens, plus 127 clams previously collect in exceedance of take (in addition to the 300 authorized in original permit). Total = 727	If 300 live specimens cannot be found, then dead specimens may be salvaged up to a total of 727 (combined live and dead).

10. METHODS OF COLLECTION:			
☐ Firearms are being used for this collection.			
Lethal: See attached methods SOP-3 for mussels & SOP-4 for crayfish			**Species:** All species listed
In addition, collection for mussels will include use a scientific dive team from the U.S. Environmental Protection Agency (EPA), specific team member names will be added later.			
Non-lethal: See attached methods SOP-3 for mussels & SOP-4 for crayfish			**Species:** All species listed
In addition, collection for mussels will include use an US EPA scientific dive team			
Salvage: See attached methods			**Species:** All species listed
In addition, collection for mussels will include use an US EPA scientific dive team			
Body-gripping traps:	☐ Padded Foot-hold	☐ Non-strangling Foot Snare	**Species:**
Electrofishing:	☐ Backpack	☐ Boat	**Species:**

11. MARKING (check all that apply):
☐ Band ☐ Mark ☐ Other (please describe):________________________
☐ Fit with radio/acoustic telemetry transmitters: Max # of Transmitters ________ Radio Frequencies/Tag Codes

12. DISPOSITION OF SPECIMENS (check all that apply):	
☐ Display Permanent – Dead	☐ Display Temporary - Dead
☐ Display Permanent – Live	☐ Display Temporary – Live
☐ Live Housing Research of Laboratory use – Permanent	
☐ Live Housing Research of Laboratory use – Temporary	
☐ Immediate Release at Capture Site	
☐ Relocated to Wild (additional permits may be required; wildlife may not be captured and relocated without a permit)	
☐ Carcass disposal at site	☐ Display Temporary – Dead
☐ Euthanize	☒ Other: **Transported to laboratory for analysis**

GENERAL PERMIT CONDITIONS:

1. A Scientific Collection Permit is non-transferable.
2. A copy of this permit must be in the possession of any person exercising the privileges authorized by this permit.
3. The Permit Holder is responsible for ensuring that all Sub-Permit Holders are qualified and experienced to conduct the specified activities, including collection by firearms and comply with all conditions of this permit. Only those Sub-Permit Holder(s) listed on the permit are authorized to engage in permitted activities.
4. Please note that compliance with Scientific Collection Permit requirements and permit conditions does not ensure compliance with federal, local, or other state laws. Collection of state or federal endangered or threatened species, state sensitive species, or state or federal candidate species is prohibited unless specifically authorized in this permit. Collection of game birds or game animals is prohibited unless specifically authorized in this permit. Collection of migratory birds, marine mammals, and any species listed under the federal Endangered Species Act may require a federal permit before collecting. For any collection/research activity of marine mammals and/or federally-protected anadromous and marine fish species, etc., contact NOAA-National Marine Fisheries Service at http://www.nmfs.noaa.gov/endangered.htm or 503-230-5400. For any

collection/research activity of migratory birds, resident fish species (Bull Trout) and/or federally-protected wildlife, contact U.S. Fish and Wildlife Service at http://endangered.fws.gov or 360-753-9440.

5. This permit does not authorize collection from **non-WDFW** protected lands or waters (may include but not exclusive to: parks, reserves, refuges, natural areas, conservation areas, tribal lands, monuments, etc.). This permit does not authorize trespassing on private or restricted public lands. Additional permits issued by other state and local agencies, tribal governments, or landowners/managers may be required.

6. No collection shall occur in WDFW Marine Preserves or Conservation Areas (see http://wdfw.wa.gov/fishing/mpa), or Wildlife Areas unless permission is obtained from the Area manager. Contact the appropriate WDFW Regional Office for information. Regional office information is listed at http://wdfw.wa.gov/about/regions.

7. Specimens acquired under this permit remain the property of the state and will not be offered for sale or sold or used for commercial purposes or human consumption. Exchange or transfer of specimens, unless otherwise specified in this permit, requires prior written approval from the Director of WDFW.

8. Employees of WDFW have the right to inspect the collection activities authorized by this permit.

9. Vessels engaged in collection activities shall display a sign "RESEARCH," readable at 100 feet to unaided vision.

10. Permit Holders using unattended equipment must have attached to that equipment, a tag clearly marked with the permit number and name and current address of the Permit Holder. The address used may be that of the organization the Permit Holder represents, e.g., university, company, or corporation.

11. Permit holders may only use FDA approved fish anesthesia.
    a) **MS-222** may not be used at times/in places where fish may be subject to "catch and keep" fisheries within 21 days;
    b) **Clove oil** may not be used at all;
    c) **AQUI-S®** may be used as an alternative to MS-222.
       i. To use AQUI-S® 20E as an immediate release sedative in freshwater fish for field-based activities, permit holder must sign up to participate in USFWS-AADAP INAD 11-741 and must comply with the requirements as set forth in the INAD Study Protocol for AQUI-S® 20E (for more information about aquatic animal drugs, AQUI-S® 20E, or to apply to participate in USFWS-AADAP INAD 11-741 go to www.fws.gov/fisheries/aadap or contact the USFWS-AADAP INAD Administrator Bonnie Johnson at Bonnie Johnston@fws.gov or 406-994-9905).
    d) Carbon dioxide can be used as a fish anesthetic as per FDA rules and requires no withdrawal time;
    e) As alternative to chemicals, electroahesthesia can be used as a fish anesthetic and requires no withdrawal time.

12. Unless otherwise specified in this permit, release of specimens is allowed only at the exact capture site immediately after capture. Release of fish and marine and freshwater invertebrates at any other site or time requires a transport, release, or planting permit. Relocating wildlife and releasing wildlife other than at the location of capture requires a special permit. The conditions of this permit may specify that no release of certain specimens is allowed. Contact WDFW Fish Program (360-902-2700) or Wildlife Program (360-902-2515) for further information.

13. Temporary holding of wildlife is permitted for identification only. Individuals must be released at site of capture, unless they exhibit evidence of disease.

14. Wildlife Salvage — Notify the WDFW immediately if any State or Federally listed Threatened or Endangered species are encountered or salvaged and any salvaged State or Federal Threatened or Endangered Species must go to a major research collection such as WSU Conner Museum, University of Puget Sound Slater Museum of natural History, or UW Seattle Burke Museum, or as directed by the WDFW.

Reporting Requirements:

Permit renewal is contingent upon submission of a complete Annual Report. Reports must be submitted to WDFW upon completion of the display, education, or research project or the expiration date of the permit, whichever comes first, and must be received no later than 60 days after the expiration of the permit. All reports submitted to WDFW shall include Permit Holder's name and permit number and all required information on the Annual Report Form.

For **anadromous fish and freshwater collections,** the report shall include the 1) Date of collection; 2) Species name (for invertebrates, to the lowest taxonomic level possible); 3) Numbers of each species encountered and/or retained; 4) Location of each sample site, including county, water body, and latitude/longitude or GPS coordinates; 5) Disposition of specimens. This information is to be recorded at each capture site and includes ALL species encountered (or impacted by the collection activity) even if not retained or meant for the study
For **marine collections,** the report shall include the 1) Date of collection; 2) Species name (to the lowest taxonomic level possible); 3) Numbers of each species encountered and/or retained; 4) Location of each sample site, including county, water body, and latitude/longitude or GPS coordinates; 5) Disposition of specimens. This information is to be recorded at each

capture site and includes ALL classified and unclassified species encountered (or impacted by the collection activity) even if not retained or meant for the study. IN ADDITION for:

i. **Rock scallops** *(Crassodoma gigantea)* include: specific location, mortality of any rock scallop during collection, exact position and depth of specimens collected, and shell length measured from edge to edge at the widest part of the shell.
ii. **Octopus** *(Enteroctopus dofleini)* include: specific location, individual weight, depth, and sex of octopus taken.

For **wildlife collections,** the annual report shall include all categories on the Annual Report Form including the 1) Date of collection; 2) Species name (common and scientific) with numbers collected, numbers released, and disposition of individuals; 3) Location of collection including GPS coordinates, number of accidental mortalities.

SPECIAL CONDITIONS:

To prevent the spreading of aquatic invasive species, follow the procedures in the attached ***WDFW Protocols for Field Work***. For additional information on aquatic invasive species, please visit the WDFW website at http://wdfw.wa.gov/ais/.

Aquatic Invasive Species (AIS) Conditions:
Permit holder is required to humanely euthanize all collected aquatic invasive species (AIS) classified as "Prohibited aquatic animal species" under WAC 220-12-090 except as noted below for transport purposes. Collection of all Prohibited level 1 species[1] must be reported immediately to WDFW with photos of the species and specimens saved until provided to WDFW or directed to dispose. All other prohibited AIS must be euthanized before being removed from the immediate vicinity of the water body where collected and then disposed of in a public landfill system or chemically preserved. Collection and disposal of all other prohibited AIS must be included in a report submitted to WDFW within 30 days using the online reporting form noted below.

Permit holder may transport live prohibited AIS outside the immediate vicinity of the water body where collected only under the following conditions:

1. Transport to nearest WDFW regional office or headquarters for purpose of identification; AND
2. Transported in a secure container to prevent release of either the AIS or any associated water, plant, sediment, animal, or other materials; OR
3. Transported as authorized by a separate WDFW AIS Permit secured prior to collection.

Contact WDFW Headquarters: 360-902-2700 and request Aquatic Invasive Species Unit Staff
Online reporting form: www.wdfw.wa.gov/ais/reporting Toll-free: 888-933-9247

[1] Includes: Zebra mussels (*Dreissena polymorpha*), quagga mussels (*Dreissena rostriformis bugensis*), European green crab (*Carcinus maenas*), and all members of the genus Eriocheir (including Chinese mitten crabs), all members of the walking catfish family (Clariidae), all members of the snakehead family (Channidae), silver carp (*Hypophthalmichthys molitrix*), largescale silver carp (*Hypophthalmichthys harmandi*), black carp (*Mylopharyngodon piceus*), and bighead carp (*Hypophthalmichthys nobilis*).

A violation of the terms or conditions of this permit is an infraction unless it involves big game, which is a gross misdemeanor. By signing below, permit holder agrees to the conditions of this permit and those in WAC 220-20-045 and RCW 77.32.240.

<u>This permit is not valid until signed by the permit holder and returned to WDFW either electronically or through the mail.</u>

Signature of Permit Holder

August 8, 2016
Date

Anita Victoria
Signature of WDFW Representative

August 31, 2016
Date

THIS PERMIT CAN BE REVOKED OR MODIFIED AT THE DISCRETION OF THE DIRECTOR OR THE DIRECTOR'S DESIGNEE.

Teck American Incorporated
501 N Riverpoint Blvd., Suite 300
Spokane, WA 99202
PO Box 3087
Spokane, WA 99220-3087

+1 509 747-6111 Tel
+1 509 922-8767 Fax
www.teck.com

Teck

September 12, 2016

File No.: 01-773180-000

Mr. Dan Foster, Park Superintendent
U.S. Department of the Interior, National Park Service
Lake Roosevelt National Recreation Area
1008 Crest Drive
Coulee Dam, WA 99116

Subject: Upper Columbia River Remedial Investigation Feasibility Study (UCR RI/FS)
U.S. Department of the Interior, National Park Service
Special Use Permit #PWR LARO TCAI-011

Dear Mr. Foster:

Further to your September 6, 2016 letter and as requested, please find enclosed for your records a signed copy of the above-referenced Special Use Permit.

I would like to thank you in advance for your assistance on this matter and look forward to continue working with you on this project. Should you have any questions or require any additional information at this time, please do not hesitate to contact me at (509) 623-4501.

Sincerely,
Teck American Incorporated

Kris R. McCaig

Kris R. McCaig
Manager, Environment and Public Affairs

Attachment (1) – *Executed Special Use Permit #PWR LARO TCAI-011*

cc: Dustan Bott, U.S. Environmental Protection Agency, Richland, WA (electronic only)
Keith Holliday, U.S. Dept. of the Interior, National Park Service, Kettle Falls, WA (electronic only)
Dr. Jenny Pretare, AECOM, Seattle, WA (electronic only)

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United States Department of the Interior
NATIONAL PARK SERVICE
Lake Roosevelt National Recreation Area
1008 Crest Drive
Coulee Dam, Washington 99116-1259

RECEIVED
SEP - 8 2016

IN REPLY REFER TO: TCAI-011

September 6, 2016

Ms. Kris McCaig
Teck American Incorporated
501 N. Riverpoint Blvd., #300
Spokane, WA 99202

Dear Ms. McCaig,

The National Park Service (NPS), Lake Roosevelt National Recreation Area (LRNRA) has received your application for a Special Use Permit (SUP) pertaining to the *Upper Columbia River - Final Quality Assurance Project Plan for the Macroinvertebrate Tissue Study Addendum No. 1* dated September 2016.

Enclosed are two copies of the SUP along with the stipulated conditions. Please sign both copies of the permit as the Permitee, and return one copy in the enclosed envelope.

If you have any questions regarding the conditions of this permit, please feel free to contact me at (509) 754-7812.

Sincerely,

Dan A. Foster
Superintendent

Form 10-114
Rev. DEC. 99

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use: **Sample Collection for Macroinvertebrate Tissue Study**

Date Permit Reviewed: September 6,2016
Expires: October 16, 2016
Permit #PWR **LARO TCAI-011**
Region Park Type No. #

Long Term _

Short Term X

Name of Area: **Lake Roosevelt National Recreation Area**

Name or Permittee: Teck America Inc.
Phone: (509) 623-4501

Service Address: **501 N Riverpoint Blvd., Suite 300**
Spokane, WA 99202

Teck America is hereby authorized during the period from (07 day 9 Month 2016), through (16 Day 10 Month 2016), to use the following described land or facilities in the permit conditions:

Those areas within Lake Roosevelt National Recreation Area described within the *Upper Columbia River - Final Quality Assurance Project Plan for the Macroinvertebrate Tissue Study Addendum No. 1* dated September 2016 and as approved by the U.S. Environmental Protection Agency on September 2, 2016 in consultation with the Cultural Resource Coordination Group.

For the purpose(s) of: Collecting Samples [Research (2500)]
Contact: Keith Holliday Phone: (509) 754-7858

Authorizing legislation or other authority (RE - DO-53): 16 U.S.C. §§1a-1; 42 U.S.C. §§9601 *et seq*.

NEPA Compliance: CATEGORICALLY EXCLUDED ___ EA/FONSI ___ EIS X OTHER APPROVED PLANS

DO-12 CE 3.3 (P)

PERFORMANCE BOND: Required ____ Not Required X **Amount $0**

LIABILITY INSURANCE: Required X Not Required ____ **Amount $1,000,000**

ISSUANCE of this permit is subject to the conditions on the reverse hereof and appended pages and when appropriate to the payment to the U.S. Dept. of the Interior, National Park Service.

The undersigned hereby accepts this permit subject to the terms, conditions, covenants, obligations, and reservations, expressed or implied herein.

Permittee:

Kris McCaig | Kris McCaig, Manager, Environment + Public Affairs | 9/12/16

Signature | Print Name and Title | Date

Authorizing Official:

[signature] | | 9/6/2016

Signature | Park Superintendent | Date

CONDITIONS OF THIS PERMIT

1. The Permittee shall exercise this privilege subject to the supervision of the Park Superintendent and shall comply with all applicable laws, regulations, codes, standards and policies, including but not limited to 29 CFR 1910 and 16 U.S.C. Section 1 *et seq*.

   Based on previously cited and/or documented violations at Lake Roosevelt National Recreation Area (LARO), the following firm and/or individual is not granted access and shall not perform any field activities under this Permit.

   Mr. Greg Diefenbach, Consulting Geologist

2. The Permittee shall pay the United States for any damage resulting from the activities contemplated by this Permit, which would not reasonably be inherent in the use that the Permittee is authorized to make of the Site. For purposes of this Permit, the Site is that portion of the Upper Columbia River (UCR) Site as defined within the June 2, 2006 Settlement Agreement between the U.S. Environmental Protection Agency (EPA) and Teck Cominco that lies within the boundaries of LARO.

3. No Member of or Delegate to Congress, or Resident Commissioner shall be admitted to any share or part of this Permit or to any benefit that may arise there from, but this provision shall not be construed to extend to this grant if made with a corporation for its general benefit.

4. During the performance of this Permit, the Permittee agrees that it will not discriminate against any person because of race, color, religion, sex, or national origin. The Permittee will take affirmative action to ensure that applicants are employed without regard to their race, color, religion, sex, or national origin.

5. ANTI-DEFICIENCY ACT. No provision of this Permit shall be interpreted as or constitute a commitment or requirement that the United States obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. §§1341-1344 and 1511-1519, or any other applicable provision of law.

6. This Permit may not be transferred or assigned to parties not described within the permit application without the prior written consent of the Park Superintendent.

7. The National Park Service (NPS) reserves the right to stop any work being performed on the Site pursuant to this Permit should NPS determine that such work has or will negatively impact any NPS resources, which would not reasonably be inherent in the use that the Permittee is entitled to make of the Site pursuant to this Permit.

8. The Permittee is prohibited from giving false information; to do so will be considered a breach of conditions and be grounds for revocation [Re: 36 CFR 2.32(a)(4)].

9. This Permit is granted upon the express condition that the United States, its agents and employees, shall be free from all liabilities and claims for damages and/or suits for or by any reason, arising from or related to activities conducted pursuant to this Permit, including any releases of Waste Materials (as defined in Paragraph 33 of this Permit), injury, or death to any person or property of the Permittee, its contractors, subcontractors, agents or employees, or third parties, from any cause or causes whatsoever while in or upon the Site or any part thereof during the term of this Permit or occasioned by any use of the Site or any activity carried on by the Permittee or its contractors or subcontractors in connection herewith, and the Permittee hereby covenants and agrees to indemnify, defend, save and hold harmless the United States, its agents and employees, from all liabilities, charges, expenses and costs on account of or by reason of any such injuries, deaths, liabilities, claims, suits or losses however occurring, or damages arising from any acts related to this Permit.

10. This Permit is issued only for the use of the portion of the Site within LARO identified in the EPA approved *Upper Columbia River - Final Quality Assurance Project Plan for the Macroinvertebrate Tissue Study Addendum No. 1* dated September 2016 (QAPP), and only for the dates and times specified.

11. At no time will Permittee's activities at the Site interfere with a visitor's enjoyment of the Park, except as necessary to conduct the activities contemplated by this Permit. Visitor access to all park facilities, exhibits, resources, etc. will be maintained at all times and the Permittee will not block or obstruct any park walkway, dock, boat launch, trail, or road, except to the extent necessary to conduct the activities authorized by this Permit.

12. The Permittee will comply with any and all instructions from official representatives of the NPS (e.g., Rangers, Point(s) of Contact, and Cultural Resource Representatives), including but not limited to orders to cease and desist work.

13. This Permit does not authorize any use, activity, or purpose other than those expressly described herein.

14. NPS reserves the right to immediately rescind this Permit at any time should any of the Permit conditions be violated, or should the activity in any way interfere with any program of the Park, except as expressly authorized by this Permit, or at the discretion of the Park Superintendent.

15. If the Permittee fails to comply with the requirements of the Permit or uses the Permit for an unauthorized use, activity, or purpose, the Permittee shall pay the Department $25,000 for each failure to comply or unauthorized use, activity or purpose, unless excused by the Park Superintendent.

16. The issuance of this Permit will grant the Permittee access to the Site to conduct only those activities necessary to perform the work in the EPA approved QAPP and described in the Permit conditions. To the extent practicable, all work performed subject to this Permit shall comply with the EPA guidance, *Green Remediation: Incorporating*

Sustainable Environmental Practices into Remediation of Contaminated Sites, EPA 542-R-08-002 (April 2008).

17. Future access to NPS property or any modifications to this Permit will require a written amendment issued by the NPS.

18. The Permittee shall coordinate the performance of work with the appropriate representative of the NPS. The primary local NPS point of contact for all aspects of this Permit will be Keith Holliday (Office: 509/754-7858, Cell: 509/631-0306, and Email: keith_holliday@nps.gov). The alternate point of contact is Jon Edwards (Office: 509/754-7876, Cell: 509-631-0103, and Email: jon_edwards@nps.gov). In the event of emergency, accident, injury or death, call 911. For any other environmental accidents, spill or release, NPS law enforcement must be contacted via the local county Sherriff's office, Stevens County (509/684-2555) or Lincoln County (509/725-3501). Additionally, Keith Holliday must be contacted within one-hour of any incident.

19. REGULATORY REQUIREMENTS: All Site work will be conducted and implemented in accordance with all federal, state, and local laws, regulations and requirements as directed by the NPS, and will be consistent with the NPS mission (*see, e.g.*, 16 U.S.C. Section 1 *et seq.*) and Permit conditions.

20. The Permittee is responsible for complying with any federal, state, or local requirement(s) to obtain any licenses and/or permits for the activities conducted pursuant to this Permit, and for obtaining any utility clearances required before the permitted work is commenced.

21. All work and investigations on NPS property requires a minimum 48-hour advance notice (business days, Monday-Friday except federal holidays) to the NPS points of contact identified above. The Permittee will provide before activities commence the NPS a written list of names with email addresses, phone and fax numbers of its points of contact, including the Permittee's contractors and subcontractors for activities conducted on the Site pursuant to this Permit.

22. The Permittee and its representatives, agents, contractors, and subcontractors must be apprised of, be familiar with, and comply with the contents of this Permit. A copy of this Permit will be available and producible upon request by any NPS representative to the Permittee and/or its contractors and subcontractors during all phases of the permitted work.

23. Any and/or all sample collection activities on NPS or Bureau of Reclamation (BOR) property, or those activities that are or may be impacting NPS or BOR property and resources shall be monitored by NPS cultural resource representative(s) or previously agreed upon cultural resource professional(s) meeting the Secretary of Interior's standards (36 CFR part 61). The daily work hours for NPS cultural resource representatives are 7:00 am to 5:00 pm PDT. Travel and meetings (e.g., safety) necessary for the activities allowed by this Permit will occur during work hours. Also, included in

work hours are at least two 15-minute breaks and an hour lunch. NPS cultural resource representatives weekly work days are Monday through Saturday, but not Sunday.

24. This Permit does not grant any property rights, easements, right-of-ways, or any other interest in real property, including ownership of samples collected.

25. Permittee shall dispose of samples collected but not selected for analysis or collected in excess of the volume required in the EPA approved QAPP as Investigation Derived Waste (IDW) prior to expiration of the Permit, unless amended. Permittee shall submit to the NPS point of contact a copy of the complete chain of custody form, manifest, and receipt of disposal for each sample collected within 30-days of permit expiration.

26. The Permittee and its contractors and subcontractors are responsible for the proper handling and off-Site disposal of all generated wastes, including but not limited to samples, in accordance with state and federal regulations. This includes all IDW, which will be handled in accordance with all legal requirements and will be containerized, characterized for disposal purposes only, and properly disposed of at an off-Site facility at the Permittee's expense. All IDW shall be placed in appropriate containers and removed from NPS property at the end of each work day. IDW shall not be staged or stored for more than 24 hours on NPS property. IDW shall not be disposed on NPS property. IDW shall not be used for any other purposes and/or characterized/analyzed, except as needed for disposal.

27. Appropriate Occupational Safety and Health Administration personal protective equipment must be used by field crews and other on-Site personnel.

28. A copy of all data (*e.g.*, sample results, laboratory results, coordinates, wildlife inventories), documentation (*e.g.*, manifests, field notes, maps, photographs, monitoring results), and reports prepared relating to work performed pursuant to this Permit will be made available to the NPS points of contact when submitted to the EPA.

29. The Permittee assumes liability for all activities, releases, incidents and events caused by or associated with any permitted activity, including any and all releases of Waste Materials into the environment resulting from permitted activities. The Permittee assumes responsibility for costs, repairs, and/or restoration to any areas damaged by such releases and/or discharges, whether those areas are within the permitted area or not.

30. In the event of a spill or other release or threatened release of a Waste Material into the environment that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, the Permittee shall immediately take all appropriate action to prevent, abate, or minimize such release or threat of release, and shall immediately make proper notification in accordance with all applicable legal and regulatory requirements. Notification of any release of a Waste Material shall be made to the Washington Emergency Management Division at 1-800-258-5990 and NPS law enforcement at (509) 754-7813. Notice also shall be made to the NPS points of contact identified in Paragraph 19 above. Contingency measures will be implemented as noted in

the following paragraph, and the Permittee shall be responsible for cleanup of all spills or other releases.

31. Contingency measures:
    a. Permittee and its contractors will immediately stop operations;
    b. All crew members will don appropriate personal protective equipment and take appropriate steps to abate and remediate the release; and
    c. Authorized activities will be suspended until conditions are determined to be stable according to NPS determination.

32. Nothing in the preceding paragraphs shall be deemed to limit any authority of the United States, (a) to take all appropriate action to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Materials on, at, or from the Site, or (b) to direct or order such action, or seek an order from the requisite Court, to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Materials on, at, or from the Site.

33. "Waste Material" shall mean, for purposes of this Permit, (a) any "hazardous substance" under CERCLA Section 101(14), 42 U.S.C. § 9601(14); (b) any "pollutant or contaminant" under CERCLA Section 101(33), 42 U.S.C. § 9601(33); (c) any "solid waste" under RCRA Section 1004(27); (d) any hazardous waste under RCRA Section 1004(5), 42 U.S.C. § 6903(5); (e) any petroleum product or waste, including crude oil or any fraction thereof or waste; and (f) natural gas, liquefied natural gas, or synthetic gas or any mixtures thereof.

34. The Permittee shall ensure its liability insurance remains in full force during the entirety of the period covered by this Permit. The Permittee agrees to be fully responsible for the management, performance, use and safety of the Site under this Permit and hereby accepts responsibility and assumes liability for any and all claims arising from the intentional, reckless or negligent actions or omissions of its representatives, employees, agents, contractors or subcontractors directly or indirectly connected with the work performed, or the maintenance or use of the Site, to the extent permitted by law. The Permittee shall, and shall require all of its contractors and subcontractors to:
    a. Procure a general liability insurance policy from responsible companies for $1,000,000 (one million dollars), or the minimum required by law, if any, whichever amount is greater. The United States of America shall be named as an additional insured on all policies. The Permit number will be included on said policy. All such policies shall specify that the insured shall have no right of subrogation against the United States for payments of any premiums or deductibles thereunder, and such insurance policies shall be obtained by, be for the account of, and be at the insured's sole risk. A copy of the Certificate of Insurance evidencing proper insurance coverage and referencing the Permit number shall be returned to NPS with the executed Permit to the Park

Superintendent. No work shall be allowed to proceed under this Permit until the copy of said Certificate of Insurance is provided to the Park Superintendent.

b. Pay the United States the full value for all damages to the lands or other property of the United States caused by the Permittee or by the Permittee's employees, agents, contractors, subcontractors, or employees of the contractors or subcontractors.

c. Indemnify, save and hold harmless and defend the United States against all fines, claims, damages, losses, judgments, and expenses to the extent permitted by law rising out of, or from any omission or activity in connection with activities conducted under this Permit.

35. The Permittee and its contractors and subcontractors shall take adequate measures as directed and approved by NPS to prevent, minimize, and mitigate damage to Park resources during all activities conducted pursuant to this Permit. The Permittee shall restore any injury to NPS property resulting from activities conducted pursuant to this Permit in accordance with NPS, other federal and state requirements, and at the direction of NPS.

36. No IDW or waste materials shall be allowed to enter natural or manmade water or sewer systems in or on NPS property by either direct or indirect action of the Permittee. Any waste material entering onto NPS property shall be removed and the affected property cleaned, stabilized, or restored the day that this condition is discovered, at the direction, and to the satisfaction, of NPS. The Permittee shall take all necessary measures to prevent air, noise, and water pollution by any material and/or equipment used during this permitted activity.

37. Construction equipment, materials, and all other supplies shall be staged in such a way as to allow for the safe use of the area by park visitors, to the extent possible.

38. The Permittee is responsible for the safety of all Site visitors and shall provide the necessary direction, barricades, detours, and other safety measures to ensure visitor safety. All access restrictions to the work area will be coordinated with the NPS points of contact listed above.

39. Other than the immediate work area and the clearly defined safety zone, all sidewalks, walkways, roadways, docks, boat launches, and trails must remain unobstructed to allow for the reasonable use of these areas by pedestrians, vehicles, and other park users.

40. Any injuries to any persons from the activities authorized under this Permit shall be reported immediately to the NPS points of contact. At least one operable cell phone is required to be with each field crew at all times.

41. The United States shall have no liability for any claims or causes of action in any forum regarding any activities conducted pursuant to this Permit, including but not limited to

liability for claims or causes of action for property damage, bodily injury, or death caused by Permittee's use of NPS property in connection with this Permit.

42. The Permittee agrees to comply with and be bound by the terms of this Permit and to undertake all actions set forth in this Permit. In any action by the NPS to enforce the terms of this Permit, the Permittee consents to and agrees not to contest the authority or jurisdiction of NPS to issue or enforce this Permit, and agrees not to contest the validity of the Permit or its terms.

43. All promotional and informational material related to Site activities, including signage, relating to activities undertaken pursuant to this Permit shall be reviewed and approved by the Park Superintendent prior to its release or use.

44. Good order and proper decorum shall be maintained by those persons conducting and participating in Site activities and public safety and general welfare will not be endangered.

UPON THE ACCEPTANCE OF THE CONDITIONS CONTAINED IN THIS PERMIT, INDICATED BY THE APPROVAL OF THE PERMITTEE IN THE SPACE PROVIDED ON THIS PERMIT, AND THE RETURN OF A PROPERLY EXECUTED ORIGINAL TO THIS OFFICE WITHIN NOT MORE THAN 30 DAYS OF ISSUANCE, THIS PERMIT BECOMES VALID FOR THE ACTIVITIES DESCRIBED.

RETURN ONE SIGNED ORIGINAL TO:

Attention: Superintendent
Dan A. Foster
1008 Crest Drive
Coulee Dam, WA 99116

Confederated Tribes of the Colville Reservation

Research Permit

Permit No. 2016-05 Approved by Resolution ________

This permit authorizes the following study, survey, or research project:

Macroinvertebrate Tissue Sample

This permit is valid from: **TIMELINE EXTENSION – 4/25/16 to 10/31/16**

In accordance with Colville Tribal Law, as well as the written research agreement entered into by the holder of this permit, the permittee recognizes and acknowledges that:

1) This Research Permit is conditional and may be canceled at any time if the study, survey, or research project is deviating or has deviated from the study design approved in the granting of the Research Permit, or from any provisions of the required underlying agreement upon which issuance of the permit is based.
2) All information and data gathered are the property of the Tribes, and the permittee may only publish or disseminate the data gathered, or any conclusions based on that data, under the conditions of the agreement underlying this permit, and with permission of the Tribes. Any unauthorized use of the data by the permittee or any third-party is strictly prohibited. All information and data gathered in the course of this project will be returned to the CCT Archives and Records Center at the conclusion of the project.
3) During the course of the study, survey, or research project the Office of the Tribal Chairman and the Archives and Records Center for the Tribes shall receive at least one copy of all interim and/or progress reports, and the final report resulting from the study, survey, or research project.
4) As a condition of receiving this Research Permit the research must comply with:
   a. the National Research Service Award Act, Pub. L. No. 93-348, 88 Stat. 342, as amended and as implemented by 45 C.F.R. pt. 46;
   b. all laws, ordinances, and codes of the Tribes regarding the protection of human subjects involved in the research, development and related activities; and
   c. any other laws, regulations, policies, or procedures applying to the study, survey, or research project.
5) Failing to comply with the conditions of this permit, the underlying agreement, or any other applicable law will subject the permittee to any and all civil or criminal penalties available to the Tribes pursuant to the Tribes' Law and Order Code and any other applicable law, including but not limited to exclusion from Tribal property and criminal trespass.
6) As a condition of accepting this permit, the permittee consents to the jurisdiction of Colville Tribal Courts for all civil and criminal matters arising out of this research, and accepts the Colville Tribal Court as the appropriate venue for any such actions.
7) The permittee shall carry a copy of this permit at all times while conducting research on the Colville Reservation.

______________________ 8-24-16

Mike Marchand, Chairman, Colville Tribes or Karen Condon, Designee Date

Kris McCaig for Teck American Incorporated 8/24/16

Permittee Date

LIMITED USE AGREEMENT
UNITED STATES OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS

Colville Indian Agency
Post Office Box 111
Nespelem, WA 99155-0111

EXTENSION

From the 7th day of September 2016, thorough Midnight 31st day of October 2016, for the purpose of ingress/egress to Teck Comino within 151-H189, 151-H192, 151-H193, 151-H195 also known as "Public Domains" and for the CCT Research Permit # 2016-05.

DESCRIPTION REMARKS: 151-H189: LOT 12 (SOUTHEAST-QUARTER SOUTHEAST-QUARTER) OF SECTION 20; LOT 12 (WEST-HALF SOUTHWEST-QUARTER) OF SECTION 21; LOTS 2A, 2B AND 2D (NORTHWEST-QUARTER NORTHWEST-QUARTER) OF SECTION 28 AND LOTS 2A, 2B AND 2C (NORTH-HALF NORTHEAST-QUARTER) OF SECTION 29, TOWNSHIP 40 NORTH, RANGE 40 EAST, WILLAMETTE MERIDIAN, STEVENS COUNTY, WASHINGTON, CONTAINING 80.10 ACRES, MORE OR LESS.

151-H192: LOT 11 (NORTHEAST-QUARTER SOUTHEAST-QUARTER) OF SECTION 20 AND LOT 10 (NORTH-HALF SOUTHWEST-QUARTER) OF SECTION 21, TOWNSHIP 40 NORTH, RANGE 40 EAST, WILLAMETTE MERIDIAN, STEVENS COUNTY, WASHINGTON, CONTAINING 80.00 ACRES, MORE OR LESS.

151-H193: LOT 9 (NORTH-HALF NORTH-HALF) OF SECTION 21, TOWNSHIP 40 NORTH, RANGE 40 EAST, WILLAMETTE MERIDIAN, STEVENS COUNTY, WASHINGTON, CONTAINING 80.00 ACRES, MORE OR LESS.

151-H195: LOT 11 (NORTH-HALF SOUTHEAST-QUARTER) OF SECTION 21 AND LOT 7 (SOUTHWEST-QUARTER SOUTHWEST-QUARTER) OF SECTION 22, TOWNSHIP 40 NORTH, RANGE 40 EAST, WILLAMETTE MERIDIAN, STEVENS COUNTY, WASHINGTON, CONTAINING 73.40 ACRES, MORE OR LESS.

RENT: in kind

Administrative Fee: waived

Date:____________________

____
Teck Comino, Lessee

Superintendent granting the within lease is hereby approved pursuant to 209 DM 8, 230 MD 1, 3 IAM 4, 4A

Approved: 8-31-2016

Approving Official: Debra Wulff
Debra Wulff, BIA Superintendent
Colville Indian Agency

Pretare, Jennifer

From:	JOHNSON, ARNE (DNR) <ARNE.JOHNSON@dnr.wa.gov>
Sent:	Monday, August 29, 2016 1:17 PM
To:	'McCaig Kris SPOK'
Cc:	Pretare, Jennifer
Subject:	RE: Teck American UCR Mussel and Crayfish Sampling - Deadman's Eddy

Kriss

Tech American UCR has permission to conduct a second round of mussel and crayfish sampling on the Upper Columbia River in September and October. Give me at least 2 days' notice prior to beginning the sampling.

Arne Johnson
North Columbia District Manager
Washington State Department of Natural Resources
225 S. Silke Rd
Colville, WA 99114
(509) 684-7474

From: McCaig Kris SPOK [mailto:Kris.McCaig@teck.com]
Sent: Thursday, August 25, 2016 5:37 PM
To: JOHNSON, ARNE (DNR) <ARNE.JOHNSON@dnr.wa.gov>
Cc: Jennifer Pretare (Jennifer.Pretare@aecom.com) <Jennifer.Pretare@aecom.com>
Subject: RE: Teck American UCR Mussel and Crayfish Sampling - Deadman's Eddy

Hi Arne,

Thank you for taking my phone call the other day. As we discussed, we will be conducting a second round of mussel and crayfish sampling on the Upper Columbia River in September and October. We will be searching for mussels near Deadman's Eddy Island again and this email is to request permission from DNR to be out there. I have attached two draft maps in the attached file that shows the area more specifically.

Please let me know if you need further information or have any questions.

Thanks,

Kris

Kris McCaig
Manager, Environment & Public Affairs
Teck American Incorporated
Phone: +1.509.623.4501
Fax: +1.509.922.8767
Mobile: +1.509.434.8542
eMail: Kris.McCaig@teck.com
www.teck.com

From: JOHNSON, ARNE (DNR) [mailto:ARNE.JOHNSON@dnr.wa.gov]
Sent: Monday, April 11, 2016 4:38 PM

To: McCaig Kris SPOK <Kris.McCaig@teck.com>
Cc: Jennifer Pretare (Jennifer.Pretare@aecom.com) <Jennifer.Pretare@aecom.com>
Subject: RE: Teck American UCR Mussel and Crayfish Sampling - Deadman's Eddy

Kris

You have permission to conduct the crayfish and mussel sampling activities as described in your request. Please inform me at least two days prior to beginning the work. You can reach me or leave a message at (509) 685-2790.

Arne Johnson
North Columbia District Manager
Washington State Department of Natural Resources
225 S. Silke Rd
Colville, WA 99114
(509) 684-7474

From: McCaig Kris SPOK [mailto:Kris.McCaig@teck.com]
Sent: Friday, April 01, 2016 3:21 PM
To: JOHNSON, ARNE (DNR) <ARNE.JOHNSON@dnr.wa.gov>
Cc: Jennifer Pretare (Jennifer.Pretare@aecom.com) <Jennifer.Pretare@aecom.com>
Subject: Teck American UCR Mussel and Crayfish Sampling - Deadman's Eddy

Hello Arne,

Thank you for our phone conversation to discuss this upcoming work. As mentioned, Teck American Incorporated (TAI), under the oversight of the U.S. Environmental Protection Agency (EPA), will be conducting a benthic macroinvertebrate (crayfish and mussels) tissue study in late April through May 2016. The crayfish and mussel sampling activities to be completed under this program are outlined within the quality assurance project plan (QAPP), which will be available shortly at http://www.ucr-rifs.com/documents-plans/. This study will encompass six sampling areas and two reference areas within the entire Upper Columbia River Site (UCR) from the U.S.-Canada border to the Grand Coulee Dam. As part of this work, TAI will collect crayfish from the river and mussel samples from the shoreline in defined sample collection areas. All mussel samples will be collected by hand within the wadeable water along the shoreline and submitted for laboratory compositing and analysis.

I am writing specifically regarding defined sampling area 1, which includes beach area in the relict flood plains (e.g., Deadman's Eddy) (see attached overview map). According to the Stevens County Assessor's Office, a portion of this land (parcel no. 8092837) is owned by the State Department of Natural Resources (see attached DNR map). Therefore, TAI respectfully requests permission to access the property by boat and perform the above-mentioned mussel sampling activities. It is our understanding that no permits are required for this work.

If you have any questions, please don't hesitate to give me call.

Thanks,

Kris

Kris McCaig
Manager, Environment & Public Affairs
Teck American Incorporated

Phone: +1.509.623.4501
Fax: +1.509.922.8767
Mobile: +1.509.434.8542
eMail: Kris.McCaig@teck.com
www.teck.com

Pretare, Jennifer

From:	McCaig Kris SPOK <Kris.McCaig@teck.com>
Sent:	Friday, September 30, 2016 4:07 PM
To:	Tonel, Monica; McDaniel, Sarah; Bott, Dustan; Pretare, Jennifer
Cc:	Jacqueline Corley (jacqueline.corley@spokanetribe.com); Buelow, Laura; Pedersen, Rob
Subject:	RE: Potential UCR work at STI Reservation-may need monitor?

Thanks very much to all.

Kris

Kris McCaig
Manager, Environment & Public Affairs
Teck American Incorporated
Phone: +1.509.623.4501
Fax: +1.509.922.8767
Mobile: +1.509.434.8542
eMail: Kris.McCaig@teck.com
www.teck.com

From: Tonel, Monica [mailto:Tonel.Monica@epa.gov]
Sent: Friday, September 30, 2016 3:51 PM
To: McDaniel, Sarah <sarah.mcdaniel@aecom.com>; Bott, Dustan <Bott.Dustan@epa.gov>; McCaig Kris SPOK <Kris.McCaig@teck.com>; Pretare, Jennifer <jennifer.pretare@aecom.com>
Cc: Jacqueline Corley (jacqueline.corley@spokanetribe.com) <jacqueline.corley@spokanetribe.com>; Buelow, Laura <Buelow.Laura@epa.gov>; Pedersen, Rob <Pedersen.Rob@epa.gov>
Subject: RE: Potential UCR work at STI Reservation-may need monitor?

Hi All-

I just got off the phone with Jackie Corley of the Spokane Tribe.
Jackie is okay with mussel sampling proceeding in Area 5 on Sunday October 2, 2016 provided that an AECOM cultural observer/monitor is present; and mussels are pulled off/picked up and not dug out. If there is any need to reach Jackie on Sunday, her number is 909-725-8894.

If for some reason sampling in Area 5 occurs on Monday Oct 4, Jackie would like to be contacted so that she could be given the option to participate/observe. Best means to reach Jackie at short notice is by cell phone.

Thank you everyone.
-Monica Tonel
USEPA Region 10

From: McDaniel, Sarah [mailto:sarah.mcdaniel@aecom.com]
Sent: Friday, September 30, 2016 3:13 PM
To: Bott, Dustan <Bott.Dustan@epa.gov>
Cc: Jacqueline Corley (jacqueline.corley@spokanetribe.com) <jacqueline.corley@spokanetribe.com>; Tonel, Monica <Tonel.Monica@epa.gov>; kris.mccaig@teck.com; Pretare, Jennifer <jennifer.pretare@aecom.com>
Subject: FW: Potential UCR work at STI Reservation-may need monitor?
Importance: High

(Sorry Dustan—resending to your correct email.)

From: McDaniel, Sarah
Sent: Friday, September 30, 2016 2:09 PM
To: Jacqueline Corley (jacqueline.corley@spokanetribe.com)
Cc: Monica Tonel (Tonel.Monica@epamail.epa.gov); 'dustan.bott@epamail.epa.gov'; Pretare, Jennifer; kris.mccaig@teck.com
Subject: Potential UCR work at STI Reservation-may need monitor?
Importance: High

Hi Jackie,

I just learned today that for the UCR RI/FS Macroinvertebrate Tissue Study (related to last spring's effort), EPA is considering asking Teck American Incorporated to have their sampling crew and the EPA dive team go to Area 5 and search for mussels possibly as early as next Monday/Tuesday.

From what I understand, the EPA is still considering whether or not to proceed with this work (and they will coordinate with STI if so), but if so I wanted you to have the maximum amount of advanced notice while it is being decided (especially since it is now Friday afternoon!). That way if there is a potential schedule conflict for providing an STI monitor, we can try to get it sorted out ASAP.

Thank you,
Sarah

Sarah McDaniel, MA, RPA
Senior Archaeologist
D 1-503-478-7660 C 1-360-624-4285
sarah.mcdaniel@aecom.com
****Please note my new email address****

AECOM
111 SW Columbia, Suite 1500
Portland, Oregon 97201
T 1-503-222-7200 F 1-503-222-4292
www.aecom.com

Pretare, Jennifer

From: McCaig Kris SPOK <Kris.McCaig@teck.com>
Sent: Wednesday, August 31, 2016 1:43 PM
To: Pretare, Jennifer
Subject: FW: UCR/RIFS: Sept 2016 mussel sampling

FYI

Kris McCaig
Manager, Environment & Public Affairs
Teck American Incorporated
Phone: +1.509.623.4501
Fax: +1.509.922.8767
Mobile: +1.509.434.8542
eMail: Kris.McCaig@teck.com
www.teck.com

From: Tonel, Monica [mailto:Tonel.Monica@epa.gov]
Sent: Wednesday, August 31, 2016 12:47 PM
To: Bott, Dustan <Bott.Dustan@epa.gov>; McCaig Kris SPOK <Kris.McCaig@teck.com>
Cc: Jacqueline Corley <jacqueline.corley@SpokaneTribe.com>; McDaniel, Sarah (sarah.mcdaniel@aecom.com) <sarah.mcdaniel@aecom.com>; Kelly, Mike S. <mike.s.kelly@urs.com>; Buelow, Laura <Buelow.Laura@epa.gov>; Arrow Coyote (HSY) (Arrow.Coyote@colvilletribes.com) <Arrow.Coyote@colvilletribes.com>; Whitlam, Rob (DAHP) <Rob.Whitlam@DAHP.WA.GOV>; randya@spokanetribe.com; Pedersen, Rob <Pedersen.Rob@epa.gov>; johnm@spokanetribe.com; jamesh@spokanetribe.com; Cameron.Irvine@CH2M.com
Subject: UCR/RIFS: Sept 2016 mussel sampling

Hi Dustan and Kris-

Wanted to let you know that I spoke today (8/31/16) with Jackie Corley of the Spokane Tribe Archaeology & Preservation Office, regarding the planned September 2016 mussel sampling. Jackie understands that a drop camera (deployed from a boat) may be used in area 5 to help evaluate the possibility of collecting mussels at area 5. The Spokane Tribe is okay with the use of a drop camera in Area 5 without a Spokane Tribe cultural monitor present. However, Jackie requests that:

- if EPA and Teck decide to collect mussels from area 5, that she (Jackie) be contacted prior to any mussel collection. The Spokane Tribe will provide a Tribal monitor to observe any mussel collection that occurs in area 5.
  Jackie's contact info: 509-258-4060 ofc/909-725-8894 cp
  jacqueline.corley@spokanetribe.com

Thank you for your attention to the Spokane Tribe's request regarding area 5.
-Monica

Appendix B

MUSSEL SPECIMENS

Teck American Inc
Macroinvertebrate Tissue Study
Fall 2016

Sample ID	Sample Date	Sample Time	Location ID	Species	Health	Length total (mm)	Breadth (mm)	Width (mm)	Weight (g)
A1-MB43-MU-01	9/28/2016	1149	A1-MB43	Anodonta sp.	Live	78	22	43	37
A1-MB43-MU-02	9/28/2016	1153	A1-MB43	Anodonta sp.	Live	77	24	40	39
A1-MB43-MU-03	9/28/2016	1202	A1-MB43	Anodonta sp.	Live	74	22	37	34
A1-MB43-MU-04	9/28/2016	1205	A1-MB43	Anodonta sp.	Live	77	26	40	42
A1-MB43-MU-05	9/28/2016	1207	A1-MB43	Anodonta sp.	Live	71	22	38	33
A1-MB43-MU-06	9/28/2016	1210	A1-MB43	Anodonta sp.	Live	70	23	36	33
A1-MB43-MU-07	9/28/2016	1213	A1-MB43	Anodonta sp.	Live	72	24	40	37
A1-MB43-MU-08	9/28/2016	1216	A1-MB43	Anodonta sp.	Live	72	24	40	36
A1-MB43-MU-09	9/28/2016	1219	A1-MB43	Anodonta sp.	Live	68	21	34	28
A1-MB43-MU-10	9/28/2016	1223	A1-MB43	Anodonta sp.	Live	68	22	38	30
A1-MB43-MU-11	9/28/2016	1226	A1-MB43	Anodonta sp.	Live	71	25	43	42
A1-MB43-MU-12	9/28/2016	1230	A1-MB43	Anodonta sp.	Live	73	21	38	33
A1-MB43-MU-13	9/28/2016	1234	A1-MB43	Anodonta sp.	Live	58	22	34	24
A1-MB43-MU-14	9/28/2016	1237	A1-MB43	Anodonta sp.	Live	70	23	35	30
A1-MB43-MU-15	9/28/2016	1240	A1-MB43	Anodonta sp.	Live	55	19	28	15
A1-MB43-MU-16	9/28/2016	1242	A1-MB43	Anodonta sp.	Live	66	23	35	27
A1-MB43-MU-17	9/28/2016	1245	A1-MB43	Anodonta sp.	Live	69	21	37	28
A1-MB43-MU-18	9/28/2016	1248	A1-MB43	Anodonta sp.	Live	55	19	29	17
A1-MB43-MU-19	9/28/2016	1250	A1-MB43	Anodonta sp.	Live	50	17	29	14
A1-MB43-MU-20	9/28/2016	1253	A1-MB43	Anodonta sp.	Live	53	17	31	14
A3-MB14-MU-01	9/29/2016	1107	A3-MB14	Anodonta sp.	Live	53	17	30	14
A3-MB14-MU-02	9/29/2016	1111	A3-MB14	Anodonta sp.	Live	61	19	33	19
A3-MB14-MU-03	9/29/2016	1115	A3-MB14	Anodonta sp.	Live	61	19	33	19
A3-MB14-MU-04	9/29/2016	1118	A3-MB14	Anodonta sp.	Live	53	17	30	14
A3-MB14-MU-05	9/29/2016	1121	A3-MB14	Anodonta sp.	Live	58	20	33	19
A3-MB14-MU-06	9/29/2016	1125	A3-MB14	Anodonta sp.	Live	43	14	25	9
A3-MB14-MU-07	9/29/2016	1139	A3-MB14	Anodonta sp.	Live	48	13	27	9
A3-MB14-MU-08	9/29/2016	1143	A3-MB14	Anodonta sp.	Live	51	14	28	12
A3-MB14-MU-09	9/29/2016	1146	A3-MB14	Anodonta sp.	Live	53	17	31	15
A3-MB14-MU-10	9/29/2016	1149	A3-MB14	Anodonta sp.	Live	48	15	28	12
A3-MB14-MU-11	9/29/2016	1152	A3-MB14	Anodonta sp.	Live	55	17	33	15

MUSSEL SPECIMENS

Teck American Inc
Macroinvertebrate Tissue Study
Fall 2016

Sample ID	Sample Date	Sample Time	Location ID	Species	Health	Length total (mm)	Breadth (mm)	Width (mm)	Weight (g)
A3-MB14-MU-12	9/29/2016	1155	A3-MB14	Anodonta sp.	Live	49	16	28	13
A3-MB14-MU-13	9/29/2016	1158	A3-MB14	Anodonta sp.	Live	74	23	42	41
A3-MB14-MU-14	9/29/2016	1202	A3-MB14	Anodonta sp.	Live	81	25	42	48
A3-MB14-MU-15	9/29/2016	1205	A3-MB14	Anodonta sp.	Live	78	25	42	44
A3-MB14-MU-16	9/29/2016	1209	A3-MB14	Anodonta sp.	Live	87	30	45	60
A3-MB14-MU-17	9/29/2016	1213	A3-MB14	Anodonta sp.	Live	70	22	36	32
A3-MB14-MU-18	9/29/2016	1217	A3-MB14	Anodonta sp.	Live	62	20	33	24
A3-MB14-MU-19	9/29/2016	1221	A3-MB14	Anodonta sp.	Live	93	32	46	65
A3-MB14-MU-20	9/29/2016	1225	A3-MB14	Anodonta sp.	Live	66	20	38	25
A3-MB14-MU-21	9/29/2016	1228	A3-MB14	Anodonta sp.	Live	63	21	35	26
A3-MB14-MU-22	9/29/2016	1231	A3-MB14	Anodonta sp.	Live	61	19	32	19
A4-MB18-MU-01	9/30/2016	1140	A4-MB18	Anodonta sp.	Live	71	25	41	35
A4-MB18-MU-02	9/30/2016	1146	A4-MB18	Anodonta sp.	Live	75	27	42	42
A4-MB18-MU-03	9/30/2016	1150	A4-MB18	Anodonta sp.	Live	85	30	48	58
A4-MB18-MU-04	9/30/2016	1153	A4-MB18	Anodonta sp.	Live	75	27	43	42
A4-MB18-MU-05	9/30/2016	1155	A4-MB18	Anodonta sp.	Live	70	25	41	35
A4-MB18-MU-06	9/30/2016	1159	A4-MB18	Anodonta sp.	Live	77	25	44	44
A4-MB18-MU-07	9/30/2016	1202	A4-MB18	Anodonta sp.	Live	76	28	41	45
A4-MB18-MU-08	9/30/2016	1205	A4-MB18	Anodonta sp.	Live	79	26	45	50
A4-MB18-MU-09	9/30/2016	1207	A4-MB18	Anodonta sp.	Live	80	26	45	46
A4-MB18-MU-10	9/30/2016	1211	A4-MB18	Anodonta sp.	Live	75	26	44	41
A4-MB18-MU-11	9/30/2016	1214	A4-MB18	Anodonta sp.	Live	75	27	40	44
A4-MB18-MU-12	9/30/2016	1217	A4-MB18	Anodonta sp.	Live	74	26	42	39
A4-MB18-MU-13	9/30/2016	1220	A4-MB18	Anodonta sp.	Live	67	23	40	33
A4-MB18-MU-14	9/30/2016	1224	A4-MB18	Anodonta sp.	Live	77	27	41	48
A4-MB18-MU-15	9/30/2016	1227	A4-MB18	Anodonta sp.	Live	72	21	43	38
A4-MB19-MU-01	9/30/2016	1234	A4-MB19	Anodonta sp.	Live	72	24	42	36
A4-MB19-MU-02	9/30/2016	1238	A4-MB19	Anodonta sp.	Live	78	28	43	46
A4-MB19-MU-03	9/30/2016	1241	A4-MB19	Anodonta sp.	Live	69	29	38	34
A4-MB19-MU-04	9/30/2016	1245	A4-MB19	Anodonta sp.	Live	82	30	46	55
A4-MB19-MU-05	9/30/2016	1248	A4-MB19	Anodonta sp.	Live	73	27	41	39

MUSSEL SPECIMENS

Teck American Inc
Macroinvertebrate Tissue Study
Fall 2016

Sample ID	Sample Date	Sample Time	Location ID	Species	Health	Length total (mm)	Breadth (mm)	Width (mm)	Weight (g)
A4-MB19-MU-06	9/30/2016	1251	A4-MB19	Anodonta sp.	Live	72	24	43	36
A4-MB19-MU-07	9/30/2016	1253	A4-MB19	Anodonta sp.	Live	70	23	40	35
A4-MB19-MU-08	9/30/2016	1256	A4-MB19	Anodonta sp.	Live	67	25	42	32
A4-MB19-MU-09	9/30/2016	1259	A4-MB19	Anodonta sp.	Live	71	26	38	34
A4-MB19-MU-10	9/30/2016	1302	A4-MB19	Anodonta sp.	Live	69	26	42	36
A4-MB19-MU-11	9/30/2016	1305	A4-MB19	Anodonta sp.	Live	70	23	42	32
A4-MB19-MU-12	9/30/2016	1308	A4-MB19	Anodonta sp.	Live	55	22	34	23
A4-MB19-MU-13	9/30/2016	1312	A4-MB19	Anodonta sp.	Live	65	23	41	33
A4-MB19-MU-14	9/30/2016	1314	A4-MB19	Anodonta sp.	Live	61	23	38	29
A4-MB19-MU-15	9/30/2016	1317	A4-MB19	Anodonta sp.	Live	62	22	38	27
A5-MB21-MU-01	10/2/2016	1103	A5-MB21	Anodonta sp.	Live	61	21	35	22
A5-MB21-MU-02	10/2/2016	1107	A5-MB21	Anodonta sp.	Live	66	20	38	25
A5-MB21-MU-03	10/2/2016	1110	A5-MB21	Anodonta sp.	Live	69	25	40	33
A5-MB21-MU-04	10/2/2016	1112	A5-MB21	Anodonta sp.	Live	64	22	35	25
A5-MB21-MU-05	10/2/2016	1115	A5-MB21	Anodonta sp.	Live	63	21	37	22
A5-MB21-MU-06	10/2/2016	1119	A5-MB21	Anodonta sp.	Live	60	18	35	17
A5-MB21-MU-07	10/2/2016	1122	A5-MB21	Anodonta sp.	Live	59	20	35	20
A5-MB21-MU-08	10/2/2016	1126	A5-MB21	Anodonta sp.	Live	62	20	36	21
A5-MB21-MU-09	10/2/2016	1129	A5-MB21	Anodonta sp.	Live	62	20	36	22
A5-MB21-MU-10	10/2/2016	1239	A5-MB21	Anodonta sp.	Live	58	19	34	19
A5-MB21-MU-11	10/2/2016	1242	A5-MB21	Anodonta sp.	Live	55	17	32	15
A5-MB21-MU-12	10/2/2016	1244	A5-MB21	Anodonta sp.	Live	59	20	34	19
A5-MB21-MU-13	10/2/2016	1247	A5-MB21	Anodonta sp.	Live	54	17	32	15
A5-MB21-MU-14	10/2/2016	1251	A5-MB21	Anodonta sp.	Live	59	20	35	20
A5-MB21-MU-15	10/2/2016	1253	A5-MB21	Anodonta sp.	Live	49	15	27	9
A5-MB21-MU-16	10/2/2016	1256	A5-MB21	Anodonta sp.	Live	59	21	33	19
A5-MB21-MU-17	10/2/2016	1259	A5-MB21	Anodonta sp.	Live	73	24	38	33
A5-MB21-MU-18	10/2/2016	1301	A5-MB21	Anodonta sp.	Live	73	23	39	33
A5-MB22-MU-01	10/2/2016	1308	A5-MB22	Anodonta sp.	Live	61	20	35	22

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Sample ID	Sample Date	Sample Time	Location ID	Species	Health	Length total (mm)	Breadth (mm)	Width (mm)	Weight (g)
A5-MB22-MU-02	10/2/2016	1310	A5-MB22	Anodonta sp.	Live	59	21	34	22
A5-MB22-MU-03	10/2/2016	1313	A5-MB22	Anodonta sp.	Live	71	23	38	32
A5-MB22-MU-04	10/2/2016	1315	A5-MB22	Anodonta sp.	Live	70	24	37	31
A5-MB22-MU-05	10/2/2016	1317	A5-MB22	Anodonta sp.	Live	80	26	49	45
A5-MB22-MU-06	10/2/2016	1320	A5-MB22	Anodonta sp.	Live	75	25	40	38
A5-MB23-MU-01	10/2/2016	1329	A5-MB23	Anodonta sp.	Live	40	13	24	6
A5-MB23-MU-02	10/2/2016	1333	A5-MB23	Anodonta sp.	Live	54	20	32	5
A5-MB24-MU-01	10/2/2016	1540	A5-MB24	Anodonta sp.	Live	57	18	32	15
A5-MB24-MU-02	10/2/2016	1542	A5-MB24	Anodonta sp.	Live	53	18	30	15
A5-MB24-MU-03	10/2/2016	1545	A5-MB24	Anodonta sp.	Live	58	20	32	22
A5-MB24-MU-04	10/2/2016	1548	A5-MB24	Anodonta sp.	Live	52	17	31	15
A5-MB24-MU-05	10/2/2016	1551	A5-MB24	Anodonta sp.	Live	55	17	32	16
A5-MB24-MU-06	10/2/2016	1553	A5-MB24	Anodonta sp.	Live	57	18	32	18
A5-MB24-MU-07	10/2/2016	1555	A5-MB24	Anodonta sp.	Live	53	16	31	14
A5-MB24-MU-08	10/2/2016	1558	A5-MB24	Anodonta sp.	Live	55	18	31	17
A5-MB24-MU-09	10/2/2016	1602	A5-MB24	Anodonta sp.	Live	63	24	36	27
A5-MB24-MU-10	10/2/2016	1607	A5-MB24	Anodonta sp.	Live	63	23	35	25
A6-MB11-MU-01	10/1/2016	1131	A6-MB11	Anodonta sp.	Live	58	21	32	23
A6-MB11-MU-02	10/1/2016	1134	A6-MB11	Anodonta sp.	Live	57	20	33	20
A6-MB11-MU-03	10/1/2016	1138	A6-MB11	Anodonta sp.	Live	54	19	29	19
A6-MB11-MU-04	10/1/2016	1142	A6-MB11	Anodonta sp.	Live	50	15	29	13
A6-MB11-MU-05	10/1/2016	1145	A6-MB11	Anodonta sp.	Live	56	20	34	21
A6-MB11-MU-06	10/1/2016	1148	A6-MB11	Anodonta sp.	Live	55	18	30	17
A6-MB11-MU-07	10/1/2016	1151	A6-MB11	Anodonta sp.	Live	41	12	24	7
A6-MB11-MU-08	10/1/2016	1204	A6-MB11	Anodonta sp.	Live	52	19	29	17
A6-MB11-MU-09	10/1/2016	1208	A6-MB11	Anodonta sp.	Live	53	18	30	16
A6-MB11-MU-10	10/1/2016	1212	A6-MB11	Anodonta sp.	Live	52	18	28	15
A6-MB11-MU-11	10/1/2016	1215	A6-MB11	Anodonta sp.	Live	51	15	27	13
A6-MB11-MU-12	10/1/2016	1219	A6-MB11	Anodonta sp.	Live	50	17	29	14

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Sample ID	Sample Date	Sample Time	Location ID	Species	Health	Length total (mm)	Breadth (mm)	Width (mm)	Weight (g)
A6-MB11-MU-13	10/1/2016	1222	A6-MB11	Anodonta sp.	Live	48	16	29	12
A6-MB11-MU-14	10/1/2016	1224	A6-MB11	Anodonta sp.	Live	52	17	30	13
A6-MB11-MU-15	10/1/2016	1229	A6-MB11	Anodonta sp.	Live	50	17	27	13
A6-MB11-MU-16	10/1/2016	1232	A6-MB11	Anodonta sp.	Live	58	20	31	20
A6-MB11-MU-17	10/1/2016	1234	A6-MB11	Anodonta sp.	Live	46	16	26	11
A6-MB11-MU-18	10/1/2016	1238	A6-MB11	Anodonta sp.	Live	46	16	26	11
A6-MB11-MU-19	10/1/2016	1241	A6-MB11	Anodonta sp.	Live	49	18	32	17
A6-MB11-MU-20	10/1/2016	1244	A6-MB11	Anodonta sp.	Live	46	14	27	9
A6-MB11-MU-21	10/1/2016	1248	A6-MB11	Anodonta sp.	Live	45	13	26	9
A6-MB12-MU-01	10/1/2016	1258	A6-MB12	Anodonta sp.	Live	64	21	33	22
A6-MB12-MU-02	10/1/2016	1301	A6-MB12	Anodonta sp.	Live	62	21	33	22
A6-MB12-MU-03	10/1/2016	1304	A6-MB12	Anodonta sp.	Live	59	22	31	21
A6-MB12-MU-04	10/1/2016	1307	A6-MB12	Anodonta sp.	Live	57	18	32	16
SR-MB34-MU-01	9/18/2016	1350	SR-MB34	Margaritifera falcata	Live	48.3	15.7	26.2	14
SR-MB34-MU-02	9/20/2016	915	SR-MB34	Margaritifera falcata	Live	44.0	13.9	23.7	9
SR-MB34-MU-03	9/20/2016	920	SR-MB34	Margaritifera falcata	Live	57.5	16.7	29.4	16
SR-MB34-MU-04	9/20/2016	921	SR-MB34	Margaritifera falcata	Live	56.6	17.7	31.5	22
SR-MB34-MU-05	9/20/2016	922	SR-MB34	Margaritifera falcata	Live	63.7	18.6	34.3	28
SR-MB34-MU-06	9/20/2016	926	SR-MB34	Margaritifera falcata	Live	73.5	22.3	37.8	40
SR-MB34-MU-07	9/20/2016	927	SR-MB34	Margaritifera falcata	Live	74.6	21.9	37.9	39
SR-MB34-MU-08	9/20/2016	929	SR-MB34	Margaritifera falcata	Live	75.5	21.6	37.0	39
SR-MB34-MU-09	9/20/2016	933	SR-MB34	Margaritifera falcata	Live	73.3	22.5	37.3	40
SR-MB34-MU-10	9/20/2016	1530	SR-MB34	Margaritifera falcata	Live	51.5	14.6	27.4	13
SR-MB34-MU-11	9/20/2016	1532	SR-MB34	Margaritifera falcata	Live	58.5	17.0	31.0	20
SR-MB34-MU-12	9/20/2016	1532	SR-MB34	Margaritifera falcata	Live	57.6	17.4	29.2	20
SR-MB34-MU-13	9/20/2016	1532	SR-MB34	Margaritifera falcata	Live	66.5	18.5	35.1	27
SR-MB34-MU-14	9/20/2016	1533	SR-MB34	Margaritifera falcata	Live	74.0	22.1	38.5	42
SR-MB34-MU-15	9/20/2016	1533	SR-MB34	Margaritifera falcata	Live	79.1	22.5	40.0	44
SR-MB35-MU-01	9/18/2016	1425	SR-MB35	Margaritifera falcata	Live	42.6	13.3	21.8	8

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Sample ID	Sample Date	Sample Time	Location ID	Species	Health	Length total (mm)	Breadth (mm)	Width (mm)	Weight (g)
SR-MB35-MU-02	9/18/2016	1428	SR-MB35	Margaritifera falcata	Live	40.9	11.7	20.6	6
SR-MB36-MU-01	9/18/2016	1505	SR-MB36	Margaritifera falcata	Live	37.6	11.4	20.5	6
SR-MB36-MU-02	9/18/2016	1507	SR-MB36	Margaritifera falcata	Live	68.7	20.6	35.2	32
SR-MB38-MU-01	9/19/2016	1010	SR-MB38	Margaritifera falcata	Live	36.9	9.8	18.7	4
SR-MB38-MU-02	9/19/2016	1012	SR-MB38	Margaritifera falcata	Live	45.7	14.5	23.5	11
SR-MB41-MU-01	9/19/2016	1248	SR-MB41	Margaritifera falcata	Live	40.5	12.6	21.2	8
SR-MB42-MU-01	9/19/2016	1330	SR-MB42	Margaritifera falcata	Live	26.5	8.3	15.1	3

CRAYFISH SPECIMENS

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Sample ID	Sample Date	Sample Time	Location ID	Species	Health	Length carapace (mm)	Length total (mm)	Weight (g)	Bait
A1-CT61-CR-01	9/14/2016	1124	A1-CT61	Orconectes virilis	Live	43	86	14.5	None
A2-CT31-CR-01	10/5/2016	815	A2-CT31	Orconectes virilis	Live	42	89	20	Salmon
A2-CT31-CR-02	10/5/2016	815	A2-CT31	Orconectes virilis	Live	46	97	32	Salmon
A2-CT31-CR-03	10/5/2016	815	A2-CT31	Orconectes virilis	Live	31	66	7	Salmon
A2-CT32-CR-01	10/5/2016	820	A2-CT32	Orconectes virilis	Live	37	75	12	Salmon
A2-CT34-CR-01	10/5/2016	830	A2-CT34	Orconectes virilis	Live	46	95	28	Salmon
A2-CT35-CR-01	10/5/2016	833	A2-CT35	Orconectes virilis	Live	49	101	39	Salmon
A2-CT40-CR-01	10/5/2016	856	A2-CT40	Orconectes virilis	Live	39	77	11	Salmon
A2-CT45-CR-01	10/5/2016	915	A2-CT45	Orconectes virilis	Live	48	100	31	Salmon
A2-CT45-CR-02	10/5/2016	915	A2-CT45	Pacifastacus leniusculus	Live	54	114	40	Salmon
A2-CT45-CR-03	10/5/2016	915	A2-CT45	Pacifastacus leniusculus	Live	52	111	39	Salmon
A2-CT45-CR-04	10/5/2016	915	A2-CT45	Pacifastacus leniusculus	Live	51	106	36	Salmon
A2-CT46-CR-01	10/5/2016	924	A2-CT46	Orconectes virilis	Live	47	91	36	Salmon
A2-CT48-CR-01	10/5/2016	934	A2-CT48	Orconectes virilis	Live	49	102	34	Salmon
A2-CT48-CR-02	10/5/2016	934	A2-CT48	Orconectes virilis	Live	46	95	29	Salmon
A2-CT48-CR-03	10/5/2016	934	A2-CT48	Orconectes virilis	Live	44	90	31	Salmon
A2-CT53-CR-01	10/5/2016	1003	A2-CT53	Orconectes virilis	Live	51	107	47	Salmon
A2-CT54-CR-01	10/5/2016	1012	A2-CT54	Orconectes virilis	Live	51	103	42	Salmon
A2-CT54-CR-02	10/5/2016	1012	A2-CT54	Orconectes virilis	Live	50	107	38	Salmon
A2-CT55-CR-01	10/5/2016	1020	A2-CT55	Orconectes virilis	Live	53	111	42	Salmon
A2-CT56-CR-01	10/5/2016	1025	A2-CT56	Orconectes virilis	Live	47	98	26	Salmon
A2-CT56-CR-02	10/5/2016	1025	A2-CT56	Orconectes virilis	Live	47	95	31	Salmon
A2-CT58-CR-01	10/5/2016	1039	A2-CT58	Orconectes virilis	Live	64	129	89	Salmon
A2-CT62-CR-01	10/5/2016	1058	A2-CT62	Orconectes virilis	Live	50	104	34	Salmon
A3-CT36-CR-01	9/11/2016	0841	A3-CT36	Orconectes virilis	Live	63	121	55	Salmon
A3-CT36-CR-02	9/11/2016	0841	A3-CT36	Orconectes virilis	Live	52	104	40	Salmon
A3-CT37-CR-01	9/12/2016	1348	A3-CT37	Orconectes virilis	Live	25	56	4	Salmon
A3-CT39-CR-01	9/11/2016	0855	A3-CT39	Orconectes virilis	Live	35	74	19	Salmon
A3-CT45-CR-01	9/12/2016	1117	A3-CT45	Orconectes virilis	Live	32	67	8	Salmon
A3-CT45-CR-02	9/12/2016	1117	A3-CT45	Orconectes virilis	Live	23	55	5	Salmon
A3-CT46-CR-01	9/11/2016	0927	A3-CT46	Orconectes virilis	Live	44	83	23	Salmon

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Sample ID	Sample Date	Sample Time	Location ID	Species	Health	Length carapace (mm)	Length total (mm)	Weight (g)	Bait
A3-CT46-CR-02	9/12/2016	1128	A3-CT46	Orconectes virilis	Live	45	94	24	Salmon
A3-CT46-CR-03	9/12/2016	1128	A3-CT46	Orconectes virilis	Live	43	93	23	Salmon
A3-CT47-CR-01	9/11/2016	0933	A3-CT47	Orconectes virilis	Live	20	41	2	Salmon
A3-CT48-CR-01	9/12/2016	1142	A3-CT48	Orconectes virilis	Live	42	84	19	Salmon
A3-CT48-CR-02	9/12/2016	1142	A3-CT48	Orconectes virilis	Live	16	34	1	Salmon
A3-CT49-CR-01	9/12/2016	1145	A3-CT49	Orconectes virilis	Live	26	56	5	Salmon
A3-CT50-CR-01	9/11/2016	0947	A3-CT50	Orconectes virilis	Live	37	84	20	Salmon
A3-CT50-CR-02	9/11/2016	0947	A3-CT50	Orconectes virilis	Live	47	92	29	Salmon
A3-CT50-CR-03	9/11/2016	0947	A3-CT50	Orconectes virilis	Live	45	88	28	Salmon
A3-CT52-CR-01	9/11/2016	1002	A3-CT52	Orconectes virilis	Live	54	111	46	Salmon
A3-CT53-CR-01	9/12/2016	1218	A3-CT53	Orconectes virilis	Live	23	49	3	Salmon
A3-CT58-CR-01	9/11/2016	1027	A3-CT58	Orconectes virilis	Live	35	76	15	Salmon
A3-CT58-CR-02	9/11/2016	1027	A3-CT58	Orconectes virilis	Live	30	65	7	Salmon
A3-CT60-CR-01	9/11/2016	1036	A3-CT60	Orconectes virilis	Live	31	66	9	Salmon
A3-CT62-CR-01	9/12/2016	1105	A3-CT62	Orconectes virilis	Live	47	101	30	Salmon
A3-CT63-CR-01	9/12/2016	1114	A3-CT63	Orconectes virilis	Live	26	56	4	Salmon
A4-CT31-CR-01	9/8/2016	0929	A4-CT31	Orconectes virilis	Live	42	87	25	Salmon
A4-CT31-CR-02	9/8/2016	0935	A4-CT31	Orconectes virilis	Live	42	83	20	Salmon
A4-CT31-CR-03	9/8/2016	0941	A4-CT31	Orconectes virilis	Live	52	104	35	Salmon
A4-CT31-CR-04	9/8/2016	0943	A4-CT31	Orconectes virilis	Live	32	84	23	Salmon
A4-CT31-CR-05	9/8/2016	0947	A4-CT31	Orconectes virilis	Live	42	84	25	Salmon
A4-CT31-CR-06	9/8/2016	0949	A4-CT31	Orconectes virilis	Live	42	83	20	Salmon
A4-CT31-CR-07	9/8/2016	0952	A4-CT31	Orconectes virilis	Live	42	84	25	Salmon
A4-CT34-CR-01	9/8/2016	0958	A4-CT34	Orconectes virilis	Live	42	94	26	Salmon
A4-CT34-CR-02	9/8/2016	1001	A4-CT34	Orconectes virilis	Live	42	94	27	Salmon
A4-CT34-CR-03	9/8/2016	1007	A4-CT34	Orconectes virilis	Live	42	94	24	Salmon
A4-CT34-CR-04	9/8/2016	1009	A4-CT34	Orconectes virilis	Live	52	107	45	Salmon
A4-CT34-CR-05	9/8/2016	1012	A4-CT34	Orconectes virilis	Live	42	94	25	Salmon
A4-CT34-CR-06	9/8/2016	1014	A4-CT34	Orconectes virilis	Live	42	94	30	Salmon
A4-CT34-CR-07	9/8/2016	1016	A4-CT34	Orconectes virilis	Live	42	94	25	Salmon
A4-CT34-CR-08	9/8/2016	1018	A4-CT34	Orconectes virilis	Live	42	83	26	Salmon

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Sample ID	Sample Date	Sample Time	Location ID	Species	Health	Length carapace (mm)	Length total (mm)	Weight (g)	Bait
A4-CT34-CR-09	9/8/2016	1021	A4-CT34	Orconectes virilis	Live	52	104	47	Salmon
A4-CT34-CR-10	9/8/2016	1024	A4-CT34	Orconectes virilis	Live	52	94	41	Salmon
A4-CT35-CR-01	9/8/2016	1139	A4-CT35	Orconectes virilis	Live	32	73	15	Salmon
A4-CT35-CR-02	9/8/2016	1144	A4-CT35	Orconectes virilis	Live	52	104	42	Salmon
A4-CT35-CR-03	9/8/2016	1147	A4-CT35	Orconectes virilis	Live	52	105	52	Salmon
A4-CT35-CR-04	9/8/2016	1150	A4-CT35	Orconectes virilis	Live	42	94	27	Salmon
A4-CT35-CR-05	9/8/2016	1154	A4-CT35	Orconectes virilis	Live	52	94	38	Salmon
A4-CT35-CR-06	9/8/2016	1158	A4-CT35	Orconectes virilis	Live	43	87	21	Salmon
A4-CT35-CR-07	9/8/2016	1201	A4-CT35	Orconectes virilis	Live	43	91	30	Salmon
A4-CT36-CR-01	9/8/2016	1208	A4-CT36	Orconectes virilis	Live	44	88	26	Salmon
A4-CT36-CR-02	9/8/2016	1212	A4-CT36	Orconectes virilis	Live	43	90	23	Salmon
A4-CT36-CR-03	9/8/2016	1219	A4-CT36	Orconectes virilis	Live	47	91	32	Salmon
A4-CT36-CR-04	9/8/2016	1222	A4-CT36	Orconectes virilis	Live	45	91	26	Salmon
SR-CT32-CR-01	9/19/2016	943	SR-CT32	Orconectes virilis	Live	43	85	23	Salmon
SR-CT41-CR-01	9/19/2016	1016	SR-CT41	Orconectes virilis	Live	54	110	42	Salmon
SR-CT41-CR-02	9/19/2016	1016	SR-CT41	Orconectes virilis	Live	43	90	22	Salmon
SR-CT41-CR-03	9/19/2016	1016	SR-CT41	Orconectes virilis	Live	33	72	10	Salmon
SR-CT44-CR-01	9/19/2016	1032	SR-CT44	Orconectes virilis	Live	54	114	53	Salmon
SR-CT47-CR-01	9/19/2016	1052	SR-CT47	Orconectes virilis	Live	53	102	46	Salmon
SR-CT50-CR-01	9/19/2016	1113	SR-CT50	Pacifastacus leniusculus	Live	35	71	18	Salmon
SR-CT51-CR-01	9/19/2016	1114	SR-CT51	Orconectes virilis	Live	56	110	56	Salmon
SR-CT51-CR-02	9/19/2016	1114	SR-CT51	Orconectes virilis	Live	51	104	40	Salmon
SR-CT55-CR-01	9/20/2016	1127	SR-CT-55	Pacifastacus leniusculus	Live	34	73	18	Salmon
SR-CT62-CR-01	9/19/2016	1235	SR-CT62	Pacifastacus leniusculus	Live	42	83	29	Salmon

Appendix C

CRAYFISH

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Location ID	Begin Sample Date	Live	Dead	Total Crayfish	Species	Trap Count	Trap Count	Trap Count	Total Trap Night (Count)
A1						13-Sep	14-Sep	15-Sep	
A1-CT31	9/13/2016	0	0	0		1	1	1	3
A1-CT32	9/13/2016	0	0	0		1	1	1	3
A1-CT33	9/13/2016	0	0	0		1	1	1	3
A1-CT33	9/13/2016	0	0	0		1	1	1	3
A1-CT34	9/13/2016	0	0	0		1	1	1	3
A1-CT35	9/13/2016	0	0	0		1	1	1	3
A1-CT36	9/13/2016	0	0	0		1	1	1	3
A1-CT37	9/13/2016	0	0	0		1	1	1	3
A1-CT38	9/13/2016	0	0	0		1	1	1	3
A1-CT39	9/13/2016	0	0	0		1	1	1	3
A1-CT40	9/13/2016	0	0	0		1	1	1	3
A1-CT41	9/13/2016	0	0	0		1	1	1	3
A1-CT42	9/13/2016	0	0	0		1	1	1	3
A1-CT43	9/13/2016	0	0	0		1	1	1	3
A1-CT44	9/13/2016	0	0	0		1	0	0	1
A1-CT45	9/13/2016	0	0	0		1	1	1	3
A1-CT46	9/13/2016	0	0	0		1	1	1	3
A1-CT47	9/13/2016	0	0	0		1	1	1	3
A1-CT48	9/13/2016	0	0	0		1	1	1	3
A1-CT49	9/13/2016	0	0	0		1	1	1	3
A1-CT50	9/13/2016	0	0	0		1	1	1	3
A1-CT51	9/13/2016	0	0	0		1	1	1	3
A1-CT52	9/13/2016	0	0	0		1	1	1	3
A1-CT53	9/13/2016	0	0	0		1	1	1	3
A1-CT54	9/13/2016	0	0	0		1	1	1	3
A1-CT55	9/13/2016	0	0	0		1	1	1	3
A1-CT56	9/13/2016	0	0	0		1	1	1	3
A1-CT57	9/13/2016	0	0	0		1	1	1	3
A1-CT58	9/13/2016	0	0	0		1	1	1	3

CRAYFISH

Teck American Inc
Macroinvertebrate Tissue Study
Fall 2016

Location ID	Begin Sample Date	Live	Dead	Total Crayfish	Species	Trap Count	Trap Count	Trap Count	Total Trap Night (Count)
A1-CT59	9/13/2016	0	0	0		1	1	1	3
A1-CT60	9/13/2016	0	0	0		1	1	1	3
A1-CT61	N/A	1	0	1	Orconectes virilis	N/A	N/A	N/A	0
A1-CT62	9/15/2016	0	0	0		0	0	1	1
A1-CT63	9/15/2016	0	0	0		0	0	1	1
A1-CT64	9/15/2016	0	0	0		0	0	1	1
A1-CT65	9/15/2016	0	0	0		0	0	1	1
Subtotal		**1**	**0**	**1**		**31**	**30**	**34**	**94**

A2						4-Oct			
A2-CT31	10/4/2016	3	0	3	Orconectes virilis	1			1
A2-CT32	10/4/2016	1	0	1	Orconectes virilis	1			1
A2-CT33	10/4/2016	0	0	0		1			1
A2-CT34	10/4/2016	1	0	1	Orconectes virilis	1			1
A2-CT35	10/4/2016	1	0	1	Orconectes virilis	1			1
A2-CT36	10/4/2016	0	0	0		1			1
A2-CT37	10/4/2016	0	0	0		1			1
A2-CT38	10/4/2016	0	0	0		1			1
A2-CT39	10/4/2016	0	0	0		1			1
A2-CT40	10/4/2016	1	0	1	Orconectes virilis	1			1
A2-CT41	10/4/2016	0	0	0		1			1
A2-CT42	10/4/2016	0	0	0		1			1
A2-CT43	10/4/2016	0	0	0		1			1
A2-CT44	10/4/2016	0	0	0		1			1
A2-CT45	10/4/2016	4	0	4	3 Pacifastacus leniusculus, 1 Orconectes virilis	1			1
A2-CT46	10/4/2016	1	0	1	Orconectes virilis	1			1
A2-CT47	10/4/2016	0	0	0		1			1

CRAYFISH

Teck American Inc
Macroinvertebrate Tissue Study
Fall 2016

Location ID	Begin Sample Date	Live	Dead	Total Crayfish	Species	Trap Count	Trap Count	Trap Count	Total Trap Night (Count)
A2-CT48	10/4/2016	3	0	3	Orconectes virilis	1			1
A2-CT49	10/4/2016	0	0	0		1			1
A2-CT50	10/4/2016	0	0	0		1			1
A2-CT51	10/4/2016	0	0	0		1			1
A2-CT52	10/4/2016	0	0	0		1			1
A2-CT53	10/4/2016	1	0	1	Orconectes virilis	1			1
A2-CT54	10/4/2016	2	0	2	Orconectes virilis	1			1
A2-CT55	10/4/2016	1	0	1	Orconectes virilis	1			1
A2-CT56	10/4/2016	2	0	2	Orconectes virilis	1			1
A2-CT57	10/4/2016	0	0	0		1			1
A2-CT58	10/4/2016	1	0	1	Orconectes virilis	1			1
A2-CT59	10/4/2016	0	0	0		1			1
A2-CT60	10/4/2016	0	0	0		1			1
A2-CT61	10/4/2016	0	0	0		1			1
A2-CT62	10/4/2016	1	0	1	Orconectes virilis	1			1
A2-CT63	10/4/2016	0	0	0		1			1
Subtotal		**23**	**0**	**23**		**33**	**0**	**0**	**33**

A3						10-Sep	11-Sep		
A3-CT31	9/10/2016	0	0	0		1	1		2
A3-CT32	9/10/2016	0	0	0		1	1		2
A3-CT33	9/10/2016	0	0	0		1	1		2
A3-CT34	9/10/2016	0	0	0		1	1		2
A3-CT35	9/10/2016	0	0	0		1	1		2
A3-CT36	9/10/2016	2	0	2	Orconectes virilis	1	1		2
A3-CT37	9/10/2016	1	0	1	Orconectes virilis	1	1		2
A3-CT38	9/10/2016	0	0	0		1	1		2
A3-CT39	9/10/2016	1	0	1	Orconectes virilis	1	1		2
A3-CT40	9/10/2016	0	0	0		1	1		2
A3-CT41	9/10/2016	0	0	0		1	0		1

CRAYFISH

Teck American Inc
Macroinvertebrate Tissue Study
Fall 2016

Location ID	Begin Sample Date	Live	Dead	Total Crayfish	Species	Trap Count	Trap Count	Trap Count	Total Trap Night (Count)
A3-CT42	9/10/2016	0	0	0		1	0		1
A3-CT43	9/10/2016	0	0	0		1	1		2
A3-CT44	9/10/2016	0	0	0		1	0		1
A3-CT45	9/10/2016	2	0	2	Orconectes virilis	1	1		2
A3-CT46	9/10/2016	3	0	3	Orconectes virilis	1	1		2
A3-CT47	9/10/2016	1	0	1	Orconectes virilis	1	1		2
A3-CT48	9/10/2016	2	0	2	Orconectes virilis	1	1		2
A3-CT49	9/10/2016	1	0	1	Orconectes virilis	1	1		2
A3-CT50	9/10/2016	3	0	3	Orconectes virilis	1	1		2
A3-CT51	9/10/2016	0	0	0		1	1		2
A3-CT52	9/10/2016	1	0	1	Orconectes virilis	1	1		2
A3-CT53	9/10/2016	1	0	1	Orconectes virilis	1	1		2
A3-CT54	9/10/2016	0	0	0		1	1		2
A3-CT55	9/10/2016	0	0	0		1	1		2
A3-CT56	9/10/2016	0	0	0		1	1		2
A3-CT57	9/10/2016	0	0	0		1	1		2
A3-CT58	9/10/2016	2	0	2	Orconectes virilis	1	1		2
A3-CT59	9/10/2016	0	0	0		1	1		2
A3-CT60	9/10/2016	1	0	1	Orconectes virilis	1	1		2
A3-CT61	9/11/2016	0	0	0		0	1		1
A3-CT62	9/11/2016	1	0	1	Orconectes virilis	0	1		1
A3-CT63	9/11/2016	1	0	1	Orconectes virilis	0	1		1
Subtotal		**23**	**0**	**23**		**30**	**30**	**0**	**60**

A4						7-Sep	8-Sep		
A4-CT31	9/7/2016	7	0	7	Orconectes virilis	1	0		1
A4-CT32	9/7/2016	0	0	0		1	0		1
A4-CT33	9/7/2016	0	0	0		1	0		1
A4-CT34	9/7/2016	10	0	10	Orconectes virilis	1	0		1
A4-CT35	9/7/2016	7	0	7	Orconectes virilis	1	0		1

CRAYFISH

Teck American Inc
Macroinvertebrate Tissue Study
Fall 2016

Location ID	Begin Sample Date	Live	Dead	Total Crayfish	Species	Trap Count	Trap Count	Trap Count	Total Trap Night (Count)
A4-CT36	9/7/2016	4	0	4	Orconectes virilis	1	0		1
A4-CT37	9/7/2016	0	0	0		1	0		1
A4-CT38	9/7/2016	0	0	0		1	0		1
A4-CT39	9/7/2016	0	0	0		1	0		1
A4-CT40	9/7/2016	0	0	0		1	0		1
A4-CT41	9/7/2016	0	0	0		1	0		1
A4-CT42	9/7/2016	0	0	0		1	0		1
A4-CT43	9/7/2016	0	0	0		1	0		1
A4-CT44	9/7/2016	0	0	0		1	0		1
A4-CT45	9/7/2016	0	0	0		1	1		2
A4-CT46	9/7/2016	0	0	0		1	1		2
A4-CT47	9/7/2016	0	0	0		1	1		2
A4-CT48	9/7/2016	0	0	0		1	1		2
A4-CT49	9/7/2016	0	0	0		1	1		2
A4-CT50	9/7/2016	0	0	0		1	1		2
A4-CT51	9/7/2016	0	0	0		1	1		2
A4-CT52	9/7/2016	0	0	0		1	0		1
A4-CT53	9/7/2016	0	0	0		1	0		1
A4-CT54	9/7/2016	0	0	0		1	0		1
A4-CT55	9/7/2016	0	0	0		1	0		1
A4-CT56	9/7/2016	0	0	0		1	0		1
A4-CT57	9/7/2016	0	0	0		1	0		1
A4-CT58	9/7/2016	0	0	0		1	0		1
A4-CT59	9/7/2016	0	0	0		1	0		1
A4-CT60	9/7/2016	0	0	0		1	0		1
A4-CT61	9/7/2016	0	0	0		1	0		1
Subtotal		**28**	**0**	**28**		**31**	**7**	**0**	**38**

CRAYFISH

Teck American Inc
Macroinvertebrate Tissue Study
Fall 2016

Location ID	Begin Sample Date	Live	Dead	Total Crayfish	Species	Trap Count	Trap Count	Trap Count	Total Trap Night (Count)
SANPOIL RIVER						18-Sep	19-Sep		
SR-CT31	9/18/2016	0	0	0		1	1		2
SR-CT32	9/18/2016	1	0	1	Orconectes virilis	1	1		2
SR-CT33	9/18/2016	0	0	0		1	1		2
SR-CT34	9/18/2016	0	0	0		1	0		1
SR-CT35	9/18/2016	0	0	0		1	1		2
SR-CT36	9/18/2016	0	0	0		1	1		2
SR-CT37	9/18/2016	0	0	0		1	1		2
SR-CT38	9/18/2016	0	0	0		1	1		2
SR-CT39	9/18/2016	0	0	0		1	1		2
SR-CT40	9/18/2016	0	0	0		1	1		2
SR-CT41	9/18/2016	3	0	3	Orconectes virilis	1	1		2
SR-CT42	9/18/2016	0	0	0		1	1		2
SR-CT43	9/18/2016	0	0	0		1	1		2
SR-CT44	9/18/2016	1	0	1	Orconectes virilis	1	1		2
SR-CT45	9/18/2016	0	0	0		1	1		2
SR-CT46	9/18/2016	0	0	0		1	1		2
SR-CT47	9/18/2016	1	0	1	Orconectes virilis	1	1		2
SR-CT48	9/18/2016	0	0	0		1	1		2
SR-CT49	9/18/2016	0	0	0		1	1		2
SR-CT50	9/18/2016	1	0	1	Pacifastacus leniusculus	1	1		2
SR-CT51	9/18/2016	2	0	2	Orconectes virilis	1	1		2
SR-CT52	9/18/2016	0	0	0		1	1		2
SR-CT53	9/18/2016	0	0	0		1	1		2
SR-CT54	9/18/2016	0	0	0		1	1		2
SR-CT55	9/18/2016	1	0	1	Pacifastacus leniusculus	1	1		2
SR-CT56	9/18/2016	0	0	0		1	1		2
SR-CT57	9/18/2016	0	0	0		1	1		2
SR-CT58	9/18/2016	0	0	0		1	1		2
SR-CT59	9/18/2016	0	0	0		1	1		2

CRAYFISH

Teck American Inc
Macroinvertebrate Tissue Study
Fall 2016

Location ID	Begin Sample Date	Live	Dead	Total Crayfish	Species	Trap Count	Trap Count	Trap Count	Total Trap Night (Count)
SR-CT60	9/18/2016	0	0	0		1	1		2
SR-CT61	9/18/2016	0	0	0		1	1		2
SR-CT62	9/18/2016	1	0	1	Pacifastacus leniusculus	1	1		2
SR-CT63	9/18/2016	0	0	0		1	1		2
Subtotal		**11**	**0**	**11**		**33**	**32**	**0**	**65**

MUSSELS

Teck American Inc
Macroinvertebrate Tissue Study
Fall 2016

Location ID	Sample Date	Transect Length (m) - Calculated as a straight line between beginning and end points	Live	Dead	Species	Remarks
A1-MB31	9/13/2016	145	0	0		
A1-MB32	9/13/2016	125	0	0		
A1-MB33	9/14/2016	156	0	0		
A1-MB34	9/14/2016	140	0	0		
A1-MB35	9/14/2016	12	0	0		
A1-MB36	9/14/2016	149	0	0		
A1-MB37	9/15/2016	84	0	0		
A1-MB38	9/15/2016	158	0	0		
A1-MB39	9/15/2016	145	0	0		
A1-MB40	9/15/2016	67	0	0		
A1-MB41	9/16/2016	161	0	0		
A1-MB42	9/16/2016	154	0	0		
SR-MB31	9/18/2016	122	0	0		
SR-MB32	9/18/2016	132	0	0		
SR-MB33	9/18/2016	132	0	0		
SR-MB34	9/18/2016	129	1	0	Margaritifera falcata	
SR-MB34	9/20/2016	129	14	0	Margaritifera falcata	
SR-MB35	9/18/2016	131	2	0	Margaritifera falcata	
SR-MB36	9/18/2016	30	2	0	Margaritifera falcata	
SR-MB37	9/19/2016	134	0	0		
SR-MB38	9/19/2016	144	2	0	Margaritifera falcata	
SR-MB39	9/19/2016	127	0	0		
SR-MB40	9/19/2016	73	0	0		
SR-MB41	9/19/2016	70	1	0	Margaritifera falcata	
SR-MB42	9/19/2016	126	1	0	Margaritifera falcata	
A1-MB43	9/28/2016	n/a	20	0	Anodonta sp.	A1-Dive 1
A3-MB14	9/29/2016	n/a	22	0	Anodonta sp.	A3-Dive 1 and A3-Dive 2
A4-MB18	9/30/2016	n/a	15	0	Anodonta sp.	A4-Dive 1

MUSSELS

Teck American Inc
Macroinvertebrate Tissue Study
Fall 2016

Location ID	Sample Date	Transect Length (m) - Calculated as a straight line between beginning and end points	Live	Dead	Species	Remarks
A4-MB19	9/30/2016	n/a	15	0	Anodonta sp.	A4-Dive 2
A5-MB21	10/2/2016	n/a	18	0	Anodonta sp.	A5-Dive 1
A5-MB22	10/2/2016	n/a	6	0	Anodonta sp.	A5-Dive 2
A5-MB23	10/2/2016	n/a	2	0	Anodonta sp.	A5-Dive 3
A5-MB24	10/2/2016	n/a	10	0	Anodonta sp.	A5-Dive 4
A6-MB11	10/1/2016	n/a	21	0	Anodonta sp.	A6-Dive 1
A6-MB12	10/1/2016	n/a	4	0	Anodonta sp.	A6-Dive 2

Appendix D

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

DIVE REPORT – October 24, 2016

From: Rob Pedersen, Deputy Unit Diving Officer, project divemaster

EDWARD PEDERSEN
Digitally signed by EDWARD PEDERSEN
DN: c=US, o=U.S. Government, ou=USEPA, ou=Staff, cn=EDWARD PEDERSEN, dnQualifier=0000009882
Date: 2016.10.24 16:31:27 -07'00'

Through: Sean Sheldrake, Unit Diving Officer

Dates of dive: September 28 – October 2, 2016

To: **Mark Filippini, Unit Manager, Environmental Services Unit, OERA**
David Allnut, Director, OERA

Project: **Mussel Collection for Upper Columbia River Risk Assessments**
Requested by: ECL – Dustan Bott
--
Site Acct code: 1TR2B 303DD2 10NZBB00 Removal o/s
Local Waterbody: North of Northport (vic. Dead Man's Eddy) downstream to near mouth of Sanpoil River
General Location: Approx. 48.9495° N Lat; -117.4105° W Long. to 47.9076° N Lat; -118.3413° W Long.

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Scientific Diving Purpose : The EPA R10 Dive Unit assisted the Office of Environmental Cleanup in data collection within the Upper Columbia River (UCR).

Detailed Scientific Objectives: Divers were needed to visually identify target macroinvertebrates (fresh water mussels, and in some cases, crayfish). Insufficient mussels (body mass) were collected by non-divers in the spring of 2016 from exposed areas during the spring draw down of Lake Roosevelt. Divers followed collection procedures to obtain live mussels from targeted sites and directly passed off each dive's collection to the Cultural Observer on board the contractor's support vessel. The mussels will be analyzed for human health and ecological risk assessment.

Teck contractors (AECOM, Gravity, and Columbia Navigation) directly supported EPA's Dive Unit. The contractors had been working on the UCR since April and had a wealth of knowledge about the river. The contractors had performed reconnaissance for mussels at the targeted areas using a towed underwater sled with a camera. Using this information, determinations were made on mussel presence and proposed search patterns for the divers.

The dives were planned for September 28 through October 7th. The work was completed on October 2nd.

Each morning began with a discussion of the objectives and a safety briefing. Columbia Navigation's boat or the Gravity vessel led us to the site. Gravity's research vessel, the *Tieton* dropped two anchors at the targeted site; the EPA dive platform, the *Wooldive*, tied up to the *Tieton* to conduct the dives; Columbia Navigation's boat stayed downstream to pick up staff that may fall overboard and to fend off curious boaters.

The *Tieton* deployed a down line for the divers off their stern davit. At the completion of each dive, the goodie bag of mussels collected by the diver was handed to the Cultural Observer at the stern of the *Tieton*. Completion was determined by: 1) mussel count was met; and 2) adequate biomass was acquired. Dives continued until enough mussels of adequate size were collected from each target area.

Each day there was a complete pre-dive checklist completed before each diver entered the water. RRau, KLeefers, and BRichmond had not dove tethered dive mode for over three months; refresher drills included finding the pony tank valve, tether line management, and diving tethered in current in Area 1 (facing up current, ascent/descent by body position).

Dive Details:
28 September – From the Northport boat launch, guided through hazards in the free flowing portion of the Columbia River above Northport to Area 1 (a left bank cove near Deadman's Eddy). RPedersen dove this shallow area with a cobble bottom and collected 31 mussels (met collection target); RRau on tether dive mode refresher dive and looking for crayfish (contractors trapping for crayfish was unsuccessful); KLeefers on tether dive mode refresher dive and looking for crayfish; BRichmond tether dive mode refresher dive and looking for crayfish. When AECOM finished processing mussels the three boats returned to the Northport boat launch.

29 September – From the Kettle Falls boat launch, the team worked the targeted section of Area 3. Dove the submerged area of the historic Kettle Falls rapids; KLeefers collected 23 mussels in approximately 60' of water with marginal visibility, and easily kicked-up silty bottom; RPedersen collected 9 mussels which met the targets; RRau on a training dive to 70'; BRichmond on a training dive (ear problems on down line, aborted dive).

30 September – Met at Gifford boat launch and deployed to Area 4 (2 sections Inchelium and Bissel Island). RRau collected 40 mussels at Inchelium (poor visibility, no current); transited to Bissel Island; RPedersen collected 15 mussels. With collection targets met, KLeefers and BRichmond conducted training dives.

1 October – From the boat launch near Grand Coulee, we traveled to Area 6, north of the Sanpoil River confluence. Very few signs of mussels were found here during recon. KLeefers collected approximately 20 mussels, RPedersen collected 13 more, meeting the targets. RRau and BRichmond performed training dives.

2 October – From Fort Spokane NP launch, we dove at two sites in Area 5 near the left bank (Spokane Tribal area). Very few signs of mussels were found here during recon. In Abraham Bay, RPedersen collected 18 mussels in 30 minutes, RRau found six more in 28 minutes. Transit to cove area to north, KLeefers obtained two mussels in 33 minutes. Back at Abraham Bay, BRichmond collected 12 mussels meeting the targets.

Personnel:
Divers: RR, BR, KL, RP
Boat Operators: BR
Other Field Support Personnel: AECOM, Gravity, Columbia Navigation, and Teck staff.

Hazards and Hazard Management:

-Diver awareness to prevent entanglement in sunken branches/root balls, and rock outcroppings (especially in Area 3, Kettle Falls).
-Tether line management and orientation to the current in the upper river sections.
-Boat operators' communication and coordination for securing anchor on site and when the diver is in the water.

Exposures: Mud/silt.

Diver /Equipment Issues:

BRichmond had an ear squeeze issue on the second day; resolved by day three.
AGA 17 second stage protective ring broke on the third day; replaced AGA.
An AGA whip started failing and leaking air at the distal end on the last day (KLeefers dive); replaced whip.
BRicmond's suit was leaking near the inflator valve on all days.

First Aid or other Supplies Expended: Full face mask sanitizing wipes.

Decontamination: Potable water rinse on tether line when silted up.

Follow-up to Issues (diver initials then task**)**:

1. Tanks in for fills (BR); to Seattle UWS – RR (done), need retrieval.
2. Replace AGA 17 protective ring – CS to inspect.
3. Replace AGA whip in DM kit 2/2 – SS completed this.
4. Download and organize pictures – RR (done).
5. Clean and leave AGA to dry (RP – done) – reassemble and test (KL with Rob mentoring) (done).
6. Take suit in for repair – BR.

Dive Summaries:

Dive Project	DM	of Dive	Date	Seq#	Diver	(ft)	Time	Time	(min)	Comments	TP in	TP out		Last Name,	First Name
UCR A1	Y	wk	9/28/2016	1	RP	18	11:19	11:26	7	Collected mussels (12 required, obtained 20+) CURRENT			North of Northport	Pedersen	Rob
UCR A1		wk	9/28/2016	2	RR	18	11:49	11:52	3	Tether dive mode review, look for crayfish			Near Dead Mans Eddy	Rau	Rob
UCR A1		wk	9/28/2016	3	KL	18	12:15	12:23	8	Tether dive mode review, look for crayfish			Left bank	Leefers	Kris
UCR A1		wk	9/28/2016	4	BR	18	12:37	12:44	7	Tether dive mode review, look for crayfish				Richmond	Brent
UCR A3		wk	9/29/2016	1	KL	61	10:29	10:49	20	Collected 23 mussels			On old Kettel Falls	Leefers	Kris
UCR A3		wk	9/29/2016	2	RP	66	11:09	11:34	25	Collected 9 mussels			On old Kettel Falls	Pedersen	Rob
UCR A3		tr	9/29/2016	3	RR	70	11:57	12:11	14	Explored "falls" rock formations			On old Kettel Falls	Rau	Rob
UCR A3		tr	9/29/2016	4	BR	24	12:24	12:32	8	Ear problem on line, came up			On old Kettel Falls	Richmond	Brent
UCR A4 Inchelium		wk	9/30/2016	1	RR	65	9:30	9:50	20	40 mussels (1 shell w/crayfish) POOR VIS MIN CURRENT			Right bank	Rau	Rob
UCR A4 Bissel Is		wk	9/30/2016	2	RP	70	10:49	11:27	38	15 live mussels			Right bank	Pedersen	Rov
UCR A4 Bissel Is		tr	9/30/2016	3	KL	63	11:56	12:13	17	AGA 17 2nd stage ring broke			Right bank	Leefers	Kris
UCR A4 Bissel Is		tr	9/30/2016	4	BR	58	12:29	12:44	15	No issues			Right bank	Richmond	Brent
A6		wk	10/1/2016	1	KL	65	10:31	11:11	40	Search upstream/east 20 mussels			NE shore upstream	Leefers	Kris
A6		wk	10/1/2016	2	RP	66	11:38	11:59	21	Search upstream/west 13 mussels			of Sanpoil R	Pedersen	Rob
A6		tr	10/1/2016	3	RR	66	12:20	12:36	16	TD			Right bank	Rau	Rob
A6		tr	10/1/2016	4	BR	54	12:50	13:03	13	TD				Richmond	Brent
A5 Spokane Tribe		wk	10/2/2016	1	RP	68	10:16	10:46	30	18 live mussels			Abraham Bay left bank	Pedersen	Rob
A5 Spokane Tribe		wk	10/2/2016	2	RR	68	11:09	11:37	28	6 live mussels			Abraham Bay left bank	Rau	Rob
A5 Spokane Tribe		wk	10/2/2016	3	KL	64	12:50	13:22	33	2 live mussels AGA whip failure			Northern cove left bank	Leefers	Kris
A5 Spokane Tribe		wk	10/2/2016	4	BR		14:15	14:28	13	12 live mussels			Abraham Bay left bank	Richmond	Brent

Note – purple highlighting is an artifact of the table set-up and can be ignored here.

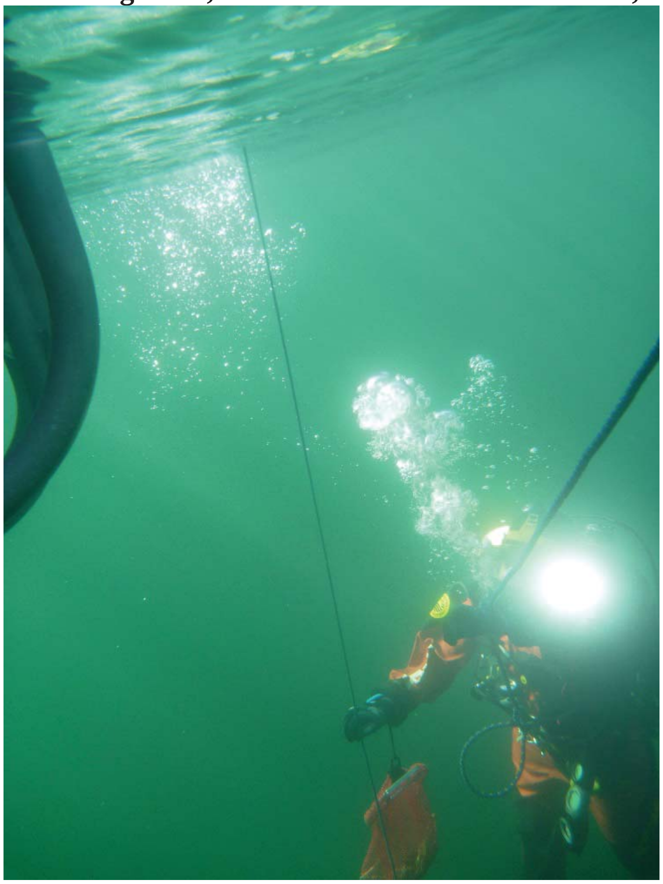
Photos: Upriver from Northport, the *Tieton*.

Tieton placing anchors in Area 1.

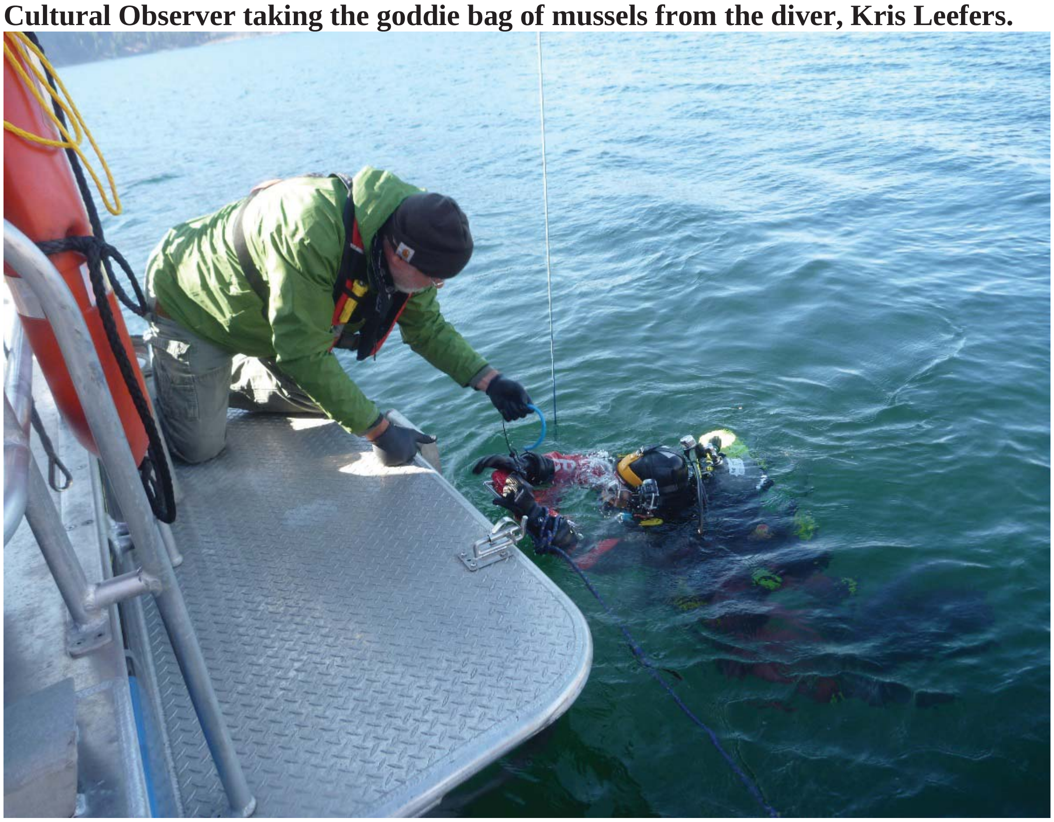
Wooldive tied up to the Tieton. Kris Leefers tending, Rob Rau standby diver, Brent Richmond diving; picture by Rob Pedersen.

Wooldive following Columbia Navigation.

Ascending diver, Kris Leefers – tether in left hand, down line in right hand. Photo by Brent Richmond.

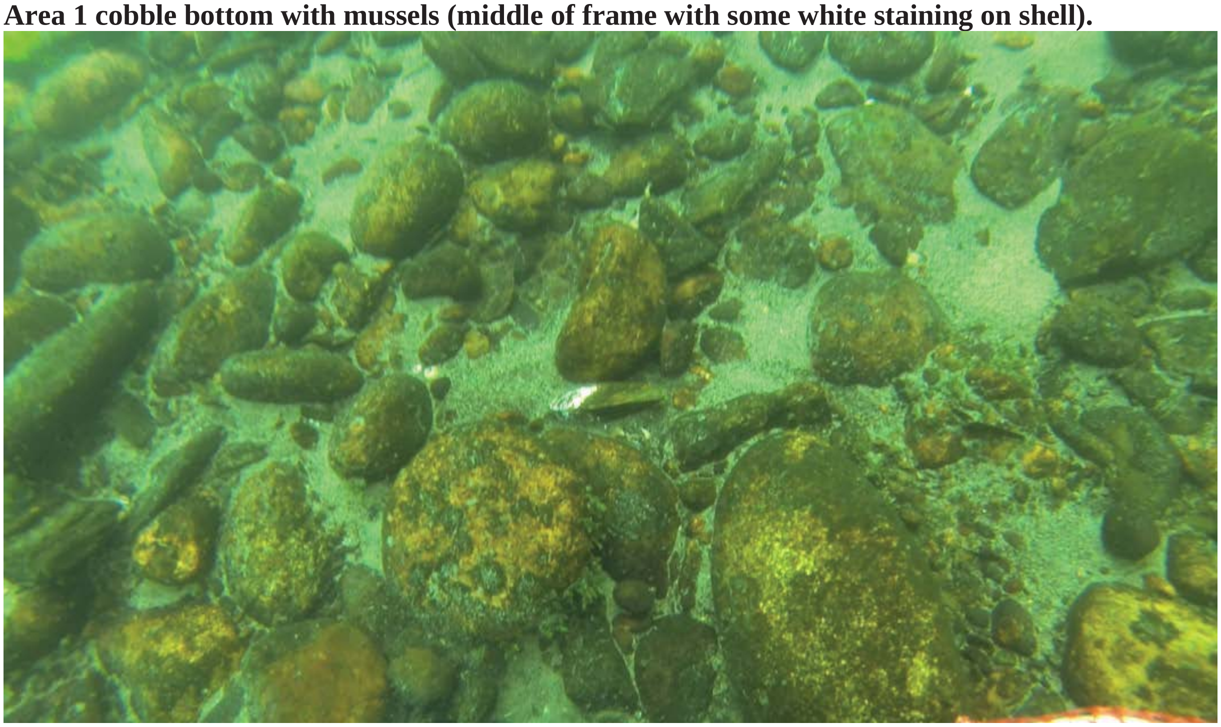


Cultural Observer taking the goddie bag of mussels from the diver, Kris Leefers.

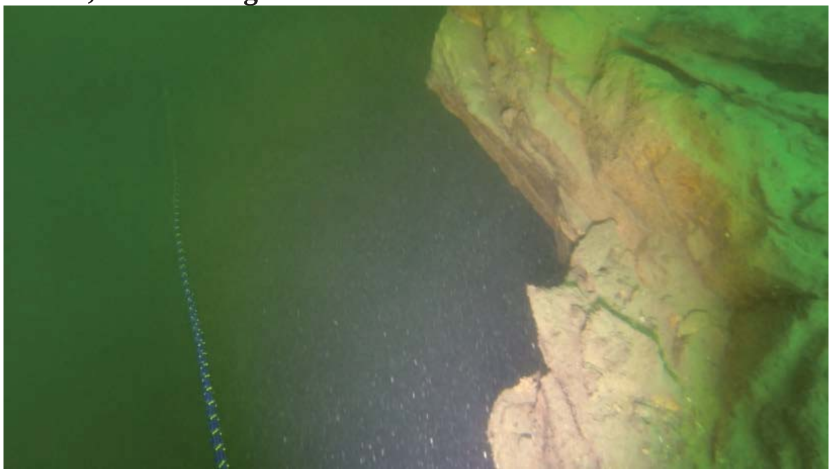


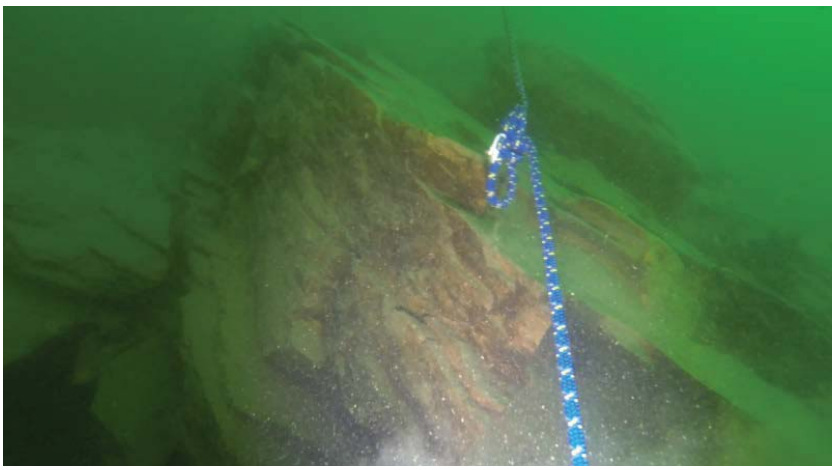
Preparing diver Rob Pedersen, Rob Rau standby, Brent Richmond tending, photo by Kris Leefers.

Area 1 cobble bottom with mussels (middle of frame with some white staining on shell).

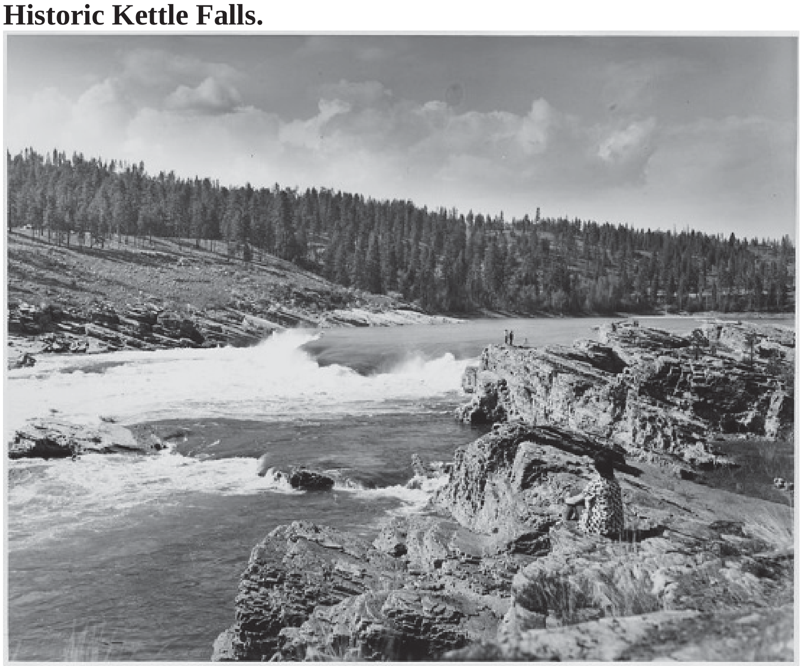


Area 3, the submerged Kettle Falls.



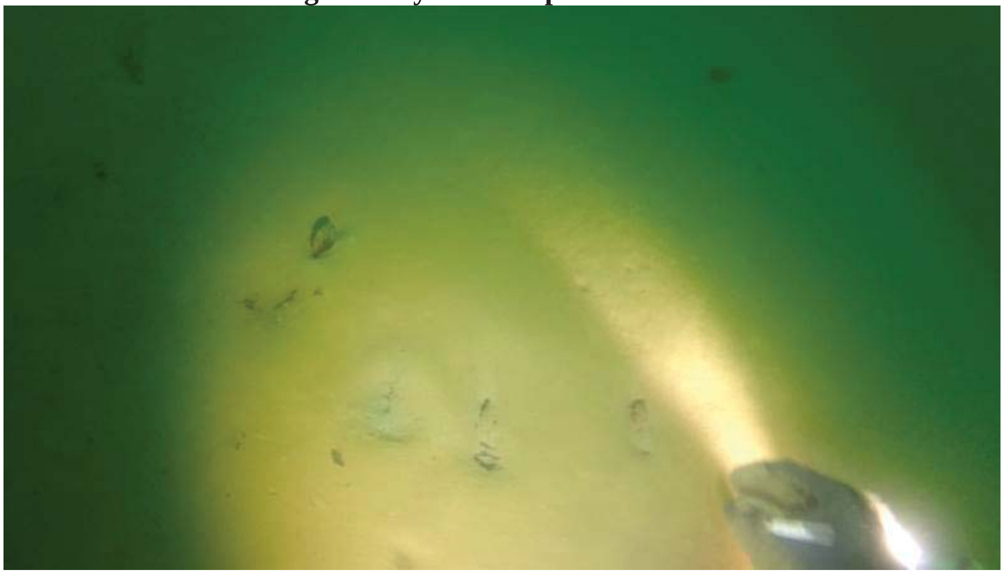


Historic Kettle Falls.



Mussels in a silt deposit – submerged Kettle Falls.

Area 4 mussel harvesting in easily kicked-up silt.

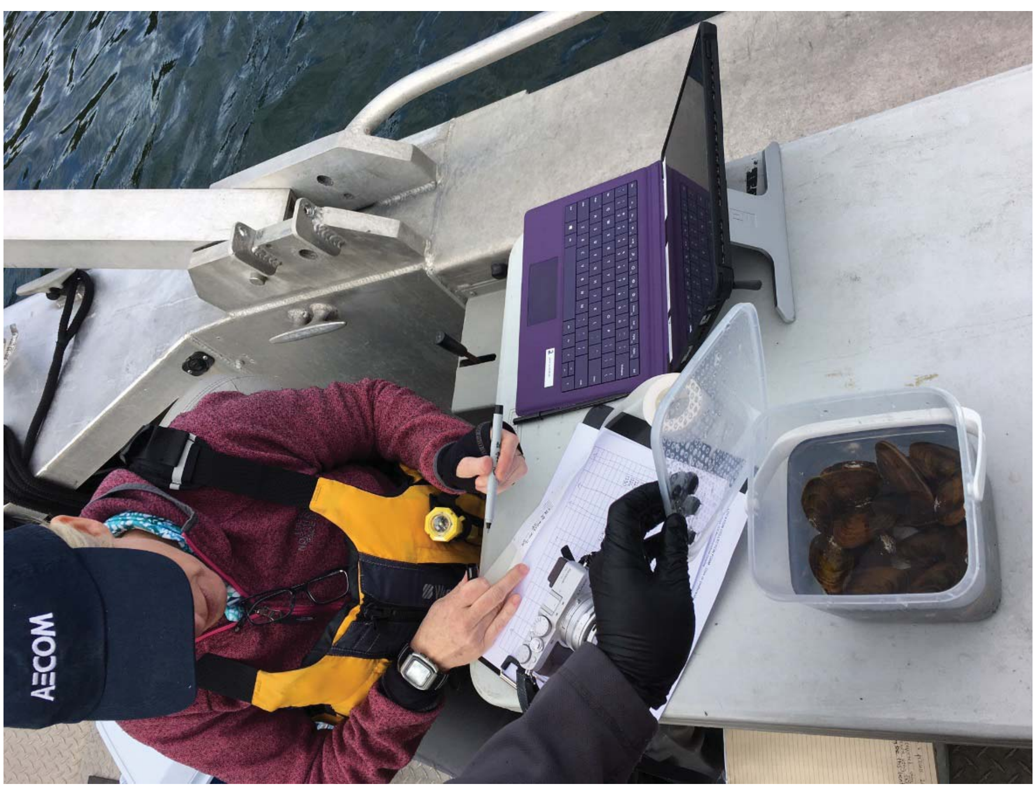


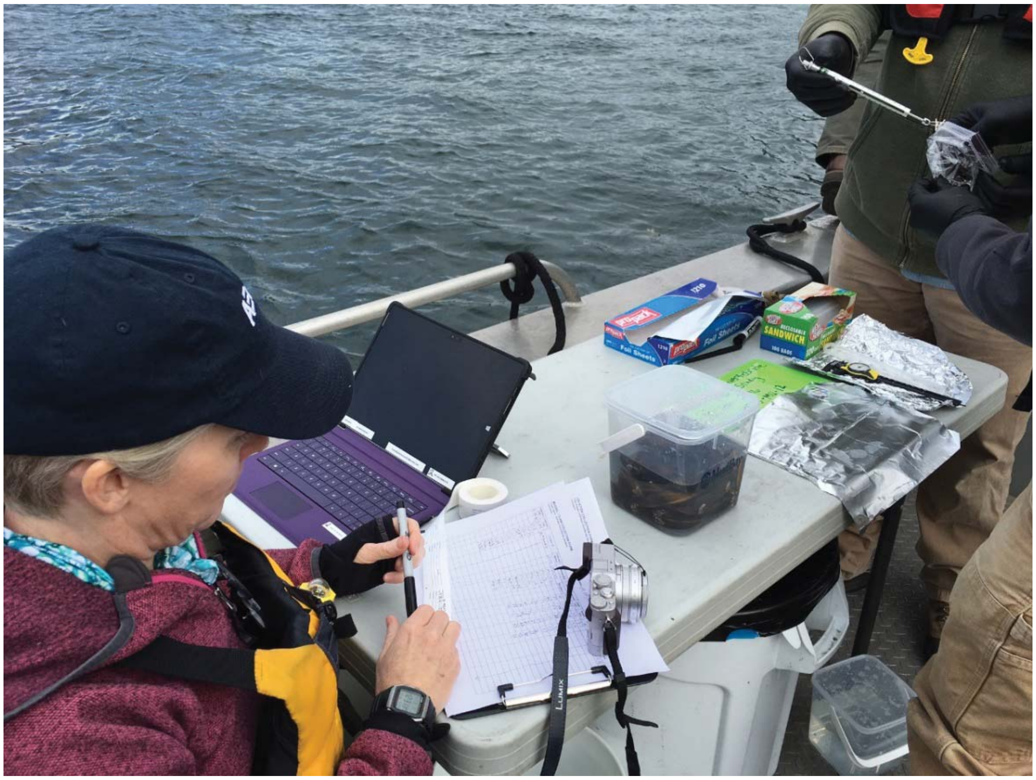
Mussel harvest in Area 4.

Diver's mask-mounted GoPro camera shows the light blue down line off the *Tieton*.

Cultural Observer just after taking the goddie bag of mussels from the diver (diver hand on the ladder).

Processing mussels on the *Tieton.*

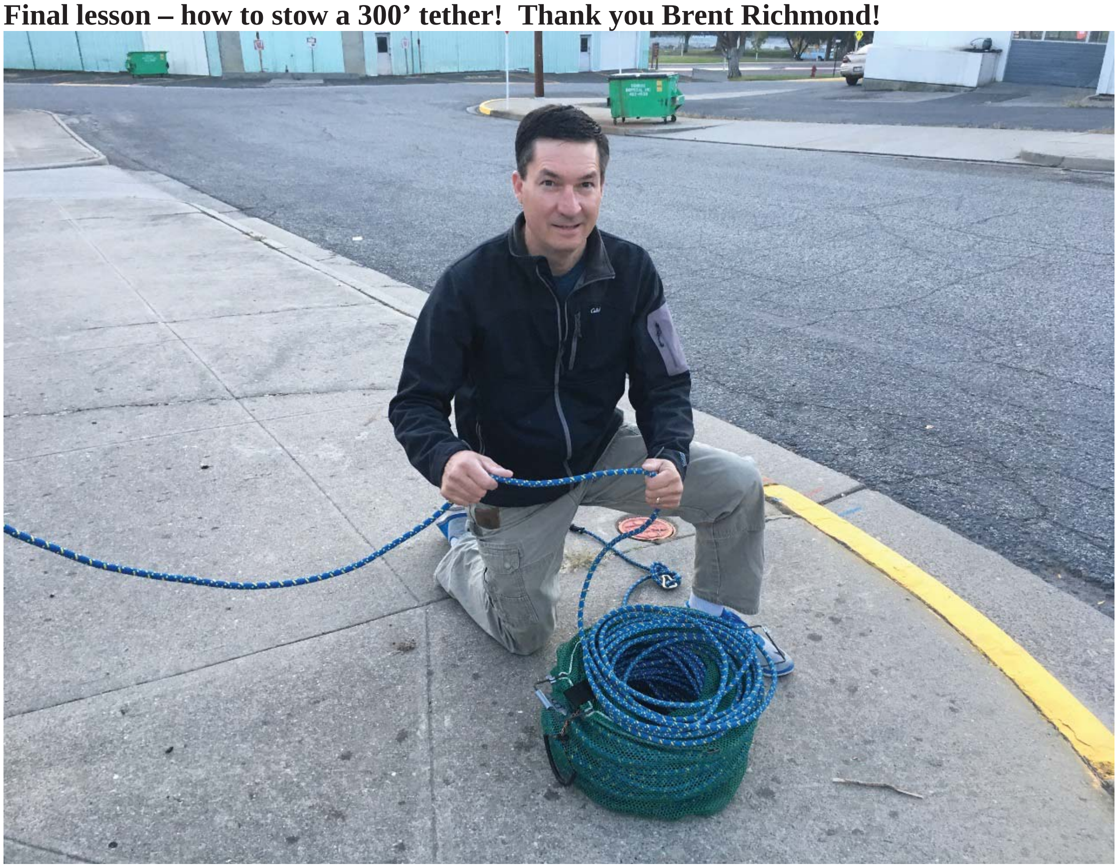



SANDWICH


SANDWICH

Another morning start – calling the recompression chamber pre-dive – Rob Pedersen and Kris Leefers.

Final lesson – how to stow a 300' tether! Thank you Brent Richmond!



Appendix E

Change Request Form

Upper Columbia River Macroinvertebrate Tissue Study Addendum

Page: 1 of 1

Change No: 1

CHANGE REQUEST

Modify the sample labelling nomenclature.

Applicable Reference:

QAPP Addendum, Section A4.2.6

Description of Change:

Revise the "sample type code" from "MCA" to "MB" for mussel samples and from "CTA" to "CT" for crayfish samples.

Reason for Change:

Field computers for the sampling team were inadvertently programmed to be consistent with the Spring 2016 QAPP labelling system, rather than matching the updated Fall 2016 QAPP Addendum. AECOM's numbering scheme creates a new 'crayfish trap location number' or 'mussel beach transection location number' greater than the numbers (and therefore unique) used in the spring, but uses the same nomenclature in every other way.

Impact on Present and Completed Work:

None. Logbooks, sample identification numbers, chain of custody paper work, and field data are all consistent with the Spring 2016 labelling system. No changes to existing documentation would need to be made.

Requested By: Jennifer Pretare (AECOM Project Manager) Date: 9/21/2016

Acknowledged By: Kris McCaig (Teck Project Manager) Date: 9/23/16

APPROVAL

Principal Investigator: Brian Bonnie Date: 9/23/16

Teck Project Manager: Kris McCaig Date: 9/26/16

EPA Project Manager: Dustin Bott Date: 9/27/16

Appendix F

PROTOCOL MODIFICATION FORM

Project Name: UCR Macroinvertebrate Tissue Study (Fall 2016)

Field Modification Number: 1

Material to be Sampled: Crayfish

Standard Procedure for Field Collection and Laboratory Analysis (cite reference):

Crayfish traps will be checked twice daily (Section A4.4.3 of QAPP Addendum).

Reason for Change in Field Procedure or Analysis Variation:

The field crew did not have adequate time to check 30 crayfish traps twice daily and complete additional required tasks such as crayfish processing and underwater camera reconnaissance.

Variation from Field or Analytical Procedure:

Crayfish traps were checked once daily at the following locations and dates:

- A1 on 9-14-15
- A1 on 9-15-16
- A3 on 9-11-16
- Sanpoil River on 9-19-16

Special Equipment, Materials or Personnel Required:

None.

Initiator Name: Jennifer Pretare Date: 9-11-16

Project Manager: Jennifer Pretare Date: 9-19-16

QA Manager: Date:

PROTOCOL MODIFICATION FORM

Project Name: UCR Macroinvertebrate Tissue Study (Fall 2016)

Field Modification Number: 2

Material to be Sampled: Crayfish

Standard Procedure for Field Collection and Laboratory Analysis (cite reference):

Crayfish traps will be checked twice daily (Section A4.4.3 of QAPP Addendum).

Reason for Change in Field Procedure or Analysis Variation:

The field crew has to stop work early on September 8, 2016 due to unsafe work conditions (high wind). Seven traps in A4 were left for 2 overnight soaking periods rather than one.

Variation from Field or Analytical Procedure:

Crayfish traps were left for 2 overnight soaking periods at the following locations on September 8, 2016:

- A4-CT45, A4-CT46, A4-CT-47, A4-CT48, A4-CT49, A4-CT50, AND A4-CT51

Special Equipment, Materials or Personnel Required:

None.

Initiator Name: Jennifer Pretare — Date: 9-9-16

Project Manager: Jennifer Pretare — Date: 9-19-16

QA Manager: — Date:

PROTOCOL MODIFICATION FORM

Project Name: UCR Macroinvertebrate Tissue Study (Fall 2016) **Field Modification Number:** 3

Material to be Sampled: Mussels and crayfish

Standard Procedure for Field Collection and Laboratory Analysis (cite reference):

SOP7 – Sample Packaging and Shipping. Use cardboard boxes and Styrofoam coolers for shipping samples on dry ice.

Reason for Change in Field Procedure or Analysis Variation:

Lab felt that plastic coolers would be a sturdier shipping container

Variation from Field or Analytical Procedure:

Plastic coolers packaged to not be airtight, instead of using boxes and Styrofoam inserts.

Special Equipment, Materials or Personnel Required:

Initiator Name: ALS Laboratory Date: 4-28-16

Project Manager: Jennifer Pretare Date: 9-6-16

QA Manager: Date:

PROTOCOL MODIFICATION FORM

Project Name: <u>UCR Macroinvertebrate Tissue Study (Fall 2016)</u> **Field Modification Number:** <u>4</u>

Material to be Sampled: Crayfish

Standard Procedure for Field Collection and Laboratory Analysis (cite reference):

Take a picture of each location, SOP9

Reason for Change in Field Procedure or Analysis Variation:

Inadvertently did not take a picture of location A1-CT60.

Variation from Field or Analytical Procedure:

No picture recorded for A1-CT60.

Special Equipment, Materials or Personnel Required:

None.

Initiator Name: Jennifer Pretare	Date: 10-1-16
Project Manager: Jennifer Pretare	Date: 11-4-16
QA Manager:	Date:

PROTOCOL MODIFICATION FORM

Project Name: UCR Macroinvertebrate Tissue Study (Fall 2016) **Field Modification Number:** 5

Material to be Sampled: Crayfish

Standard Procedure for Field Collection and Laboratory Analysis (cite reference):

Take a picture of each location, SOP4

Reason for Change in Field Procedure or Analysis Variation:

Crayfish A1-CT61-CR-01 was collected by hand during a mussel beach survey, therefore no crayfish trap location photo was taken.

Variation from Field or Analytical Procedure:

No picture recorded for location A1-CT61 (there is a picture for sample A1-CT61-CR-01).

Special Equipment, Materials or Personnel Required:

None.

Initiator Name: Jennifer Pretare	Date: 10-1-16
Project Manager: Jennifer Pretare	Date: 11-4-16
QA Manager:	Date:

Appendix G

CRAYFISH ONLY

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AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY

DATE 9-14-16

PAGE 1 OF 3

LABORATORY CLIENT: Teck American Incorporated	CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202	P.O. NO:
TEL: 509-623-4505 / Cell: 509-795-9599 / E-MAIL: dave.enos@teck.com	PROJECT CONTACT: Dave Enos, Teck American Incorporated
AECOM CONTACT: Christine Gebel	Bill To: Dave Enos, Teck American Incorporated
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101	SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel.
TEL: 206-438-2103 / Fax: 206-438-2699 / E-MAIL: christine.gebel@aecom.com	TEMPERATURE UPON RECEIPT: ____ °C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:
Freeze all samples at -20°C and hold until compositing instructions are recieved.
PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE)

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture								Comments
1	A4-CT31-CR01		9-8-16	0929	Tissue	1											
2	A4-CT31-CR02		↓	0935	Tissue	1											
3	A4-CT31-CR03			0941	Tissue	1											
4	A4-CT31-CR04			0943	Tissue	1											
5	A4-CT31-CR05			0947	Tissue	1											
6	A4-CT31-CR06			0949	Tissue	1											
7	A4-CT31-CR07			0952	Tissue	1											
8	A4-CT34-CR01			0958	Tissue	1											
9	A4-CT34-CR02			1001	Tissue	1											
10	A4-CT34-CR03		↓	1007	Tissue	1											

Additional Comments:
* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:
- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare Jenny a Pr AECOM	9-14-16	~~0900~~ 1640 (9/20/16)	Scott Nielsen Scott Niel CNI	~~9~~ 9-14-16	1640
Scott Nielsen Scott Niel CNI	9-15-16	1735	Cody Graves COdy GRAVES ALS	9/15/16	1735
Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time

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SR # / LAB USE ONLY

AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

DATE 9-14-16

PAGE 2 OF 3

LABORATORY CLIENT	Teck American Incorporated
ADDRESS	501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202
TEL	509-623-4505
Cell	509-795-9599
E-MAIL	dave.enos@teck.com
AECOM CONTACT	Christine Gebel
ADDRESS	1111 Third Avenue, Suite 1600, Seattle, WA 98101
TEL	206-438-2103
Fax	206-438-2699
E-MAIL	christine.gebel@aecom.com
CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
P.O. NO.	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel.
TEMPERATURE UPON RECEIPT:	°C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE)

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture								Comments
1	A4-CT34-CR04		9-8-16	1009	Tissue	1											
2	A4-CT34-CR05		↓	1012	Tissue	1											
3	A4-CT34-CR06			1014	Tissue	1											
4	A4-CT34-CR07			1016	Tissue	1											
5	A4-CT34-CR08			1018	Tissue	1											
6	A4-CT34-CR09			1021	Tissue	1											
7	A4-CT34-CR10			1024	Tissue	1											
8	A4-CT35-CR01			1139	Tissue	1											
9	A4-CT35-CR02			1144	Tissue	1											
10	A4-CT35-CR03		↓	1147	Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by (Print/Signature/Affiliation)	Date	Time	Received by (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	9-14-16	~~0900~~ 1640 (initials) 9/20/16	Scott Nielsen [signature]	9-14-16	1640
[signature] Scott Nielsen CNF	9-15-16	1735	CODY GRAVES [signature] ALS	9/15/16	1735

1/10/2014

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SR # / LAB USE ONLY

AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

DATE 9-14-16

PAGE 3 OF 3

LABORATORY CLIENT: Teck American Incorporated

ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202

TEL: 509-623-4505 | Cell: 509-795-9699 | E-MAIL: dave.enos@teck.com

AECOM CONTACT: Christine Gebel

ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101

TEL: 206-438-2103 | Fax: 206-438-2699 | E-MAIL: christine.gebel@aecom.com

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study

P.O. NO.:

PROJECT CONTACT: Dave Enos, Teck American Incorporated

Bill To: Dave Enos, Teck American Incorporated

SHIPPING CARRIER & TRACKING NUMBER
Fed Ex. Tracking number to be provided by Christine Gebel.

TEMPERATURE UPON RECEIPT: ________ °C

SAMPLER(S): (PRINT and SIGNATURE)

SPECIAL INSTRUCTIONS:
Freeze all samples at -20°C and hold until compositing instructions are recieved.
PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture								Comments
1	A4-CT35-CR04		9-8-16	1150	Tissue	1											
2	A4-CT35-CR05			1154	Tissue	1											
3	A4-CT35-CR06			1158	Tissue	1											
4	A4-CT35-CR07			1201	Tissue	1											
5	A4-CT36-CR01			1208	Tissue	1											
6	A4-CT36-CR02			1212	Tissue	1											
7	A4-CT36-CR03			1219	Tissue	1											
8	A4-CT36-CR04			1222	Tissue	1											
9					Tissue	1											
10					Tissue	1											

Additional Comments:
* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

GW 9/20/16

REPORT REQUIREMENTS:
- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by (Print/Signature/Affiliation)	Date	Time	Received by (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	9-14-16	~~0900~~ 1640	Scott Nielsen [signature] CNI	9-14-16	1640
Scott Nielsen [signature] CNI	9-15-16	1735	Cody Graves [signature] ALS	9/15/16	1735

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AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

DATE 9-14-16

PAGE 1 OF ~~2~~ 3

LABORATORY CLIENT: Teck American Incorporated

ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202

TEL: 509-623-4505 | Cell: 509-795-9599 | E-MAIL: dave.enos@teck.com

AECOM CONTACT: Christine Gebel

ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101

TEL: 206-438-2103 | Fax: 206-438-2699 | E-MAIL: christine.gebel@aecom.com

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study

P.O. NO:

PROJECT CONTACT: Dave Enos, Teck American Incorporated

Bill To: Dave Enos, Teck American Incorporated

SHIPPING CARRIER & TRACKING NUMBER: ~~Fed Ex. Tracking number to be provided by Christine Gebel.~~ Driven to lab by car.

TEMPERATURE UPON RECEIPT: ______ °C

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE) Jennifer Pretare

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture								Comments
1	A3-CT36-CR01		9-11-16	0841	Tissue	1											
2	A3-CT36-CR02		9-11-16	0841	Tissue	1											
3	A3-CT39-CR01		9-11-16	0855	Tissue	1											
4	A3-CT46-CR01		9-11-16	0927	Tissue	1											
5	A3-CT47-CR01		9-11-16	0933	Tissue	1											
6	A3-CT50-CR01		9-11-16	0947	Tissue	1											
7	A3-CT50-CR02		9-11-16	0947	Tissue	1											
8	A3-CT50-CR03		9-11-16	0947	Tissue	1											
9	A3-CT52-CR01		9-11-16	1002	Tissue	1											
10	A3-CT58-CR01		9-11-16	1027	Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

CG 9/20/16

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature]	9-14-16	~~0940~~ 1640	Scott Nielsen [signature] CNI	9-14-16	1640
Scott Nielsen [signature] CNI	9-15-16	1735	CODY GRAVES [signature] ALS	9/15/16	1735

1/10/2014

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ALS Environmental

AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY

DATE 9-14-16

PAGE 2 OF ~~2~~ 3

LABORATORY CLIENT	Teck American Incorporated
ADDRESS	501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202
TEL	509-623-4505
Cell	509-795-9599
E-MAIL	dave.enos@teck.com
AECOM CONTACT	Christine Gebel
ADDRESS	1111 Third Avenue, Suite 1600, Seattle, WA 98101
TEL	206-438-2103
Fax	206-438-2699
E-MAIL	christine.gebel@aecom.com
CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
PO NO	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel.
TEMPERATURE UPON RECEIPT	_______ °C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

REQUESTED ANALYSES

SAMPLER(S): (PRINT and SIGNATURE) Jennifer Pretare

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture								Comments
1	A3-CT58-CR02		9-11-16	1027	Tissue	1											
2	A3-CT60-CR01		9-11-16	1036	Tissue	1											
3	A3-CT62-CR01		9-12-16	1105	Tissue	1											
4	A3-CT63-CR01			1114	Tissue	1											
5	A3-CT45-CR01			1117	Tissue	1											
6	A3-CT45-CR02			1117	Tissue	1											
7	A3-CT46-~~CR01~~ CR02 CW 10/25/16			1128	Tissue	1											
8	A3-CT46-~~CR02~~ CR03			1128	Tissue	1											
9	A3-CT48-CR01			1142	Tissue	1											
10	A3-CT48-CR02			1142	Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

CW 9/20/16

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	9-14-16	~~0900~~ 1640	Scott Nielsen [signature] CNF	9-14-16	1640
[signature] Scott Nielsen CNF	9-15-16	1735	[signature] Cody Graves ALS	9/15/16	1735

CRAYFISH ONLY

K1610941

ALS Environmental

1317 South 13th Ave.
Kelso, WA 98626
TEL: (360) 577-7222 / (800) 695-7222 /FAX: (360) 636-1068
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AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

DATE 9-14-16

PAGE 3 OF 3

SR # / LAB USE ONLY

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TEL: 509-623-4505 | Cell: 509-795-9599 | E-MAIL: dave.enos@teck.com

AECOM CONTACT: Christine Gebel

ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101

TEL: 206-438-2103 | Fax: 206-438-2699 | E-MAIL: christine.gebel@aecom.com

CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study

P.O. NO:

PROJECT CONTACT: Dave Enos, Teck American Incorporated

Bill To: Dave Enos, Teck American Incorporated

SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel.

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

REQUESTED ANALYSES

TEMPERATURE UPON RECEIPT: ________ °C

SAMPLER(S): (PRINT and SIGNATURE)

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture								Comments
1	A3-CT49-CR01		9-12-16	1145	Tissue	1											
2	A3-CT53-CR01		↓	1248	Tissue	1											
3	A3-CT37-CR01		↓	1348	Tissue	1											
4					Tissue	1											
5					Tissue	1											
6					Tissue	1											
7					Tissue	1											
8					Tissue	1											
9					Tissue	1											
10					Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

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- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	9-14-16	~~0900~~ 1640 (9/20/16)	Scott Nielsen [signature] CNF	9-14-16	1640
Scott Nielsen [signature] CNF	9-15-16	1735	CODY GRAVES [signature] ALS	9/15/16	1735

MUSSELS ONLY

K1611342

ALS Environmental

1317 South 13th Ave.
Kelso, WA 98626
TEL: (360) 577-7222 / (800) 695-7222 /FAX: (360) 636-1068
www.alsglobal.com

AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY

DATE: 9/21/16

PAGE: 1 OF 3

LABORATORY CLIENT: Teck American Incorporated	CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202	P.O. NO.:
TEL: 509-623-4505 Cel: 509-795-9599 E-MAIL: dave.enos@teck.com	PROJECT CONTACT: Dave Enos, Teck American Incorporated
AECOM CONTACT: Christine Gebel	Bill To: Dave Enos, Teck American Incorporated
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101	SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel
TEL: 206-438-2103 Fax: 206-438-2699 E-MAIL: christine.gebel@aecom.com	TEMPERATURE UPON RECEIPT: ______ °C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ⦿ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE)

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1688A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	SR-MB34-MU-01		9/18/16	1350	Tissue	1	X	X	X	X	X	X	X	X			Western Pearlshell
2	SR-MB35-MU-01			1425	Tissue	1	X	X	X	X	X	X	X	X			
3	SR-MB35-MU-02			1428	Tissue	1	X	X	X	X	X	X	X	X			
4	SR-MB36-MU-01			1505	Tissue	1	X	X	X	X	X	X	X	X			
5	SR-MB36-MU-02			1507	Tissue	1	X	X	X	X	X	X	X	X			
6	SR-MB38-MU-01		9/19/16	1010	Tissue	1	X	X	X	X	X	X	X	X			
7	SR-MB38-MU-02			1012	Tissue	1	X	X	X	X	X	X	X	X			
8	SR-MB41-MU-01			1248	Tissue	1	X	X	X	X	X	X	X	X			
9	SR-MB42-MU-01			1330	Tissue	1	X	X	X	X	X	X	X	X			
10	SR-MB34-MU-02		9/20/16	0915	Tissue	1	X	X	X	X	X	X	X	X			

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

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- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
David Hose / [signature] / AECOM	9/21/16	1630	Russ Bevill / [signature] / AECOM	9/21/2016	16:30
Russ Bevill / [signature] / AECOM	9/22/16	15:31	[signature] ALS	9/22/16	1531

1/10/2014

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AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

DATE: 9/21/16

PAGE 2 OF 3

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CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
P.O. NO.:
PROJECT CONTACT: Dave Enos, Teck American Incorporated
Bill To: Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel

TURNAROUND TIME: ◯ SAME DAY ◯ 24 HR ◯ 48 HR ◯ 72 HR ⦿ Standard

TEMPERATURE UPON RECEIPT: ________ °C

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SPECIAL INSTRUCTIONS:
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PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

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1	SR-MB34-MU-03		9/20/16	0920	Tissue	1	X	X	X	X	X	X	X	X			Western Pearlshell
2	SR-MB34-MU-04			0921	Tissue	1	X	X	X	X	X	X	X	X			
3	SR-MB34-MU-05			0922	Tissue	1	X	X	X	X	X	X	X	X			
4	SR-MB34-MU-06			0926	Tissue	1	X	X	X	X	X	X	X	X			
5	SR-MB34-MU-07			0927	Tissue	1	X	X	X	X	X	X	X	X			
6	SR-MB34-MU-08			0929	Tissue	1	X	X	X	X	X	X	X	X			
7	SR-MB34-MU-09			0933	Tissue	1	X	X	X	X	X	X	X	X			
8	SR-MB34-MU-10			1530	Tissue	1	X	X	X	X	X	X	X	X			
9	SR-MB34-MU-11			1532	Tissue	1	X	X	X	X	X	X	X	X			
10	SR-MB34-MU-12			1532	Tissue	1	X	X	X	X	X	X	X	X			

Additional Comments:
* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

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Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
David Hose / [signature] / AECOM	9/21/16	1630	Russ Bevill / [signature] / AECOM	9/21/2016	16:30
Russ Bevill / [signature] / AECOM	9/22/16	15:31	[signature] ALS	9/22/16	15:31

1/10/2014

MUSSELS ONLY

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SR # / LAB USE ONLY

AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

DATE 9/21/16

PAGE 3 OF 3

LABORATORY CLIENT: Teck American Incorporated	CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202	P.O. NO.:
TEL: 509-623-4505 · Cell: 509-795-9599 · E-MAIL: dave.enos@teck.com	PROJECT CONTACT: Dave Enos, Teck American Incorporated
	Bill To: Dave Enos, Teck American Incorporated
AECOM CONTACT: Christine Gebel	SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101	TEMPERATURE UPON RECEIPT: ______ °C
TEL: 206-438-2103 · Fax: 206-438-2699 · E-MAIL: christine.gebel@aecom.com	SAMPLER(S): (PRINT and SIGNATURE)

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1	SR-MB34-MU-13		9/20/16	1532	Tissue	1	X	X	X	X	X	X	X	X			Western Pearlshell
2	SR-MB34-MU-14		↓	1533	Tissue	1	X	X	X	X	X	X	X	X			↓
3	SR-MB34-MU-15			1533	Tissue	1	X	X	X	X	X	X	X	X			
4					Tissue	1											
5					Tissue	1											
6					Tissue	1											
7					Tissue	1											
8					Tissue	1											
9					Tissue	1											
10					Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

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David Hose / [signature] / AECOM	9/21/16	1630	Russ Bevill / [signature] / AECOM	9/21/2016	16:30
Russ Bevill / [signature] / AECOM	9/22/16	15:31	[signature] ALS	9/22/16	1531

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ALS Environmental

AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

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PAGE 1 OF 3

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1	A1-CTG1-CR-01		9/14/16	1124	Tissue	1	X	X	X							Northorn
2					Tissue	1										
3					Tissue	1										
4					Tissue	1										
5					Tissue	1										
6					Tissue	1										
7					Tissue	1										
8					Tissue	1										
9					Tissue	1										
10					Tissue	1										

Additional Comments:

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~~Jennifer Pretare~~ David Hose / [signature] / AECOM	9/21/16	1630	Russ Bevill / [signature] / AECOM	9/21/2016	16:30
Russ Bevill / [signature] / AECOM	9/22/16	15:31	[signature] ALS	9/22/16	1531

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ALS Environmental

AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY

DATE: 9/21/16

PAGE: 2 OF 2

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	Bill To: Dave Enos, Teck American Incorporated
AECOM CONTACT: Christine Gebel	SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101	TEMPERATURE UPON RECEIPT: ______ °C
TEL: 206-438-2103 / Fax: 206-438-2699 / E-MAIL: christine.gebel@aecom.com	SAMPLER(S): (PRINT and SIGNATURE)

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1	SR-CT92-CR-01		9/19/16	0943	Tissue	1	X	X	X	X	X	X	X	X			Northern
2	SR-CT41-CR-01			1016	Tissue	1	X	X	X	X	X	X	X	X			
3	SR-CT41-CR-02			1016	Tissue	1	X	X	X	X	X	X	X	X			
4	SR-CT41-CR-03			1016	Tissue	1	X	X	X	X	X	X	X	X			
5	SR-CT44-CR-01			1032	Tissue	1	X	X	X	X	X	X	X	X			
6	SR-CT47-CR-01			1052	Tissue	1	X	X	X	X	X	X	X	X			
7	SR-CT50-CR-01			1113	Tissue	1	X	X	X	X	X	X	X	X			Signal
8	SR-CT51-CR-01			1114	Tissue	1	X	X	X	X	X	X	X	X			Northern
9	SR-CT51-CR-02			1114	Tissue	1	X	X	X	X	X	X	X	X			11
10	SR-CT62-CR-01			1235	Tissue	1	X	X	X	X	X	X	X	X			Signal

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

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- ☐ I. Routine Report: Method Blank, Surrogate, as required
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Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
David Nose / [signature] / AECOM	9/21/16	1630	Russ Bevill / [signature] / AECOM	9/21/2016	16:30
Russ Bevill / [signature] / AECOM	9/22/16	15:31	[signature] / ALS	9/22/16	1531

1/10/2014

CRAYFISH ONLY

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SR # / LAB USE ONLY

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PAGE 3 OF 3

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E-MAIL	dave.enos@teck.com
AECOM CONTACT	Christine Gebel
ADDRESS	1111 Third Avenue, Suite 1600, Seattle, WA 98101
TEL	206-438-2103
Fax	206-438-2699
E-MAIL	christine.gebel@aecom.com
CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
P.O. NO	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel
TEMPERATURE UPON RECEIPT:	______ °C
SAMPLER(S): (PRINT and SIGNATURE)	

TURNAROUND TIME
○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1688A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	SR-CT55-CR-01		9/20/16	1127	Tissue	1	X	X	X	X	X	X	X	X			Signal
2					Tissue	1											
3					Tissue	1											
4					Tissue	1											
5					Tissue	1											
6					Tissue	1											
7					Tissue	1											
8					Tissue	1											
9					Tissue	1											
10					Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
David Hose / David R. Hose / AECOM	9/21/16	1630	Russ Bevill / Russ Bevill / AECOM	9/21/2016	16:30
Russ Bevill / Russ Bevill / AECOM	9/22/16	15:31	[illegible] ALS	9/22/16	1531

1/10/2014

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ALS Environmental

AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611883

DATE: 10-4-2016

PAGE: 1 OF 15

LABORATORY CLIENT: Teck American Incorporated	CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202	P.O. NO.:
TEL: 509-623-4505 Cell: 509-795-9599 E-MAIL: dave.enos@teck.com	PROJECT CONTACT: Dave Enos, Teck American Incorporated
	Bill To: Dave Enos, Teck American Incorporated
AECOM CONTACT: Christine Gebel	SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel.
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101	TEMPERATURE UPON RECEIPT: ______ °C
TEL: 206-438-2103 Fax: 206-438-2699 E-MAIL: christine.gebel@aecom.com	

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE): Jennifer Pretare, Glen Mejia

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture								Comments
1	A3-MB14-Mu-01		9-29-16	1107	Tissue	1											
2	A3-MB14-Mu-02			1111	Tissue	1											
3	A3-MB14-Mu-03			1115	Tissue	1											
4	A3-MB14-Mu-04			1118	Tissue	1											
5	A3-MB14-Mu-05			1121	Tissue	1											
6	A3-MB14-Mu-06			1125	Tissue	1											
7	A3-MB14-Mu-07			1139	Tissue	1											
8	A3-MB14-Mu-08			1143	Tissue	1											
9	A3-MB14-Mu-09			1146	Tissue	1											
10	A3-MB14-Mu-10			1149	Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0935	[signature] ALS	10-4-16	09:35

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SR # / LAB USE ONLY: K1611853

AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

DATE: 10-4-16

PAGE: 2 OF 15

LABORATORY CLIENT	Teck American Incorporated
ADDRESS	501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202
TEL	509-623-4505
Cell	509-795-9599
E-MAIL	dave.enos@teck.com
AECOM CONTACT	Christine Gebel
ADDRESS	1111 Third Avenue, Suite 1600, Seattle, WA 98101
TEL	206-438-2103
Fax	206-438-2699
E-MAIL	christine.gebel@aecom.com
CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
P.O. NO.	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel.
TEMPERATURE UPON RECEIPT:	_______ °C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE): Jennifer Pretare, Glen Mejia

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture								Comments
1	A3-MB14-MU-11		9-29-16	1152	Tissue	1											
2	A3-MB14-MU-12			1155	Tissue	1											
3	A3-MB14-MU-13			1158	Tissue	1											
4	A3-MB14-MU-14			1202	Tissue	1											
5	A3-MB14-MU-15			1205	Tissue	1											
6	A3-MB14-MU-16			1209	Tissue	1											
7	A3-MB14-MU-17			1213	Tissue	1											
8	A3-MB14-MU-18			1217	Tissue	1											
9	A3-MB14-MU-19			1221	Tissue	1											
10	A3-MB14-MU-20			1225	Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0935	[signature]	10-4-16	09:35

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AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611853

DATE 10-4-16

LABORATORY CLIENT: Teck American Incorporated
ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202
TEL: 509-623-4505 | Cell: 509-795-9599 | E-MAIL: dave.enos@teck.com
AECOM CONTACT: Christine Gebel
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101
TEL: 206-438-2103 | Fax: 206-438-2699 | E-MAIL: christine.gebel@aecom.com

CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
P.O. NO.:
PROJECT CONTACT: Dave Enos, Teck American Incorporated
Bill To: Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel.
TEMPERATURE UPON RECEIPT: ________ °C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ⦿ Standard

SPECIAL INSTRUCTIONS:
Freeze all samples at -20°C and hold until compositing instructions are recieved.
PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE)
Jennifer Pretare
Glen Mejia

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture								Comments
1	A3-MB14-mu-~~20~~21 gp 10.4.16		9-29-16	1228	Tissue	1											
2	A3-MB14-mu-~~21~~22 gp 10.4.16		↓	1231	Tissue	1											
3	A4-MB18-mu-01		9.30.16	1140	Tissue	1											
4	A4-MB18-mu-02			1146	Tissue	1											
5	A4-MB18-mu-03			1150	Tissue	1											
6	A4-MB18-mu-04			1153	Tissue	1											
7	A4-MB18-mu-05			1155	Tissue	1											
8	A4-MB18-mu-06			1159	Tissue	1											
9	A4-MB18-mu-07			1202	Tissue	1											
10	A4-MB18-mu-08		↓	1205	Tissue	1											

Additional Comments:
* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:
- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0935	[signature] ALS	10-4-16	9:35

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ALS Environmental

AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611863

DATE: 10-4-16

PAGE 4 OF 15

LABORATORY CLIENT	Teck American Incorporated
ADDRESS	501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202
TEL	509-623-4505
Cell	509-795-9599
E-MAIL	dave.enos@teck.com
AECOM CONTACT	Christine Gebel
ADDRESS	1111 Third Avenue, Suite 1600, Seattle, WA 98101
TEL	206-438-2103
Fax	206-438-2699
E-MAIL	christine.gebel@aecom.com
CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
P.O. NO.	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel.
TEMPERATURE UPON RECEIPT	______ °C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE)

Jennifer. Pretare
Glen Mejia

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture								Comments
~~1~~	~~A3-MB18-mu-09~~		~~9.30.16~~	~~1211~~	~~Tissue~~ GP.	10-4-16											
2	A4-MB18-mu-09		9.30.16	1207	Tissue	1											
3	A4-MB18-mu-10		↓	1211	Tissue	1											
4	A4-MB18-mu-11			1214	Tissue	1											
5	A4-MB18-mu-12			1217	Tissue	1											
6	A4-MB18-mu-13			1220	Tissue	1											
7	A4-MB18-mu-14			1224	Tissue	1											
8	A4-MB18-mu-15		↓	1227	Tissue	1											
9	A4-MB19-mu-01			1234	Tissue	1											
10	A4-MB19-mu-02		↓	1238	Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0935	[signature] ALS	10-4-16	0932

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ALS Environmental

AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611853

DATE 10-4-16

LABORATORY CLIENT: Teck American Incorporated	CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202	P.O. NO.
TEL: 509-623-4505 · Cell: 509-795-9599 · E-MAIL: dave.enos@teck.com	PROJECT CONTACT: Dave Enos, Teck American Incorporated
AECOM CONTACT: Christine Gebel	Bill To: Dave Enos, Teck American Incorporated
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101	SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel.
TEL: 206-438-2103 · Fax: 206-438-2699 · E-MAIL: christine.gebel@aecom.com	TEMPERATURE UPON RECEIPT: ______ °C
TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard	SAMPLER(S): (PRINT and SIGNATURE) Jennifer Pretare, Glen Mejia

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture							Comments
1	A4-MB19-MU-03		9.30.16	1241	Tissue	1										
2	A4-MB19-MU-04			1245	Tissue	1										
3	A4-MB19-MU-05			1248	Tissue	1										
4	A4-MB19-MU-06			1251	Tissue	1										
5	A4-MB19-MU-07			1253	Tissue	1										
6	A4-MB19-MU-08			1256	Tissue	1										
7	A4-MB19-MU-09			1259	Tissue	1										
8	A4-MB19-MU-~~0~~10			~~1:02~~ 1302	Tissue	1										Time = 1302 GP. 10-7-16
9	A4-MB19-MU-11			~~1:05~~ 1305	Tissue	1										Time = 1305 GP. 10-7-16
10	A4-MB19-MU-12			~~1:08~~ 1308	Tissue	1										Time = 1308 GP. 10-7-16

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0935	[signature] ALS	10-4-16	09:35

MUSSELS ONLY

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ALS Environmental

AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611853

DATE: 10-4-16

PAGE: 6 OF 15

LABORATORY CLIENT: Teck American Incorporated	CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202	P.O. NO.:
TEL: 509-623-4505	Cell: 509-795-9599	E-MAIL: dave.enos@teck.com	PROJECT CONTACT: Dave Enos, Teck American Incorporated
Bill To: Dave Enos, Teck American Incorporated	
AECOM CONTACT: Christine Gebel	SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel.
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101	TEMPERATURE UPON RECEIPT: ______ °C
TEL: 206-438-2103	Fax: 206-438-2699	E-MAIL: christine.gebel@aecom.com	

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SAMPLER(S): (PRINT and SIGNATURE): Jennifer Pretare, Glen Mejia

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture							Comments
1	A4-MB19-MU-13		9-30-16	1:12	Tissue	1										
2	A4-MB19-MU-14		↓	1:14	Tissue	1										
3	A4-MB19-MU-15		↓	1:17	Tissue	1										
4					Tissue	1										
5					Tissue	1										
6					Tissue	1										
7					Tissue	1										
8					Tissue	1										
9					Tissue	1										
10					Tissue	1										

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0936	[signature]	10-4-16	09:36

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ALS Environmental

AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611853

DATE: 10-4-16

PAGE: 7 OF 15

LABORATORY CLIENT	Teck American Incorporated
ADDRESS	501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202
TEL	509-623-4505
Cell	509-795-9599
E-MAIL	dave.enos@teck.com
AECOM CONTACT	Christine Gebel
ADDRESS	1111 Third Avenue, Suite 1600, Seattle, WA 98101
TEL	206-438-2103
Fax	206-438-2699
E-MAIL	christine.gebel@aecom.com
CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
P.O NO	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel
TEMPERATURE UPON RECEIPT:	°C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE) Jennifer Pretare, Glen Mejia

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1688A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	A5-MB21-MU-01		10-2-16	1103	Tissue	1											
2	A5-MB21-MU-02			1107	Tissue	1											
3	A5-MB21-MU-03			1110	Tissue	1											
4	A5-MB21-MU-04			1112	Tissue	1											
5	A5-MB21-MU-05			1115	Tissue	1											
6	A5-MB21-MU-06			1119	Tissue	1											
7	A5-MB21-MU-07			1122	Tissue	1											
8	A5-MB21-MU-08			1126	Tissue	1											
9	A5-MB21-MU-09			1129	Tissue	1											
10	A5-MB21-MU-10			1239	Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0936	[signature] ALS	10-4-16	09:36

MUSSELS ONLY

1317 South 13th Ave.
Kelso, WA 98626
TEL: (360) 577-7222 / (800) 695-7222 /FAX: (360) 636-1068
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ALS Environmental

AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611853

DATE 10-4-16

LABORATORY CLIENT	Teck American Incorporated
ADDRESS	501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202
TEL	509-623-4505
Cel	509-795-9599
E-MAIL	dave.enos@teck.com
AECOM CONTACT	Christine Gebel
ADDRESS	1111 Third Avenue, Suite 1600, Seattle, WA 98101
TEL	206-438-2103
Fax	206-438-2699
E-MAIL	christine.gebel@aecom.com
CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
P.O. NO	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel
TEMPERATURE UPON RECEIPT:	°C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE) Jennifer Pretare, Glen Mejia

REQUESTED ANALYSES: EPA 6010C or 6020A / Total Metals*; EPA 1631E / Total Mercury; EPA 1630M / Methyl Mercury; EPA 1632A / Inorganic Arsenic; ALS MET-TISP / Percent Moisture; EPA 1668A / PCB Congeners; EPA 1613B / Dioxins, Furans; EPA 1668A / Percent Lipids

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1668A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	A5-MB21-Mu-11		10-2-16	1242	Tissue	1											
2	A5-MB21-Mu-12			1244	Tissue	1											
3	A5-MB21-Mu-13			1247	Tissue	1											
4	A5-MB21-Mu-14			1251	Tissue	1											
5	A5-MB21-Mu-15			1253	Tissue	1											
6	A5-MB21-Mu-16			1256	Tissue	1											
7	A5-MB21-Mu-17			1259	Tissue	1											
8	A5-MB21-Mu-18		JP. 1301	~~1621~~	Tissue	1											Time = 1301 JP. 10-7-16
9					Tissue	1											
10					Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare Jennifer A Pretare AECOM	10-4-16	0936	[illegible] ALS	10-4-16	9:35

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AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611853

DATE: 10-4-16

PAGE: 9 OF 15

LABORATORY CLIENT: Teck American Incorporated	CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202	P.O. NO:
TEL: 509-623-4505 · Cell: 509-795-9599 · E-MAIL: dave.enos@teck.com	PROJECT CONTACT: Dave Enos, Teck American Incorporated
AECOM CONTACT: Christine Gebel	Bill To: Dave Enos, Teck American Incorporated
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101	SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel
TEL: 206-438-2103 · Fax: 206-438-2699 · E-MAIL: christine.gebel@aecom.com	TEMPERATURE UPON RECEIPT: ________ °C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:
Freeze all samples at -20°C and hold until compositing instructions are recieved.
PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE) Jenifer Pretare, Glen Mejia

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1668A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	A5-MB22-MU-01		10-2-16	1:08	Tissue	1											Time = 1308 GP. 10.7.16
2	A5-MB22-MU-02			1:10	Tissue	1											= 1310
3	A5-MB22-MU-03			1:13	Tissue	1											= 1313
4	A5-MB22-MU-04			1:15	Tissue	1											= 1315
5	A5-MB22-MU-05			1:17	Tissue	1											= 1317
6	A5-MB22-MU-06			1:20	Tissue	1											= 1320
7	A5-MB23-MU-01			1:29	Tissue	1											= 1329
8	A5-MB23-MU-02			1:33	Tissue	1											= 1333
9	A5-MB24-MU-01			3:40	Tissue	1											= ~~1340~~ 1540
10	A5-MB24-MU-02			3:42	Tissue	1											= ~~1342~~ 1542

Additional Comments:
* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:
- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare / [signature] AECOM	10-4-16	0936	[signature] ALS	10-4-16	9:36

1/10/2014

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AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611853

DATE: 10-4-16

PAGE 10 OF 15

LABORATORY CLIENT	Teck American Incorporated
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TEL	206-438-2103
Fax	206-438-2699
E-MAIL	christine.gebel@aecom.com
CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
P.O. NO	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel
TEMPERATURE UPON RECEIPT:	______ °C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE) Jennifer Pretare, Glen Mejia

REQUESTED ANALYSES: EPA 6010C or 6020A / Total Metals*; EPA 1631E / Total Mercury; EPA 1630M / Methyl Mercury; EPA 1632A / Inorganic Arsenic; ALS MET-TISP / Percent Moisture; EPA 1668A / PCB Congeners; EPA 1613B / Dioxins, Furans; EPA 1668A / Percent Lipids

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1668A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	A5-MB24-MU-03		10-2-16	3:45	Tissue	1											Time = 1545 GP. 10-7-16
2	A5-MB24-MU-04			3:48	Tissue	1											1548
3	A5-MB24-MU-05			3:51	Tissue	1											1551
4	A5-MB24-MU-06			3:53	Tissue	1											1553
5	A5-MB24-MU-07			3:55	Tissue	1											1555
6	A5-MB24-MU-08			3:58	Tissue	1											1558
7	A5-MB24-MU-09			4:02	Tissue	1											1602
8	A5-MB24-MU-10			4:07	Tissue	1											1607
9					Tissue	1											
10					Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0936	[signature] ALS	10-4-16	09:36

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AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611853

DATE: 10-4-16

PAGE: 11 OF 15

LABORATORY CLIENT: Teck American Incorporated	CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202	P.O. NO:
TEL: 509-623-4505 Cell: 509-795-9599 E-MAIL: dave.enos@teck.com	PROJECT CONTACT: Dave Enos, Teck American Incorporated
	Bill To: Dave Enos, Teck American Incorporated
AECOM CONTACT: Christine Gebel	SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101	TEMPERATURE UPON RECEIPT: ______ °C
TEL: 206-438-2103 Fax: 206-438-2699 E-MAIL: christine.gebel@aecom.com	SAMPLER(S): (PRINT and SIGNATURE): Jennifer Pretare, Glen Mejia

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1668A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	A6-MB11-MU-01		10-1-16	1131	Tissue	1											
2	A6-MB11-MU-02			1134	Tissue	1											
3	A6-MB11-MU-03			1138	Tissue	1											
4	A6-MB11-MU-04			1142	Tissue	1											
5	A6-MB11-MU-05			1145	Tissue	1											
6	A6-MB11-MU-06			1148	Tissue	1											
7	A6-MB11-MU-07			1151	Tissue	1											
8	A6-MB11-MU-08			1204	Tissue	1											
9	A6-MB11-MU-09			1208	Tissue	1											
10	A6-MB11-MU-10			1212	Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0936	[signature] ALS	10-4-16	09:38

1/10/2014

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SR # / LAB USE ONLY: K1611853

AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

DATE: 10-4-16
PAGE: 12 OF 15

LABORATORY CLIENT	Teck American Incorporated
ADDRESS	501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202
TEL	509-623-4505
Cell	509-795-9599
E-MAIL	dave.enos@teck.com
AECOM CONTACT	Christine Gebel
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E-MAIL	christine.gebel@aecom.com
CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
P.O. NO	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel
TEMPERATURE UPON RECEIPT	______ °C
SAMPLER(S): (PRINT and SIGNATURE)	Jennifer Pretare, Glen Mejia

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1688A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	A6-MB11-mu-11		10-1-16	1215	Tissue	1											
2	A6-MB11-mu-12			1219	Tissue	1											
3	A6-MB11-mu-13			1222	Tissue	1											
4	A6-MB11-mu-14			1224	Tissue	1											
5	A6-MB11-mu-15			1229	Tissue	1											
6	A6-MB11-mu-16			1232	Tissue	1											
7	A6-MB11-mu-17			1234	Tissue	1											
8	A6-MB11-mu-18			1238	Tissue	1											
9	A6-MB11-mu-19			1241	Tissue	1											
10	A6-MB11-mu-20			1244	Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0938	[signature] ALS	10-4-16	09:38

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ALS Environmental

AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611853

DATE: 10-4-16

LABORATORY CLIENT	Teck American Incorporated
ADDRESS	501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202
TEL	509-623-4505
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CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
P O NO	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel
TEMPERATURE UPON RECEIPT:	______ °C

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

1248 gp. 10-4-16

SAMPLER(S): (PRINT and SIGNATURE) Jennifer Pretare, Glen Mejia

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1668A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	A6-MB11-MU-21		10-1-16	~~4:07~~	Tissue	1											
2	A6-MB12-MU-01		↓	1258	Tissue	1											
3	A6-MB12-MU-02			1:01	Tissue	1											
4	A6-MB12-MU-03			1:04	Tissue	1											
5	A6-MB12-MU-04			1:07	Tissue	1											
6					Tissue	1											
7					Tissue	1											
8					Tissue	1											
9					Tissue	1											
10					Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0938	[signature] ALS	10-4-16	09:38

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SR # / LAB USE ONLY: K1611853

AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

DATE: 10-4-16
PAGE: 4 OF 15

LABORATORY CLIENT: Teck American Incorporated
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TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:
Freeze all samples at -20°C and hold until compositing instructions are recieved.
PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE) Jennifer Pretare, Glen Mejia

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture								Comments
1	A1-MB43-MU-11		9-28-16	1226	Tissue	1											
2	12			1230	Tissue	1											
3	13			1234	Tissue	1											
4	14			1237	Tissue	1											
5	15			1240	Tissue	1											
6	16			1242	Tissue	1											
7	17			1245	Tissue	1											
8	18			1248	Tissue	1											
9	19			1250	Tissue	1											
10	20			1253	Tissue	1											

Additional Comments:
* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:
- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0938	[signature] ALS	10-4-16	09:35

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ALS Environmental

AREAS 1, 3, & 4 CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1611853

DATE: 10-4-16

PAGE: 15 OF 15

LABORATORY CLIENT: Teck American Incorporated	CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202	P.O. NO.:
TEL: 509-623-4505 / Cell: 509-795-9599 / E-MAIL: dave.enos@teck.com	PROJECT CONTACT: Dave Enos, Teck American Incorporated
	Bill To: Dave Enos, Teck American Incorporated
AECOM CONTACT: Christine Gebel	SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel.
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101	TEMPERATURE UPON RECEIPT: ______ °C
TEL: 206-438-2103 / Fax: 206-438-2699 / E-MAIL: christine.gebel@aecom.com	

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:
Freeze all samples at -20°C and hold until compositing instructions are recieved.
PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

SAMPLER(S): (PRINT and SIGNATURE): Jennifer Pretare, Glen Mejia

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	ALS MET-TISP / Percent Moisture							Comments
1	A1-MB43-MU-01		9-28-16	1149	Tissue	1										
2	02			1153	Tissue	1										
3	03			1202	Tissue	1										
4	04			1205	Tissue	1										
5	05			1207	Tissue	1										
6	06			1210	Tissue	1										
7	07			1213	Tissue	1										
8	08			1216	Tissue	1										
9	09			1219	Tissue	1										
10	10			1223	Tissue	1										

Additional Comments:
* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:
- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Jennifer Pretare [signature] AECOM	10-4-16	0938	[signature]	10-4-16	09:38

1/10/2014

CRAYFISH ONLY

K1612076

1317 South 13th Ave.
Kelso, WA 98626
TEL: (360) 577-7222 / (800) 695-7222 /FAX: (360) 636-1068
www.alsglobal.com

ALS Environmental

AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY

DATE: 10/05/2016

PAGE 1 OF 3

LABORATORY CLIENT: Teck American Incorporated	CLIENT PROJECT NAME / NUMBER: UCR Macroinvertebrate Study
ADDRESS: 501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202	P.O. NO
TEL: 509-623-4505 / Cel: 509-795-9599 / E-MAIL: dave.enos@teck.com	PROJECT CONTACT: Dave Enos, Teck American Incorporated
	Bill To: Dave Enos, Teck American Incorporated
AECOM CONTACT: Christine Gebel	SHIPPING CARRIER & TRACKING NUMBER: Fed Ex. Tracking number to be provided by Christine Gebel
ADDRESS: 1111 Third Avenue, Suite 1600, Seattle, WA 98101	TEMPERATURE UPON RECEIPT: ________ °C
TEL: 206-438-2103 / Fax: 206-438-2699 / E-MAIL: christine.gebel@aecom.com	SAMPLER(S): (PRINT and SIGNATURE)

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1668A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	A2-CT31-01		10/5/16	0815	Tissue	1											Northern CF
2	A2-CT31-02			0815	Tissue	1											
3	A2-CT31-03			0815	Tissue	1											
4	A2-CT32-01			0820	Tissue	1											
5	A2-CT34-01			0830	Tissue	1											
6	A2-CT35-01			0833	Tissue	1											
7	A2-CT40-01			0856	Tissue	1											
8	A2-CT45-01			0915	Tissue	1											
9	A2-CT45-02			0915	Tissue	1											Signal CF
10	A2-CT45-03			0915	Tissue	1											Signal CF

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Michelle Stegner AECOM	10/6/2016	5:10pm	Les Kennedy ALS	10/6/16	1710

1/10/2014

CRAYFISH ONLY

1317 South 13th Ave.
Kelso, WA 98626
TEL: (360) 577-7222 / (800) 695-7222 /FAX: (360) 636-1068
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ALS Environmental

AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1610276

DATE: 10/05/2016

LABORATORY CLIENT	Teck American Incorporated
ADDRESS	501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202
TEL	509-623-4505
Cell	509-795-9599
E-MAIL	dave.enos@teck.com
AECOM CONTACT	Christine Gebel
ADDRESS	1111 Third Avenue, Suite 1600, Seattle, WA 98101
TEL	206-438-2103
Fax	206-438-2699
E-MAIL	christine.gebel@aecom.com
CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
P.O. NO.	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel
TEMPERATURE UPON RECEIPT:	°C
SAMPLER(S): (PRINT and SIGNATURE)	

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ⦿ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1688A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	A2-CT45-04		10/5/16	0915	Tissue	1											Signal CF
2	A2-CT46-01			0924	Tissue	1											Northern CF
3	A2-CT48-01			0934	Tissue	1											
4	A2-CT48-02			0934	Tissue	1											
5	A2-CT48-03			0934	Tissue	1											
6	A2-CT53-01			1003	Tissue	1											
7	A2-CT54-01			1012	Tissue	1											
8	A2-CT54-02			1012	Tissue	1											
9	A2-CT55-01			1020	Tissue	1											
10	A2-CT56-01			1025	Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Michelle Stegner AECOM	10/6/2016	5:10pm	Les Kennedy ALS	10/6/16	1710

CRAYFISH ONLY

1317 South 13th Ave.
Kelso, WA 98626
TEL: (360) 577-7222 / (800) 695-7222 /FAX: (360) 636-1068
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ALS Environmental

AREAS 2, 5, & 6; RL AND SR CHAIN-OF-CUSTODY RECORD

SR # / LAB USE ONLY: K1612074

DATE: 10/05/2016

PAGE: 3 OF 3

LABORATORY CLIENT	Teck American Incorporated
ADDRESS	501 N. Riverpoint Blvd Ste 300, Spokane, WA 99202
TEL	509-623-4505
Cell	509-795-9599
E-MAIL	dave.enos@teck.com
AECOM CONTACT	Christine Gebel
ADDRESS	1111 Third Avenue, Suite 1600, Seattle, WA 98101
TEL	206-438-2103
Fax	206-438-2699
E-MAIL	christine.gebel@aecom.com
CLIENT PROJECT NAME / NUMBER	UCR Macroinvertebrate Study
P.O. NO	
PROJECT CONTACT	Dave Enos, Teck American Incorporated
Bill To	Dave Enos, Teck American Incorporated
SHIPPING CARRIER & TRACKING NUMBER	Fed Ex. Tracking number to be provided by Christine Gebel
TEMPERATURE UPON RECEIPT	______ °C
SAMPLER(S): (PRINT and SIGNATURE)	

TURNAROUND TIME: ○ SAME DAY ○ 24 HR ○ 48 HR ○ 72 HR ◉ Standard

SPECIAL INSTRUCTIONS:

Freeze all samples at -20°C and hold until compositing instructions are recieved.

PCB Congeners, Dioxins/Furans, and Percent Lipids to be analyzed at Vista Analytical.

REQUESTED ANALYSES

	CLIENT SAMPLE ID	ALS LAB ID (Lab Use Only)	SAMPLING DATE	SAMPLING TIME	MATRIX* TYPE	NO. OF CONTAINERS	EPA 6010C or 6020A / Total Metals*	EPA 1631E / Total Mercury	EPA 1630M / Methyl Mercury	EPA 1632A / Inorganic Arsenic	ALS MET-TISP / Percent Moisture	EPA 1668A / PCB Congeners	EPA 1613B / Dioxins, Furans	EPA 1668A / Percent Lipids			Comments
1	A2-CT56-02		10/5/16	1025	Tissue	1											Northern CF
2	A2-CT58-01			1039	Tissue	1											
3	A2-CT62-01			1058	Tissue	1											
4					Tissue	1											
5					Tissue	1											
6					Tissue	1											
7					Tissue	1											
8					Tissue	1											
9					Tissue	1											
10					Tissue	1											

Additional Comments:

* Metals by EPA 6010C or 6020A (per QAPP): Ag, Al, As, Ba, Be, Ca, Cd, Cr, Co, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Se, Sb, Tl, V, Zn

Hold for Pending Composite Plan

REPORT REQUIREMENTS:

- ☐ I. Routine Report: Method Blank, Surrogate, as required
- ☐ II. Report Dup., MS, MSD as required
- ☐ III. CLP Like Summary (no raw data)
- ☑ IV. Data Validation Report
- ☑ V. EDD

Relinquished by: (Print/Signature/Affiliation)	Date	Time	Received by: (Print/Signature/Affiliation)	Date	Time
Michelle Stegner AECOM	10/6/2016	5:10pm	Les Kennedy [signature] ALS	10/6/16	1710

Appendix H

ALS Environmental
1317 South 13th Avenue
Kelso, WA 98626

Confirmation of Sample Receipt

To:	Dave Enos	**From:**	Jeff Coronado
Email:	dave.enos@teck.com	**Email:**	Jeff.Coronado@alsglobal.com
Fax:	509-459-4400	**Fax:**	360-636-1068
Phone:	509-623-4505	**Phone:**	360-577-7222 x3330

Samples for analysis have been received by ALS Environmental on 9/15/16 and assigned our Service Request number **K1610941**. **Please verify the following information and notify me of any corrections as soon as possible.**

The estimated completion date for this work is: **10/16/16**

Client: Teck American Incorporated
Project: UCR - 2016 Benthic Invertebrate Tissue Study

EDD Required: Yes

Tier: V

Report To:
Dave Enos
Teck American Incorporated
501 North Riverpoint Blvd., Suite 300
Spokane, WA 99202

Billing Address:
Kris McCaig
Teck American Incorporated
501 North Riverpoint Blvd., Suite 300
Spokane, WA 99202

Comments:

Thank you for your business!

A - Test is Authorized H - Test is On Hold HP - Test is On Hold Pending Input P - Test is Authorized for Prep Only C - Test has been Cancelled * - Test has assigned QC

				Archive Archive -20C
K1610941-001	A4-CT31-CR-01	Tissue	9/ 8/16 0929	A
K1610941-002	A4-CT31-CR-02	Tissue	9/ 8/16 0935	A
K1610941-003	A4-CT31-CR-03	Tissue	9/ 8/16 0941	A
K1610941-004	A4-CT31-CR-04	Tissue	9/ 8/16 0943	A
K1610941-005	A4-CT31-CR-05	Tissue	9/ 8/16 0947	A
K1610941-006	A4-CT31-CR-06	Tissue	9/ 8/16 0949	A
K1610941-007	A4-CT31-CR-07	Tissue	9/ 8/16 0952	A
K1610941-008	A4-CT34-CR-01	Tissue	9/ 8/16 0958	A
K1610941-009	A4-CT34-CR-02	Tissue	9/ 8/16 1001	A
K1610941-010	A4-CT34-CR-03	Tissue	9/ 8/16 1007	A
K1610941-011	A4-CT34-CR-04	Tissue	9/ 8/16 1009	A
K1610941-012	A4-CT34-CR-05	Tissue	9/ 8/16 1012	A
K1610941-013	A4-CT34-CR-06	Tissue	9/ 8/16 1014	A
K1610941-014	A4-CT34-CR-07	Tissue	9/ 8/16 1016	A

				Archive Archive -20C
K1610941-015	A4-CT34-CR-08	Tissue	9/ 8/16 1018	A
K1610941-016	A4-CT34-CR-09	Tissue	9/ 8/16 1021	A
K1610941-017	A4-CT34-CR-10	Tissue	9/ 8/16 1024	A
K1610941-018	A4-CT35-CR-01	Tissue	9/ 8/16 1139	A
K1610941-019	A4-CT35-CR-02	Tissue	9/ 8/16 1144	A
K1610941-020	A4-CT35-CR-03	Tissue	9/ 8/16 1147	A
K1610941-021	A4-CT35-CR-04	Tissue	9/ 8/16 1150	A
K1610941-022	A4-CT35-CR-05	Tissue	9/ 8/16 1154	A
K1610941-023	A4-CT35-CR-06	Tissue	9/ 8/16 1158	A
K1610941-024	A4-CT35-CR-07	Tissue	9/ 8/16 1201	A
K1610941-025	A4-CT36-CR-01	Tissue	9/ 8/16 1208	A
K1610941-026	A4-CT36-CR-02	Tissue	9/ 8/16 1212	A
K1610941-027	A4-CT36-CR-03	Tissue	9/ 8/16 1219	A
K1610941-028	A4-CT36-CR-04	Tissue	9/ 8/16 1222	A

				Archive Archive -20C
K1610941-029	A3-CT36-CR-01	Tissue	9/11/16 0841	A
K1610941-030	A3-CT36-CR-02	Tissue	9/11/16 0841	A
K1610941-031	A3-CT39-CR-01	Tissue	9/11/16 0855	A
K1610941-032	A3-CT46-CR-01	Tissue	9/11/16 0927	A
K1610941-033	A3-CT47-CR-01	Tissue	9/11/16 0933	A
K1610941-034	A3-CT50-CR-01	Tissue	9/11/16 0947	A
K1610941-035	A3-CT50-CR-02	Tissue	9/11/16 0947	A
K1610941-036	A3-CT50-CR-03	Tissue	9/11/16 0947	A
K1610941-037	A3-CT52-CR-01	Tissue	9/11/16 1002	A
K1610941-038	A3-CT58-CR-01	Tissue	9/11/16 1027	A
K1610941-039	A3-CT58-CR-02	Tissue	9/11/16 1027	A
K1610941-040	A3-CT60-CR-01	Tissue	9/11/16 1036	A
K1610941-041	A3-CT62-CR-01	Tissue	9/12/16 1105	A
K1610941-042	A3-CT63-CR-01	Tissue	9/12/16 1114	A

				Archive Archive -20C
K1610941-043	A3-CT45-CR-01	Tissue	9/12/16 1117	A
K1610941-044	A3-CT45-CR-02	Tissue	9/12/16 1117	A
K1610941-045	A3-CT46-CR-02	Tissue	9/12/16 1128	A
K1610941-046	A3-CT46-CR-03	Tissue	9/12/16 1128	A
K1610941-047	A3-CT48-CR-01	Tissue	9/12/16 1142	A
K1610941-048	A3-CT48-CR-02	Tissue	9/12/16 1142	A
K1610941-049	A3-CT49-CR-01	Tissue	9/12/16 1145	A
K1610941-050	A3-CT53-CR-01	Tissue	9/12/16 1218	A
K1610941-051	A3-CT37-CR-01	Tissue	9/12/16 1348	A

Test Comments:

Group	Test/Method	Samples	Comments
SMO	Archive/Archive -20C	1-51	Per sample cost for -20C archive for 1 year.

1317 South 13th Avenue
Kelso, WA 98626

Confirmation of Sample Receipt

To:	Dave Enos	**From:**	Jeff Coronado
Email:	dave.enos@teck.com	**Email:**	Jeff.Coronado@alsglobal.com
Fax:	509-459-4400	**Fax:**	360-636-1068
Phone:	509-623-4505	**Phone:**	360-577-7222 x3330

Samples for analysis have been received by ALS Environmental on 9/22/16 and assigned our Service Request number **K1611342**. **Please verify the following information and notify me of any corrections as soon as possible.**

The estimated completion date for this work is: **10/22/16**

Client: Teck American Incorporated
Project: UCR - 2016 Benthic Invertebrate Tissue Study*

EDD Required: Yes

Tier: V

Report To:
Dave Enos
Teck American Incorporated
501 North Riverpoint Blvd., Suite 300
Spokane, WA 99202

Billing Address:
Dave Enos
Teck American Incorporated
501 North Riverpoint Blvd., Suite 300
Spokane, WA 99202

Comments:

Thank you for your business!

A - Test is Authorized H - Test is On Hold HP - Test is On Hold Pending Input P - Test is Authorized for Prep Only C - Test has been Cancelled * - Test has assigned QC

				Archive Archive -20C
K1611342-001	SR-MB34-MU-01	Tissue	9/18/16 1350	A
K1611342-002	SR-MB35-MU-01	Tissue	9/18/16 1425	A
K1611342-003	SR-MB35-MU-02	Tissue	9/18/16 1428	A
K1611342-004	SR-MB36-MU-01	Tissue	9/18/16 1505	A
K1611342-005	SR-MB36-MU-02	Tissue	9/18/16 1507	A
K1611342-006	SR-MB38-MU-01	Tissue	9/19/16 1010	A
K1611342-007	SR-MB38-MU-02	Tissue	9/19/16 1012	A
K1611342-008	SR-MB41-MU-01	Tissue	9/19/16 1248	A
K1611342-009	SR-MB42-MU-01	Tissue	9/19/16 1330	A
K1611342-010	SR-MB34-MU-02	Tissue	9/20/16 0915	A
K1611342-011	SR-MB34-MU-03	Tissue	9/20/16 0920	A
K1611342-012	SR-MB34-MU-04	Tissue	9/20/16 0921	A
K1611342-013	SR-MB34-MU-05	Tissue	9/20/16 0922	A
K1611342-014	SR-MB34-MU-06	Tissue	9/20/16 0926	A

				Archive Archive -20C
K1611342-015	SR-MB34-MU-07	Tissue	9/20/16 0927	A
K1611342-016	SR-MB34-MU-08	Tissue	9/20/16 0929	A
K1611342-017	SR-MB34-MU-09	Tissue	9/20/16 0933	A
K1611342-018	SR-MB34-MU-10	Tissue	9/20/16 1530	A
K1611342-019	SR-MB34-MU-11	Tissue	9/20/16 1532	A
K1611342-020	SR-MB34-MU-12	Tissue	9/20/16 1532	A
K1611342-021	SR-MB34-MU-13	Tissue	9/20/16 1532	A
K1611342-022	SR-MB34-MU-14	Tissue	9/20/16 1533	A
K1611342-023	SR-MB34-MU-15	Tissue	9/20/16 1533	A

1317 South 13th Avenue
Kelso, WA 98626

Confirmation of Sample Receipt

To:	Dave Enos	**From:**	Jeff Coronado
Email:	dave.enos@teck.com	**Email:**	Jeff.Coronado@alsglobal.com
Fax:	509-459-4400	**Fax:**	360-636-1068
Phone:	509-623-4505	**Phone:**	360-577-7222 x3330

Samples for analysis have been received by ALS Environmental on 9/22/16 and assigned our Service Request number **K1611343**. **Please verify the following information and notify me of any corrections as soon as possible.**

The estimated completion date for this work is: **10/22/16**

Client: Teck American Incorporated
Project: UCR - 2016 Benthic Invertebrate Tissue Study*

EDD Required: Yes

Tier: V

Report To:
Dave Enos
Teck American Incorporated
501 North Riverpoint Blvd., Suite 300
Spokane, WA 99202

Billing Address:
Dave Enos
Teck American Incorporated
501 North Riverpoint Blvd., Suite 300
Spokane, WA 99202

Comments:

Thank you for your business!

A - Test is Authorized H - Test is On Hold HP - Test is On Hold Pending Input P - Test is Authorized for Prep Only C - Test has been Cancelled * - Test has assigned QC

				Archive Archive -20C
K1611343-001	A1-CT61-CR-01	Tissue	9/14/16 1124	A
K1611343-002	SR-CT32-CR-01	Tissue	9/19/16 0943	A
K1611343-003	SR-CT41-CR-01	Tissue	9/19/16 1016	A
K1611343-004	SR-CT41-CR-02	Tissue	9/19/16 1016	A
K1611343-005	SR-CT41-CR-03	Tissue	9/19/16 1016	A
K1611343-006	SR-CT44-CR-01	Tissue	9/19/16 1032	A
K1611343-007	SR-CT47-CR-01	Tissue	9/19/16 1052	A
K1611343-008	SR-CT50-CR-01	Tissue	9/19/16 1113	A
K1611343-009	SR-CT51-CR-01	Tissue	9/19/16 1114	A
K1611343-010	SR-CT51-CR-02	Tissue	9/19/16 1114	A
K1611343-011	SR-CT62-CR-01	Tissue	9/19/16 1235	A
K1611343-012	SR-CT55-CR-01	Tissue	9/20/16 1127	A

ACCREDITED IN ACCORDANCE WITH nelac

ALS Environmental
1317 South 13th Avenue
Kelso, WA 98626

Confirmation of Sample Receipt

To:	Dave Enos	**From:**	Jeff Coronado
Email:	dave.enos@teck.com	**Email:**	Jeff.Coronado@alsglobal.com
Fax:	509-459-4400	**Fax:**	360-636-1068
Phone:	509-623-4505	**Phone:**	360-577-7222 x3330

Samples for analysis have been received by ALS Environmental on 10/ 4/16 and assigned our Service Request number **K1611853**. **Please verify the following information and notify me of any corrections as soon as possible.**

The estimated completion date for this work is: **11/3/16**

Client: Teck American Incorporated
Project: UCR - 2016 Benthic Invertebrate Tissue Study*

EDD Required: Yes

Tier: V

Report To:
Dave Enos
Teck American Incorporated
501 North Riverpoint Blvd., Suite 300
Spokane, WA 99202

Billing Address:
Dave Enos
Teck American Incorporated
501 North Riverpoint Blvd., Suite 300
Spokane, WA 99202

Comments:

Thank you for your business!

A - Test is Authorized   H - Test is On Hold   HP - Test is On Hold Pending Input   P - Test is Authorized for Prep Only   C - Test has been Cancelled   * - Test has assigned QC

				Archive Archive -20C
K1611853-001	A3-MB14-MU-01	Tissue	9/29/16 1107	A
K1611853-002	A3-MB14-MU-02	Tissue	9/29/16 1111	A
K1611853-003	A3-MB14-MU-03	Tissue	9/29/16 1115	A
K1611853-004	A3-MB14-MU-04	Tissue	9/29/16 1118	A
K1611853-005	A3-MB14-MU-05	Tissue	9/29/16 1121	A
K1611853-006	A3-MB14-MU-06	Tissue	9/29/16 1125	A
K1611853-007	A3-MB14-MU-07	Tissue	9/29/16 1139	A
K1611853-008	A3-MB14-MU-08	Tissue	9/29/16 1143	A
K1611853-009	A3-MB14-MU-09	Tissue	9/29/16 1146	A
K1611853-010	A3-MB14-MU-10	Tissue	9/29/16 1149	A
K1611853-011	A3-MB14-MU-11	Tissue	9/29/16 1152	A
K1611853-012	A3-MB14-MU-12	Tissue	9/29/16 1155	A
K1611853-013	A3-MB14-MU-13	Tissue	9/29/16 1158	A
K1611853-014	A3-MB14-MU-14	Tissue	9/29/16 1202	A

				Archive Archive -20C
K1611853-015	A3-MB14-MU-15	Tissue	9/29/16 1205	A
K1611853-016	A3-MB14-MU-16	Tissue	9/29/16 1209	A
K1611853-017	A3-MB14-MU-17	Tissue	9/29/16 1213	A
K1611853-018	A3-MB14-MU-18	Tissue	9/29/16 1217	A
K1611853-019	A3-MB14-MU-19	Tissue	9/29/16 1221	A
K1611853-020	A3-MB14-MU-20	Tissue	9/29/16 1225	A
K1611853-021	A3-MB14-MU-21	Tissue	9/29/16 1228	A
K1611853-022	A3-MB14-MU-22	Tissue	9/29/16 1231	A
K1611853-023	A4-MB18-MU-01	Tissue	9/30/16 1140	A
K1611853-024	A4-MB18-MU-02	Tissue	9/30/16 1146	A
K1611853-025	A4-MB18-MU-03	Tissue	9/30/16 1150	A
K1611853-026	A4-MB18-MU-04	Tissue	9/30/16 1153	A
K1611853-027	A4-MB18-MU-05	Tissue	9/30/16 1155	A
K1611853-028	A4-MB18-MU-06	Tissue	9/30/16 1159	A

				Archive Archive -20C
K1611853-029	A4-MB18-MU-07	Tissue	9/30/16 1202	A
K1611853-030	A4-MB18-MU-08	Tissue	9/30/16 1205	A
K1611853-031	A4-MB18-MU-09	Tissue	9/30/16 1207	A
K1611853-032	A4-MB18-MU-10	Tissue	9/30/16 1211	A
K1611853-033	A4-MB18-MU-11	Tissue	9/30/16 1214	A
K1611853-034	A4-MB18-MU-12	Tissue	9/30/16 1217	A
K1611853-035	A4-MB18-MU-13	Tissue	9/30/16 1220	A
K1611853-036	A4-MB18-MU-14	Tissue	9/30/16 1224	A
K1611853-037	A4-MB18-MU-15	Tissue	9/30/16 1227	A
K1611853-038	A4-MB19-MU-01	Tissue	9/30/16 1234	A
K1611853-039	A4-MB19-MU-02	Tissue	9/30/16 1238	A
K1611853-040	A4-MB19-MU-03	Tissue	9/30/16 1241	A
K1611853-041	A4-MB19-MU-04	Tissue	9/30/16 1245	A
K1611853-042	A4-MB19-MU-05	Tissue	9/30/16 1248	A

				Archive Archive -20C
K1611853-043	A4-MB19-MU-06	Tissue	9/30/16 1251	A
K1611853-044	A4-MB19-MU-07	Tissue	9/30/16 1253	A
K1611853-045	A4-MB19-MU-08	Tissue	9/30/16 1256	A
K1611853-046	A4-MB19-MU-09	Tissue	9/30/16 1259	A
K1611853-047	A4-MB19-MU-10	Tissue	9/30/16 1302	A
K1611853-048	A4-MB19-MU-11	Tissue	9/30/16 1305	A
K1611853-049	A4-MB19-MU-12	Tissue	9/30/16 1308	A
K1611853-050	A4-MB19-MU-13	Tissue	9/30/16 1312	A
K1611853-051	A4-MB19-MU-14	Tissue	9/30/16 1314	A
K1611853-052	A4-MB19-MU-15	Tissue	9/30/16 1317	A
K1611853-053	A5-MB21-MU-01	Tissue	10/ 2/16 1103	A
K1611853-054	A5-MB21-MU-02	Tissue	10/ 2/16 1107	A
K1611853-055	A5-MB21-MU-03	Tissue	10/ 2/16 1110	A
K1611853-056	A5-MB21-MU-04	Tissue	10/ 2/16 1112	A

				Archive Archive -20C
K1611853-057	A5-MB21-MU-05	Tissue	10/ 2/16 1115	A
K1611853-058	A5-MB21-MU-06	Tissue	10/ 2/16 1119	A
K1611853-059	A5-MB21-MU-07	Tissue	10/ 2/16 1122	A
K1611853-060	A5-MB21-MU-08	Tissue	10/ 2/16 1126	A
K1611853-061	A5-MB21-MU-09	Tissue	10/ 2/16 1129	A
K1611853-062	A5-MB21-MU-10	Tissue	10/ 2/16 1239	A
K1611853-063	A5-MB21-MU-11	Tissue	10/ 2/16 1242	A
K1611853-064	A5-MB21-MU-12	Tissue	10/ 2/16 1244	A
K1611853-065	A5-MB21-MU-13	Tissue	10/ 2/16 1247	A
K1611853-066	A5-MB21-MU-14	Tissue	10/ 2/16 1251	A
K1611853-067	A5-MB21-MU-15	Tissue	10/ 2/16 1253	A
K1611853-068	A5-MB21-MU-16	Tissue	10/ 2/16 1256	A
K1611853-069	A5-MB21-MU-17	Tissue	10/ 2/16 1259	A
K1611853-070	A5-MB21-MU-18	Tissue	10/ 2/16 1301	A

				Archive Archive -20C
K1611853-071	A5-MB22-MU-01	Tissue	10/ 2/16 1308	A
K1611853-072	A5-MB22-MU-02	Tissue	10/ 2/16 1310	A
K1611853-073	A5-MB22-MU-03	Tissue	10/ 2/16 1313	A
K1611853-074	A5-MB22-MU-04	Tissue	10/ 2/16 1315	A
K1611853-075	A5-MB22-MU-05	Tissue	10/ 2/16 1317	A
K1611853-076	A5-MB22-MU-06	Tissue	10/ 2/16 1320	A
K1611853-077	A5-MB23-MU-01	Tissue	10/ 2/16 1329	A
K1611853-078	A5-MB23-MU-02	Tissue	10/ 2/16 1333	A
K1611853-079	A5-MB24-MU-01	Tissue	10/ 2/16 1540	A
K1611853-080	A5-MB24-MU-02	Tissue	10/ 2/16 1542	A
K1611853-081	A5-MB24-MU-03	Tissue	10/ 2/16 1545	A
K1611853-082	A5-MB24-MU-04	Tissue	10/ 2/16 1548	A
K1611853-083	A5-MB24-MU-05	Tissue	10/ 2/16 1551	A
K1611853-084	A5-MB24-MU-06	Tissue	10/ 2/16 1553	A

				Archive Archive -20C
K1611853-085	A5-MB24-MU-07	Tissue	10/ 2/16 1555	A
K1611853-086	A5-MB24-MU-08	Tissue	10/ 2/16 1558	A
K1611853-087	A5-MB24-MU-09	Tissue	10/ 2/16 1602	A
K1611853-088	A5-MB24-MU-10	Tissue	10/ 2/16 1607	A
K1611853-089	A6-MB11-MU-01	Tissue	10/ 1/16 1131	A
K1611853-090	A6-MB11-MU-02	Tissue	10/ 1/16 1134	A
K1611853-091	A6-MB11-MU-03	Tissue	10/ 1/16 1138	A
K1611853-092	A6-MB11-MU-04	Tissue	10/ 1/16 1142	A
K1611853-093	A6-MB11-MU-05	Tissue	10/ 1/16 1145	A
K1611853-094	A6-MB11-MU-06	Tissue	10/ 1/16 1148	A
K1611853-095	A6-MB11-MU-07	Tissue	10/ 1/16 1151	A
K1611853-096	A6-MB11-MU-08	Tissue	10/ 1/16 1204	A
K1611853-097	A6-MB11-MU-09	Tissue	10/ 1/16 1208	A
K1611853-098	A6-MB11-MU-10	Tissue	10/ 1/16 1212	A

				Archive Archive -20C
K1611853-099	A6-MB11-MU-11	Tissue	10/ 1/16 1215	A
K1611853-100	A6-MB11-MU-12	Tissue	10/ 1/16 1219	A
K1611853-101	A6-MB11-MU-13	Tissue	10/ 1/16 1222	A
K1611853-102	A6-MB11-MU-14	Tissue	10/ 1/16 1224	A
K1611853-103	A6-MB11-MU-15	Tissue	10/ 1/16 1229	A
K1611853-104	A6-MB11-MU-16	Tissue	10/ 1/16 1232	A
K1611853-105	A6-MB11-MU-17	Tissue	10/ 1/16 1234	A
K1611853-106	A6-MB11-MU-18	Tissue	10/ 1/16 1238	A
K1611853-107	A6-MB11-MU-19	Tissue	10/ 1/16 1241	A
K1611853-108	A6-MB11-MU-20	Tissue	10/ 1/16 1244	A
K1611853-109	A6-MB11-MU-21	Tissue	10/ 1/16 1248	A
K1611853-110	A6-MB12-MU-01	Tissue	10/ 1/16 1258	A
K1611853-111	A6-MB12-MU-02	Tissue	10/ 1/16 1301	A
K1611853-112	A6-MB12-MU-03	Tissue	10/ 1/16 1304	A

				Archive Archive -20C
K1611853-113	A6-MB12-MU-04	Tissue	10/ 1/16 1307	A
K1611853-114	A1-MB43-MU-01	Tissue	9/28/16 1149	A
K1611853-115	A1-MB43-MU-02	Tissue	9/28/16 1153	A
K1611853-116	A1-MB43-MU-03	Tissue	9/28/16 1202	A
K1611853-117	A1-MB43-MU-04	Tissue	9/28/16 1205	A
K1611853-118	A1-MB43-MU-05	Tissue	9/28/16 1207	A
K1611853-119	A1-MB43-MU-06	Tissue	9/28/16 1210	A
K1611853-120	A1-MB43-MU-07	Tissue	9/28/16 1213	A
K1611853-121	A1-MB43-MU-08	Tissue	9/28/16 1216	A
K1611853-122	A1-MB43-MU-09	Tissue	9/28/16 1219	A
K1611853-123	A1-MB43-MU-10	Tissue	9/28/16 1223	A
K1611853-124	A1-MB43-MU-11	Tissue	9/28/16 1226	A
K1611853-125	A1-MB43-MU-12	Tissue	9/28/16 1230	A
K1611853-126	A1-MB43-MU-13	Tissue	9/28/16 1234	A

				Archive Archive -20C
K1611853-127	A1-MB43-MU-14	Tissue	9/28/16 1237	A
K1611853-128	A1-MB43-MU-15	Tissue	9/28/16 1240	A
K1611853-129	A1-MB43-MU-16	Tissue	9/28/16 1242	A
K1611853-130	A1-MB43-MU-17	Tissue	9/28/16 1245	A
K1611853-131	A1-MB43-MU-18	Tissue	9/28/16 1248	A
K1611853-132	A1-MB43-MU-19	Tissue	9/28/16 1250	A
K1611853-133	A1-MB43-MU-20	Tissue	9/28/16 1253	A

1317 South 13th Avenue
Kelso, WA 98626

Confirmation of Sample Receipt

To:	Dave Enos	**From:**	Jeff Coronado
Email:	dave.enos@teck.com	**Email:**	Jeff.Coronado@alsglobal.com
Fax:	509-459-4400	**Fax:**	360-636-1068
Phone:	509-623-4505	**Phone:**	360-577-7222 x3330

Samples for analysis have been received by ALS Environmental on 10/ 6/16 and assigned our Service Request number **K1612076**. **Please verify the following information and notify me of any corrections as soon as possible.**

The estimated completion date for this work is: **11/6/16**

Client: Teck American Incorporated
Project: UCR - 2016 Benthic Invertebrate Tissue Study*

EDD Required: Yes

Tier: V

Report To:
Dave Enos
Teck American Incorporated
501 North Riverpoint Blvd., Suite 300
Spokane, WA 99202

Billing Address:
Dave Enos
Teck American Incorporated
501 North Riverpoint Blvd., Suite 300
Spokane, WA 99202

Comments:

Thank you for your business!

A - Test is Authorized | H - Test is On Hold | HP - Test is On Hold Pending Input | P - Test is Authorized for Prep Only | C - Test has been Cancelled | * - Test has assigned QC

				Archive Archive -20C
K1612076-001	A2-CT31-01	Tissue	10/ 5/16 0815	A
K1612076-002	A2-CT31-02	Tissue	10/ 5/16 0815	A
K1612076-003	A2-CT31-03	Tissue	10/ 5/16 0815	A
K1612076-004	A2-CT32-01	Tissue	10/ 5/16 0820	A
K1612076-005	A2-CT34-01	Tissue	10/ 5/16 0830	A
K1612076-006	A2-CT35-01	Tissue	10/ 5/16 0833	A
K1612076-007	A2-CT40-01	Tissue	10/ 5/16 0856	A
K1612076-008	A2-CT45-01	Tissue	10/ 5/16 0915	A
K1612076-009	A2-CT45-02	Tissue	10/ 5/16 0915	A
K1612076-010	A2-CT45-03	Tissue	10/ 5/16 0915	A
K1612076-011	A2-CT45-04	Tissue	10/ 5/16 0915	A
K1612076-012	A2-CT46-01	Tissue	10/ 5/16 0924	A
K1612076-013	A2-CT48-01	Tissue	10/ 5/16 0934	A
K1612076-014	A2-CT48-02	Tissue	10/ 5/16 0934	A

				Archive Archive -20C
K1612076-015	A2-CT48-03	Tissue	10/ 5/16 0934	A
K1612076-016	A2-CT53-01	Tissue	10/ 5/16 1003	A
K1612076-017	A2-CT54-01	Tissue	10/ 5/16 1012	A
K1612076-018	A2-CT54-02	Tissue	10/ 5/16 1012	A
K1612076-019	A2-CT55-01	Tissue	10/ 5/16 1020	A
K1612076-020	A2-CT56-01	Tissue	10/ 5/16 1025	A
K1612076-021	A2-CT56-02	Tissue	10/ 5/16 1025	A
K1612076-022	A2-CT58-01	Tissue	10/ 5/16 1039	A
K1612076-023	A2-CT62-01	Tissue	10/ 5/16 1058	A

Appendix I

(electronic copy only)

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT31

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT31 -117.80353, 48.904985

Photos for Location Id 'A1-CT31'

File Name: A1-CT31.JPG

No samples were taken at Location Id 'A1-CT31'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT32

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT32 -117.810661, 48.907062

Photos for Location Id 'A1-CT32'

File Name: A1-CT32.JPG

No samples were taken at Location Id 'A1-CT32'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT33

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT33 -117.808548, 48.908917

Photos for Location Id 'A1-CT33'

File Name: A1-CT33.JPG

No samples were taken at Location Id 'A1-CT33'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT34

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT34 -117.808168, 48.910354

Photos for Location Id 'A1-CT34'

File Name: A1-CT34.JPG

No samples were taken at Location Id 'A1-CT34'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT35

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT35	-117.796539, 48.917238

Photos for Location Id 'A1-CT35'

File Name: A1-CT35.JPG

No samples were taken at Location Id 'A1-CT35'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT36

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT36 -117.795585, 48.917566

Photos for Location Id 'A1-CT36'

File Name: A1-CT36.JPG

No samples were taken at Location Id 'A1-CT36'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT37

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT37 -117.795147, 48.917662

Photos for Location Id 'A1-CT37'

File Name: A1-CT37.JPG

No samples were taken at Location Id 'A1-CT37'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT38

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT38	-117.791682, 48.916362

Photos for Location Id 'A1-CT38'

File Name: A1-CT38.JPG

No samples were taken at Location Id 'A1-CT38'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT39

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT39 -117.777172, 48.92155

Photos for Location Id 'A1-CT39'

File Name: A1-CT39.JPG

No samples were taken at Location Id 'A1-CT39'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT40

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT40 -117.770484, 48.922262

Photos for Location Id 'A1-CT40'

File Name: A1-CT40.JPG

No samples were taken at Location Id 'A1-CT40'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT41

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT41	-117.769126, 48.924191

Photos for Location Id 'A1-CT41'

File Name: A1-CT41.JPG

No samples were taken at Location Id 'A1-CT41'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT42

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT42 -117.766609, 48.925832

Photos for Location Id 'A1-CT42'

File Name: A1-CT42.JPG

No samples were taken at Location Id 'A1-CT42'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT43

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT43 -117.763956, 48.928625

Photos for Location Id 'A1-CT43'

File Name: A1-CT43.JPG

No samples were taken at Location Id 'A1-CT43'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT44

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT44 -117.759286, 48.932105

Photos for Location Id 'A1-CT44'

File Name: A1-CT44.JPG

No samples were taken at Location Id 'A1-CT44'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT45

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT45 -117.763095, 48.934415

Photos for Location Id 'A1-CT45'

File Name: A1-CT45.JPG

No samples were taken at Location Id 'A1-CT45'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT46

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT46	-117.763451, 48.935281

Photos for Location Id 'A1-CT46'

File Name: A1-CT46.JPG

No samples were taken at Location Id 'A1-CT46'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT47

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT47 -117.762292, 48.936394

Photos for Location Id 'A1-CT47'

File Name: A1-CT47.JPG

No samples were taken at Location Id 'A1-CT47'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT48

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT48 -117.761149, 48.9363

Photos for Location Id 'A1-CT48'

File Name: A1-CT48.JPG

No samples were taken at Location Id 'A1-CT48'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT49

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT49	-117.751678, 48.936244

Photos for Location Id 'A1-CT49'

File Name: A1-CT49.JPG

No samples were taken at Location Id 'A1-CT49'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT50

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT50 -117.749425, 48.934717

Photos for Location Id 'A1-CT50'

File Name: A1-CT50.JPG

No samples were taken at Location Id 'A1-CT50'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT51

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT51 -117.734679, 48.941827

Photos for Location Id 'A1-CT51'

File Name: A1-CT51.JPG

No samples were taken at Location Id 'A1-CT51'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT52

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT52 -117.733136, 48.941304

Photos for Location Id 'A1-CT52'

File Name: A1-CT52.JPG

No samples were taken at Location Id 'A1-CT52'

Location Id: **A1-CT53**

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT53 -117.73316, 48.940434

Photos for Location Id 'A1-CT53'

File Name: A1-CT53.JPG

No samples were taken at Location Id 'A1-CT53'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT54

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT54 -117.734122, 48.937607

Photos for Location Id 'A1-CT54'

File Name: A1-CT54.JPG

No samples were taken at Location Id 'A1-CT54'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT55

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT55 -117.728479, 48.934485

Photos for Location Id 'A1-CT55'

File Name: A1-CT55.JPG

No samples were taken at Location Id 'A1-CT55'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT56

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT56 -117.728091, 48.934452

Photos for Location Id 'A1-CT56'

File Name: A1-CT56.JPG

No samples were taken at Location Id 'A1-CT56'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT57

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT57 -117.725591, 48.933726

Photos for Location Id 'A1-CT57'

File Name: A1-CT57.JPG

No samples were taken at Location Id 'A1-CT57'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT58

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT58 -117.722397, 48.936553

Photos for Location Id 'A1-CT58'

File Name: A1-CT58.JPG

No samples were taken at Location Id 'A1-CT58'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **A1-CT59**

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT59 -117.713054, 48.945512

Photos for Location Id 'A1-CT59'

File Name: A1-CT59.JPG

No samples were taken at Location Id 'A1-CT59'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT60

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT60	-117.715548, 48.94799

Photos for Location Id 'A1-CT60'

No Photos of this location

No samples were taken at Location Id 'A1-CT60'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT61

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT61	-117.733555, 48.941704

Photos for Location Id 'A1-CT61'

No Photos of this location

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

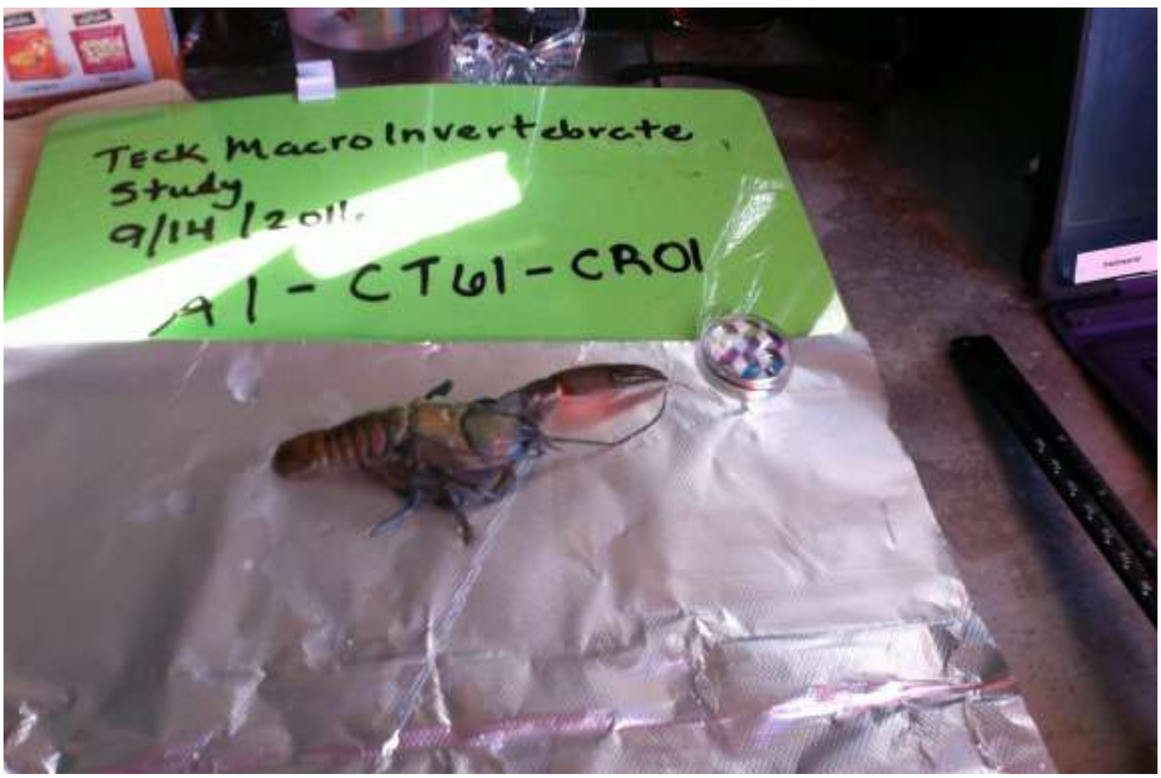
Sample Id: **A1-CT61-CR-01**

Collection Date:	Sep 14, 2016
Collection Time:	11:24
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	43	mm
Length (total)	86	mm
Weight	14.5	g
Health	Live	none
Bait	None	none

Photos for Sample Id 'A1-CT61-CR-01'

File Name: A1-CT61-CR-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT62

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT62 -117.72969, 48.934852

Photos for Location Id 'A1-CT62'

File Name: A1-CT62.JPG

No samples were taken at Location Id 'A1-CT62'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT63

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT63	-117.729547, 48.934279

Photos for Location Id 'A1-CT63'

File Name: A1-CT63.JPG

No samples were taken at Location Id 'A1-CT63'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT64

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT64 -117.759296, 48.932367

Photos for Location Id 'A1-CT64'

File Name: A1-CT64.JPG

No samples were taken at Location Id 'A1-CT64'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-CT65

Location Type: Crayfish trap (CT)

Location Coordinates:

A1-CT65 -117.763344, 48.931259

Photos for Location Id 'A1-CT65'

File Name: A1-CT65.JPG

No samples were taken at Location Id 'A1-CT65'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-MB31

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB31 Begin	-117.732147, 48.940513
A1-MB31 End	-117.730379, 48.940757

Photos for Location Id 'A1-MB31'

File Name: A1-MB31.JPG

No samples were taken at Location Id 'A1-MB31'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-MB32

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB32 Begin	-117.730382, 48.941045
A1-MB32 End	-117.732271, 48.941414

Photos for Location Id 'A1-MB32'

File Name: A1-MB32.JPG

No samples were taken at Location Id 'A1-MB32'

Location Id: **A1-MB33**

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB33 Begin	-117.724639, 48.933185
A1-MB33 End	-117.726322, 48.93302

Photos for Location Id 'A1-MB33'

File Name: A1-MB33.JPG

No samples were taken at Location Id 'A1-MB33'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-MB34

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB34 Begin	-117.726487, 48.933083
A1-MB34 End	-117.728312, 48.933607

Photos for Location Id 'A1-MB34'

File Name: A1-MB34.JPG

No samples were taken at Location Id 'A1-MB34'

Location Id: A1-MB35

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB35 Begin	-117.73242, 48.941399
A1-MB35 End	-117.734064, 48.941923

Photos for Location Id 'A1-MB35'

File Name: A1-MB35.JPG

No samples were taken at Location Id 'A1-MB35'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-MB36

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB36 Begin	-117.715934, 48.948174
A1-MB36 End	-117.717123, 48.947474

Photos for Location Id 'A1-MB36'

File Name: A1-MB36.JPG

No samples were taken at Location Id 'A1-MB36'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-MB37

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB37 Begin	-117.771612, 48.921852
A1-MB37 End	-117.769939, 48.922452

Photos for Location Id 'A1-MB37'

File Name: A1-MB37.JPG

No samples were taken at Location Id 'A1-MB37'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-MB38

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB38 Begin	-117.772129, 48.922686
A1-MB38 End	-117.771676, 48.92196

Photos for Location Id 'A1-MB38'

File Name: A1-MB38.JPG

No samples were taken at Location Id 'A1-MB38'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-MB39

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB39 Begin	-117.772254, 48.922681
A1-MB39 End	-117.772637, 48.922045

Photos for Location Id 'A1-MB39'

File Name: A1-MB39.JPG

AECOM

No samples were taken at Location Id 'A1-MB39'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-MB40

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB40 Begin	-117.773367, 48.922427
A1-MB40 End	-117.775033, 48.922048

Photos for Location Id 'A1-MB40'

File Name: A1-MB40.JPG

No samples were taken at Location Id 'A1-MB40'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-MB41

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB41 Begin	-117.803815, 48.90587
A1-MB41 End	-117.804466, 48.906158

Photos for Location Id 'A1-MB41'

File Name: A1-MB41.JPG

No samples were taken at Location Id 'A1-MB41'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-MB42

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB42 Begin	-117.804795, 48.908657
A1-MB42 End	-117.803742, 48.909796

Photos for Location Id 'A1-MB42'

File Name: A1-MB42.JPG

No samples were taken at Location Id 'A1-MB42'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A1-MB43

Location Type: Mussel beach (MB)

Location Coordinates:

A1-MB43 -117.726463, 48.934021

Photos for Location Id 'A1-MB43'

File Name: A1-MB43.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

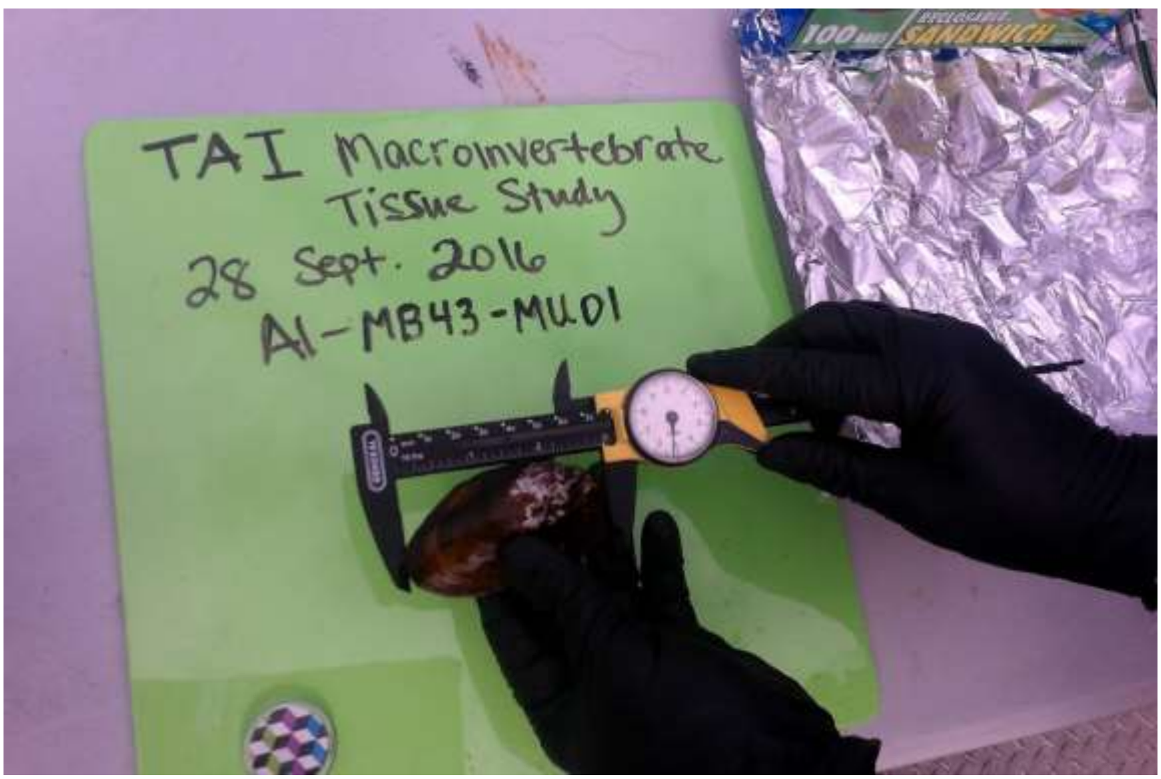
Sample Id: A1-MB43-MU-01

Collection Date:	Sep 28, 2016
Collection Time:	11:49
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	78	mm
Width	43	mm
Breadth	22	mm
Weight	37	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-01'

File Name: A1-MB43-MU-01.JPG



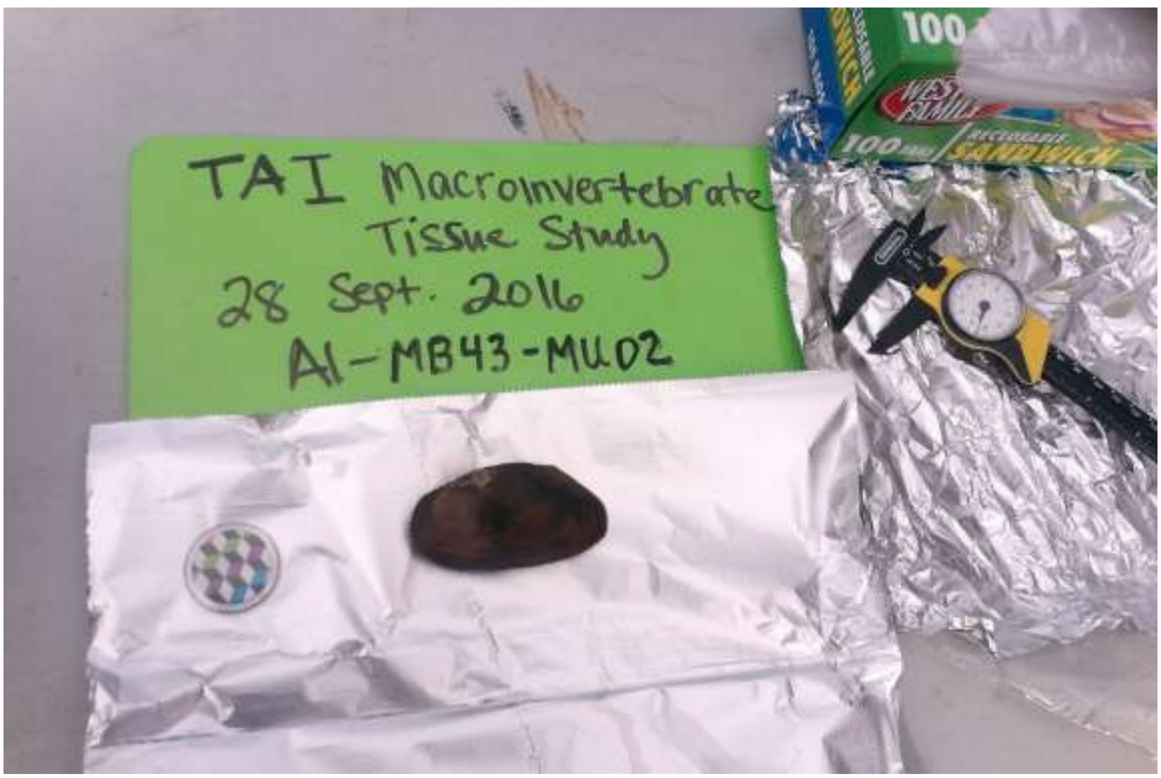
Sample Id: A1-MB43-MU-02

Collection Date:	Sep 28, 2016
Collection Time:	11:53
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	77	mm
Width	40	mm
Breadth	24	mm
Weight	39	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-02'

File Name: A1-MB43-MU-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

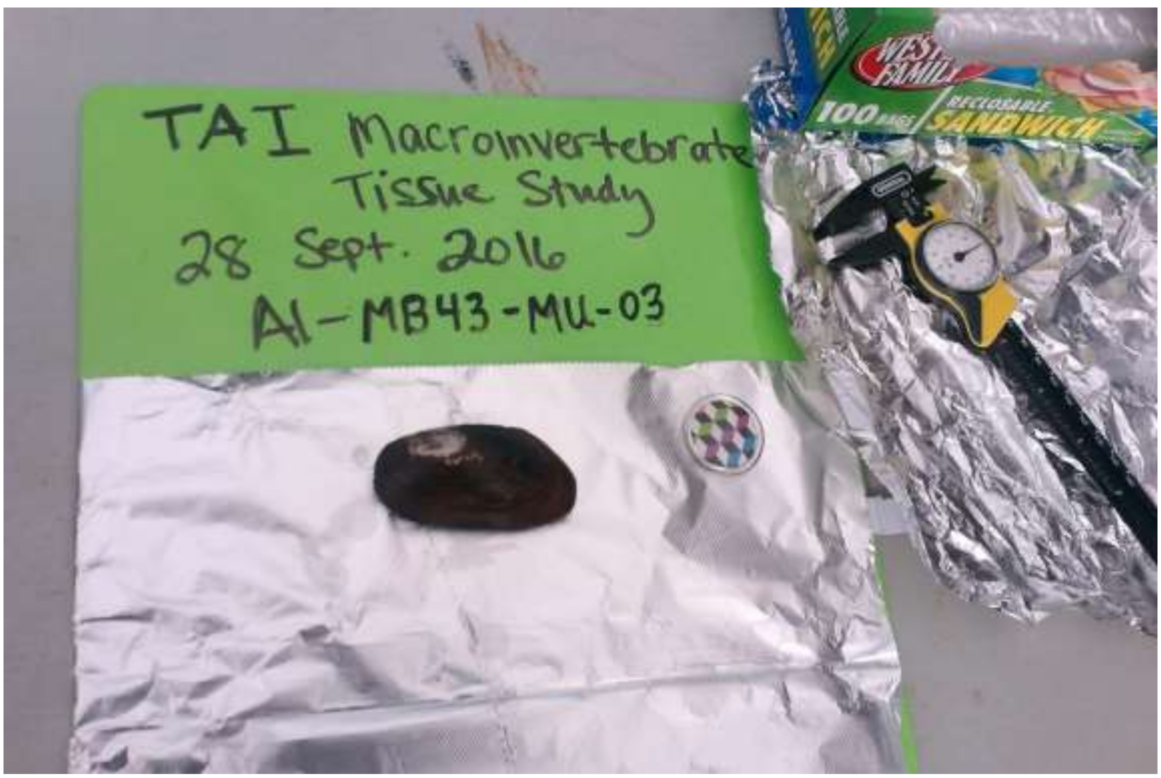
Sample Id: A1-MB43-MU-03

Collection Date:	Sep 28, 2016
Collection Time:	12:02
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	74	mm
Width	37	mm
Breadth	22	mm
Weight	34	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-03'

File Name: A1-MB43-MU-03.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

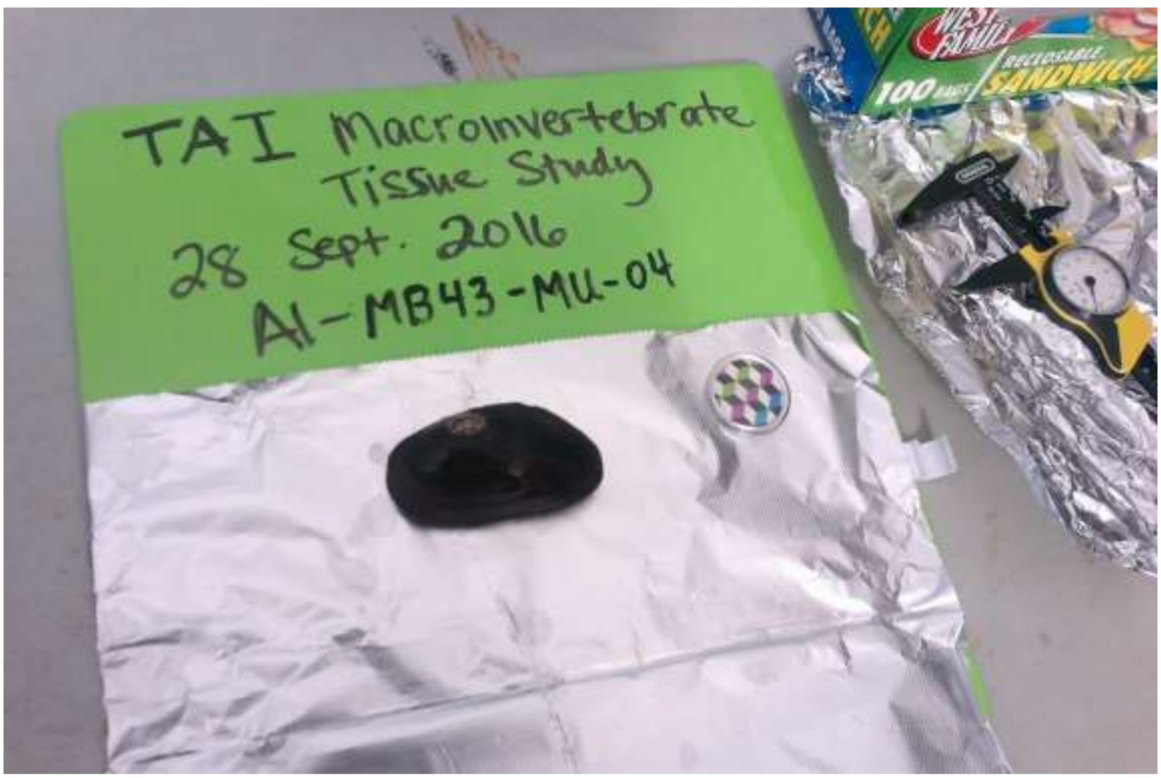
Sample Id: A1-MB43-MU-04

Collection Date:	Sep 28, 2016
Collection Time:	12:05
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	77	mm
Width	40	mm
Breadth	26	mm
Weight	42	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-04'

File Name: A1-MB43-MU-04.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

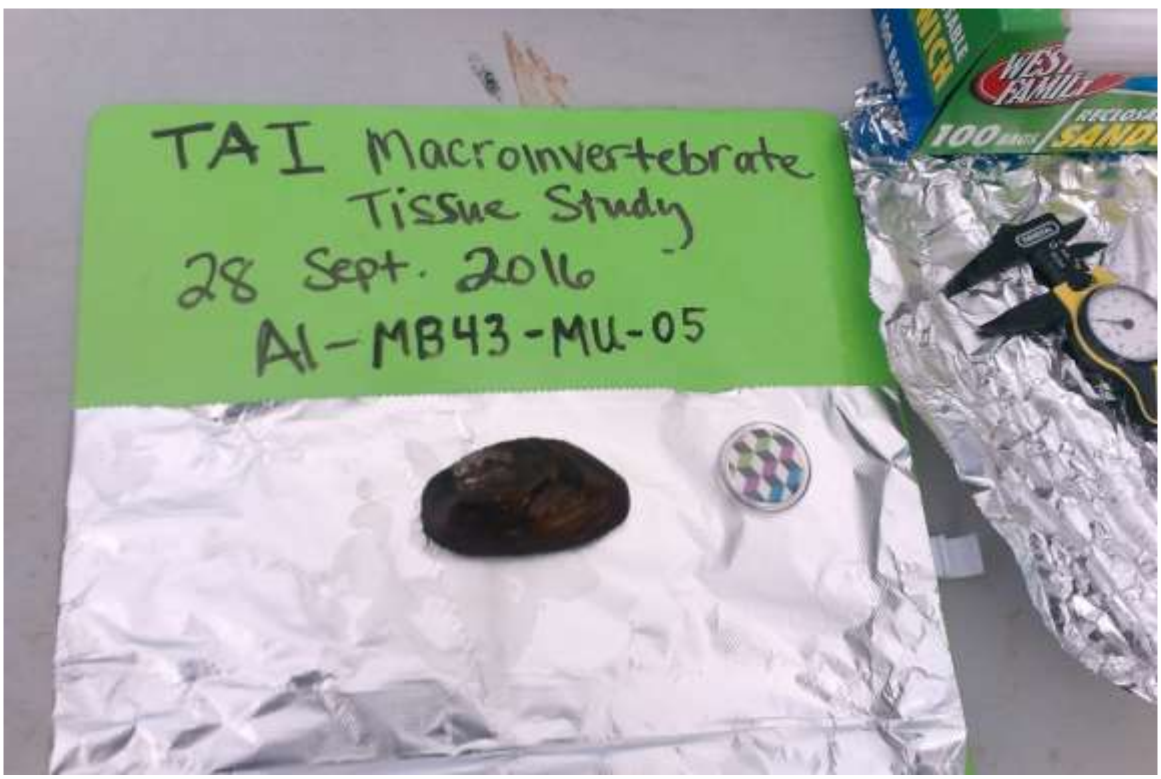
Sample Id: A1-MB43-MU-05

Collection Date:	Sep 28, 2016
Collection Time:	12:07
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	71	mm
Width	38	mm
Breadth	22	mm
Weight	33	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-05'

File Name: A1-MB43-MU-05.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

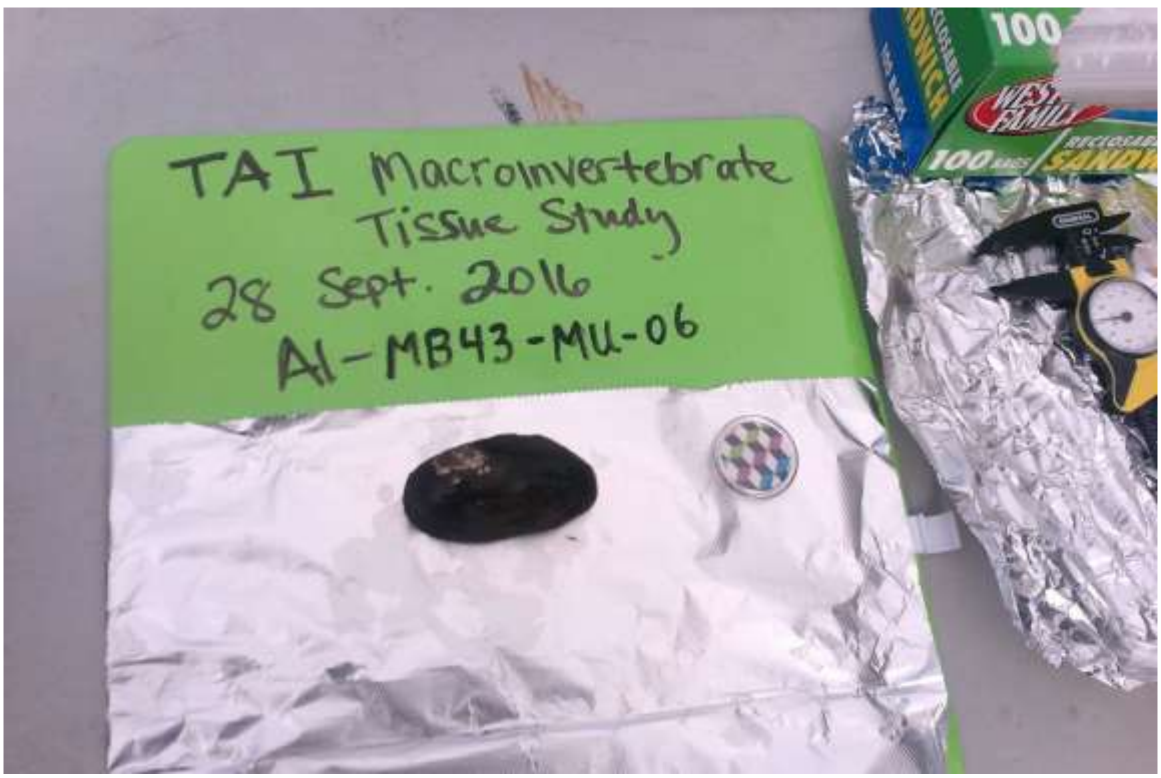
Sample Id: A1-MB43-MU-06

Collection Date:	Sep 28, 2016
Collection Time:	12:10
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	70	mm
Width	36	mm
Breadth	23	mm
Weight	33	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-06'

File Name: A1-MB43-MU-06.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

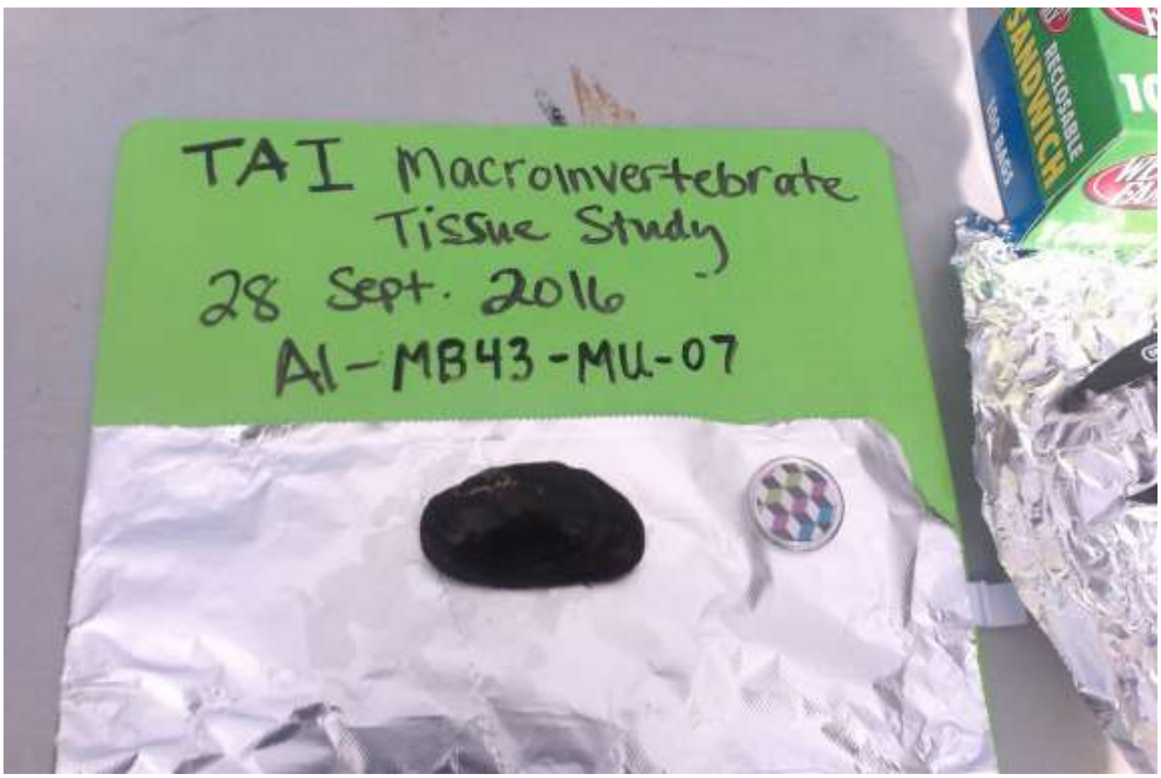
Sample Id: A1-MB43-MU-07

Collection Date:	Sep 28, 2016
Collection Time:	12:13
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	72	mm
Width	40	mm
Breadth	24	mm
Weight	37	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-07'

File Name: A1-MB43-MU-07.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

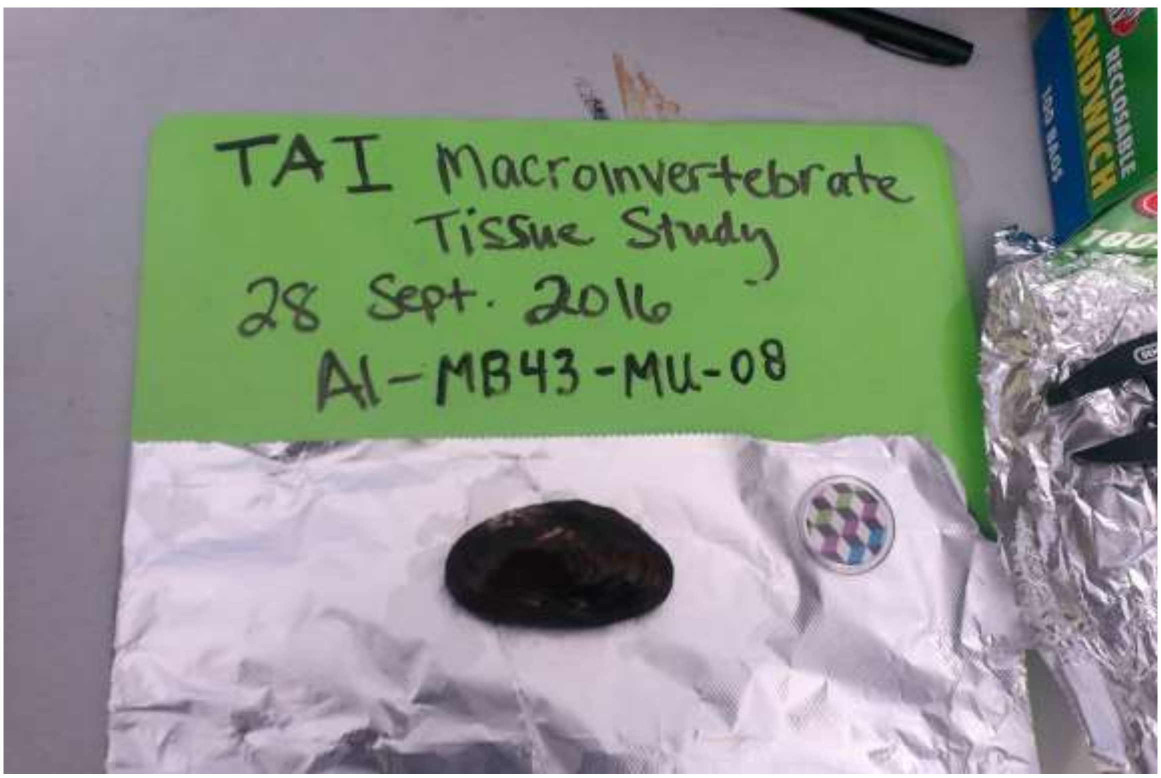
Sample Id: A1-MB43-MU-08

Collection Date:	Sep 28, 2016
Collection Time:	12:16
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	72	mm
Width	40	mm
Breadth	24	mm
Weight	36	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-08'

File Name: A1-MB43-MU-08.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

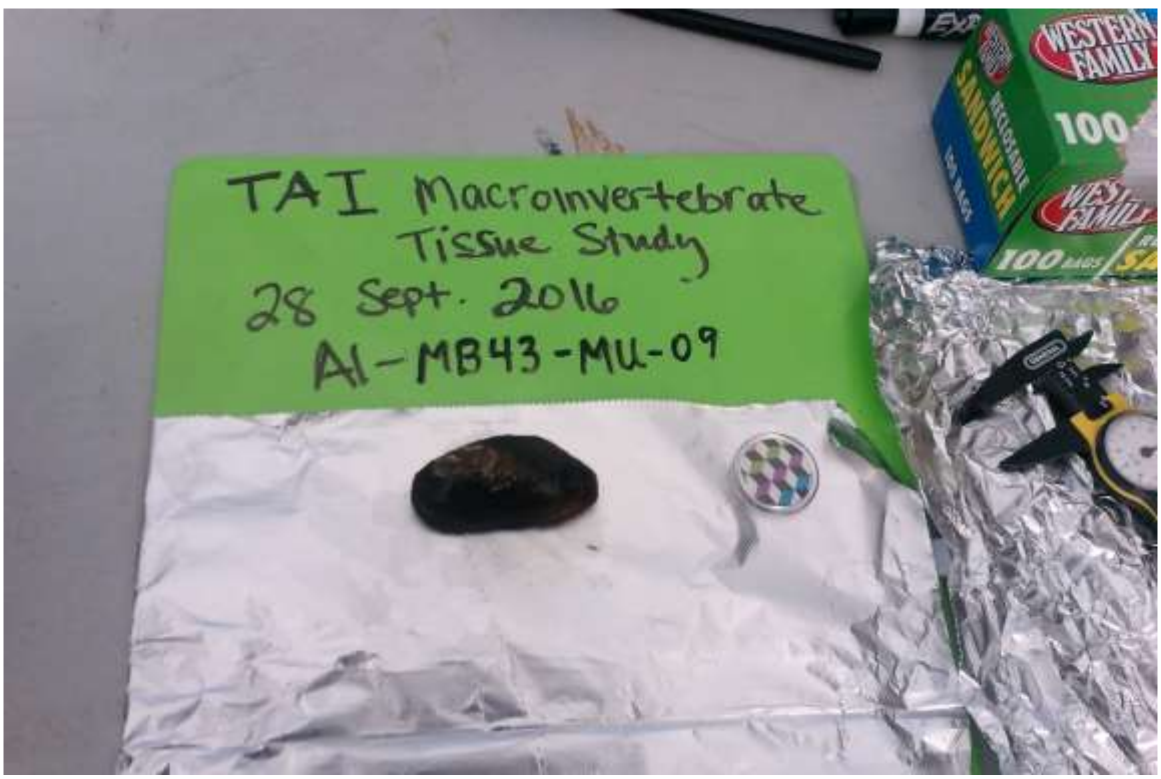
Sample Id: **A1-MB43-MU-09**

Collection Date:	Sep 28, 2016
Collection Time:	12:19
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	68	mm
Width	34	mm
Breadth	21	mm
Weight	28	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-09'

File Name: A1-MB43-MU-09.JPG



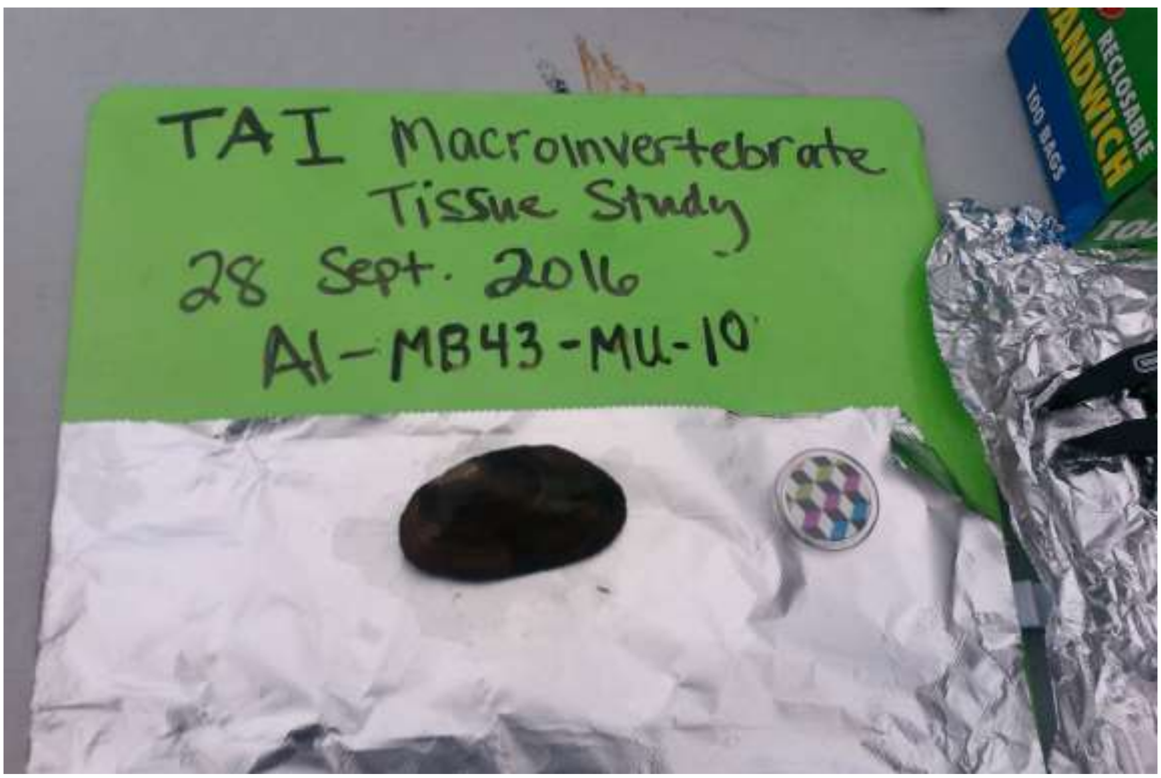
Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A1-MB43-MU-10

Collection Date:	Sep 28, 2016	
Collection Time:	12:23	
Species Type:	MU	
Species Name:	Anodonta sp.	
Measurement	Value	Unit of Measure
Length (total)	68	mm
Width	38	mm
Breadth	22	mm
Weight	30	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-10'

File Name: A1-MB43-MU-10.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

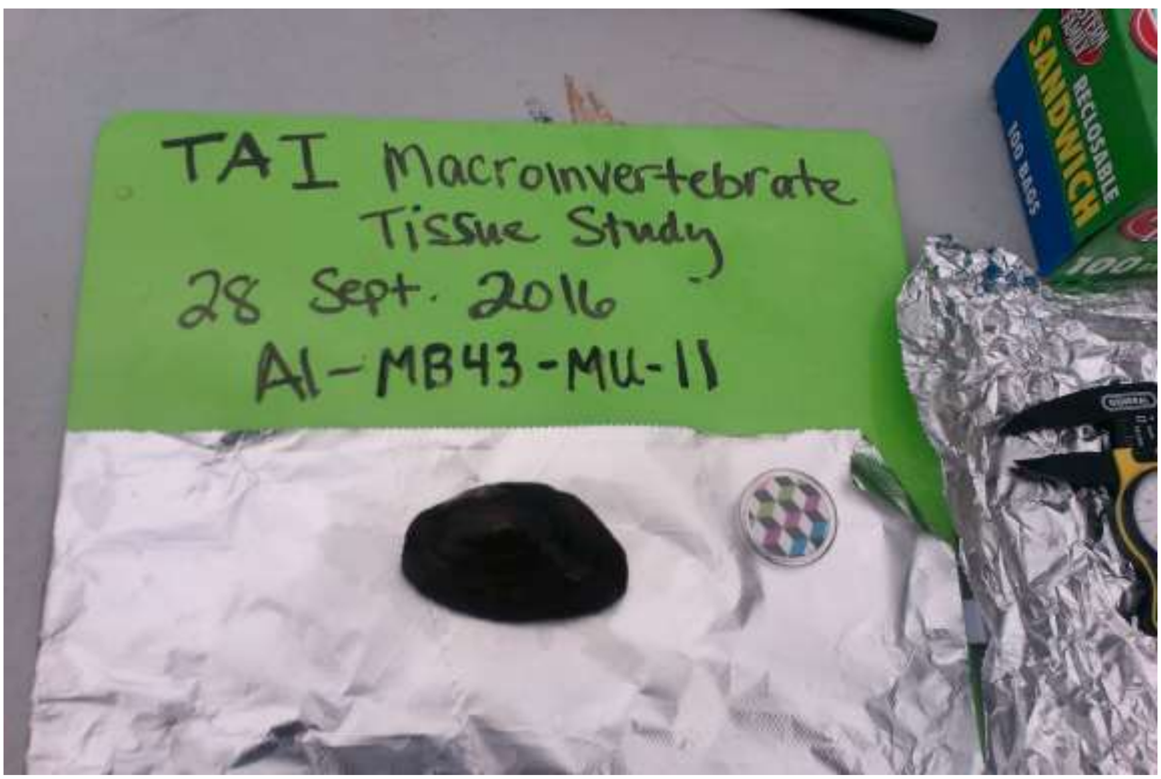
Sample Id: A1-MB43-MU-11

Collection Date:	Sep 28, 2016
Collection Time:	12:26
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	71	mm
Width	43	mm
Breadth	25	mm
Weight	42	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-11'

File Name: A1-MB43-MU-11.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

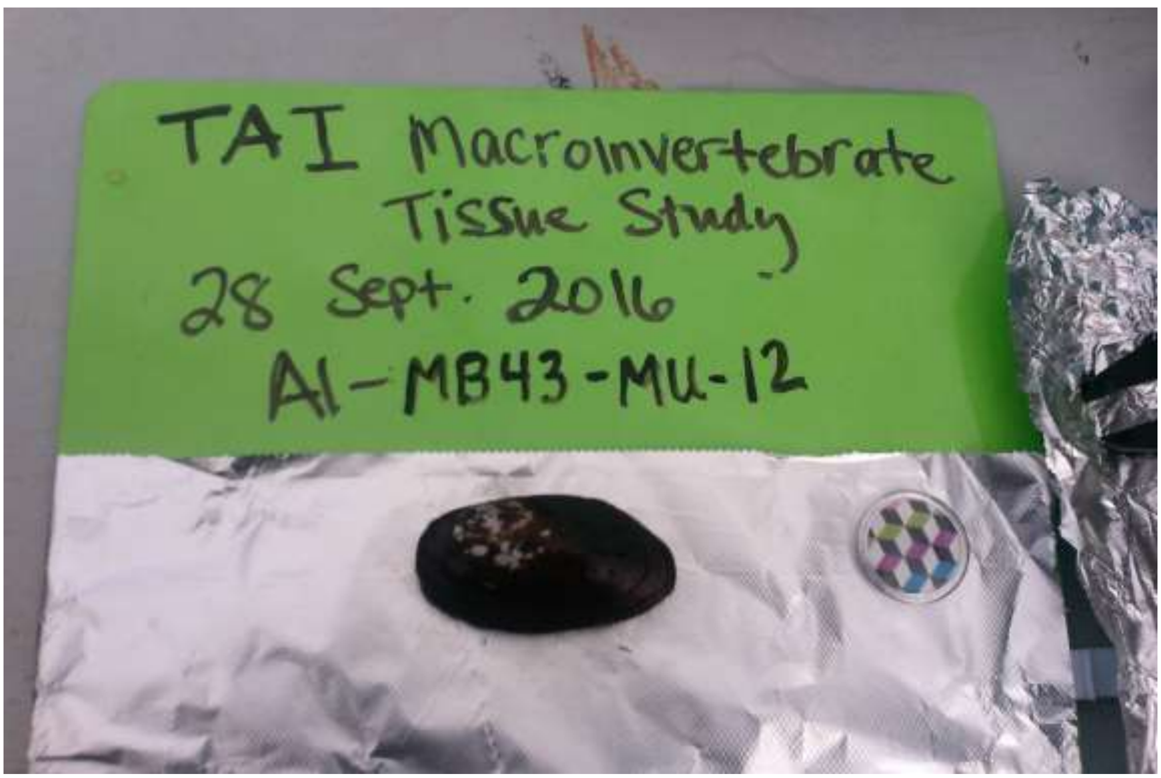
Sample Id: A1-MB43-MU-12

Collection Date:	Sep 28, 2016
Collection Time:	12:30
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	73	mm
Width	38	mm
Breadth	21	mm
Weight	33	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-12'

File Name: A1-MB43-MU-12.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

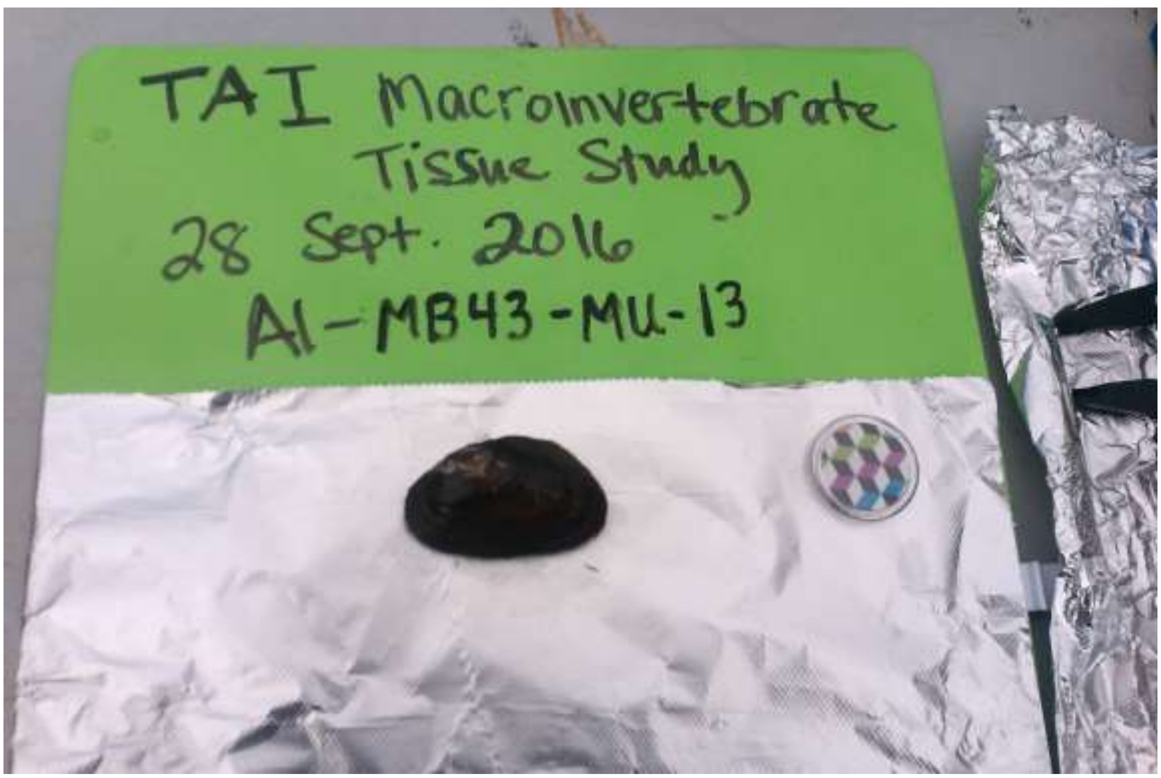
Sample Id: **A1-MB43-MU-13**

Collection Date:	Sep 28, 2016
Collection Time:	12:34
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	58	mm
Width	34	mm
Breadth	22	mm
Weight	24	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-13'

File Name: A1-MB43-MU-13.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

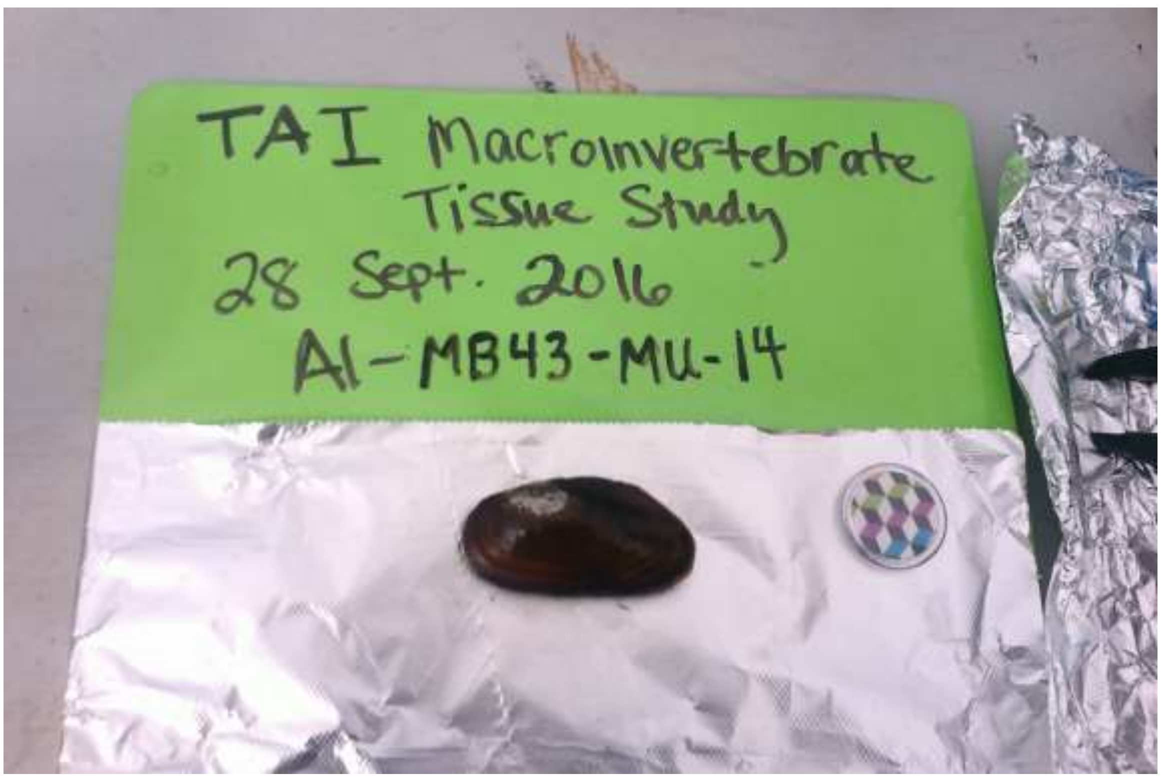
Sample Id: A1-MB43-MU-14

Collection Date:	Sep 28, 2016
Collection Time:	12:37
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	70	mm
Width	35	mm
Breadth	23	mm
Weight	30	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-14'

File Name: A1-MB43-MU-14.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

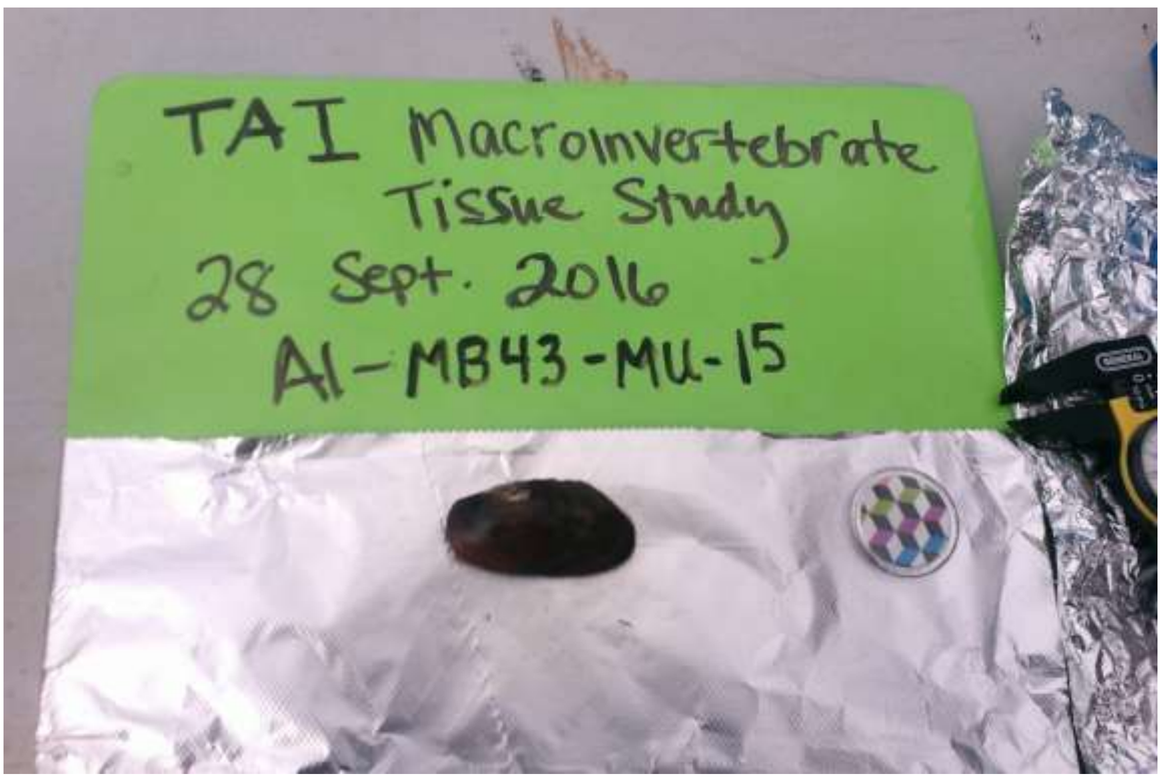
Sample Id: A1-MB43-MU-15

Collection Date:	Sep 28, 2016
Collection Time:	12:40
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	55	mm
Width	28	mm
Breadth	19	mm
Weight	15	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-15'

File Name: A1-MB43-MU-15.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A1-MB43-MU-16

Collection Date: Sep 28, 2016

Collection Time: 12:42

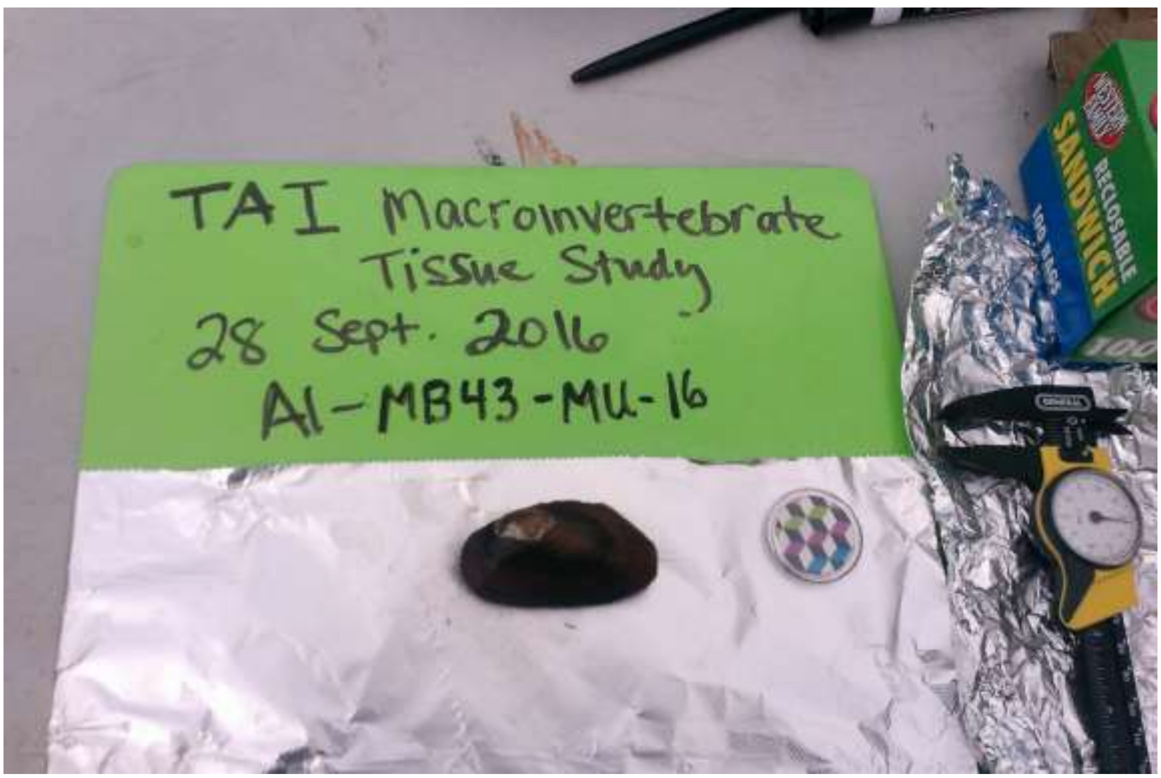
Species Type: MU

Species Name: Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	66	mm
Width	35	mm
Breadth	23	mm
Weight	27	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-16'

File Name: A1-MB43-MU-16.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

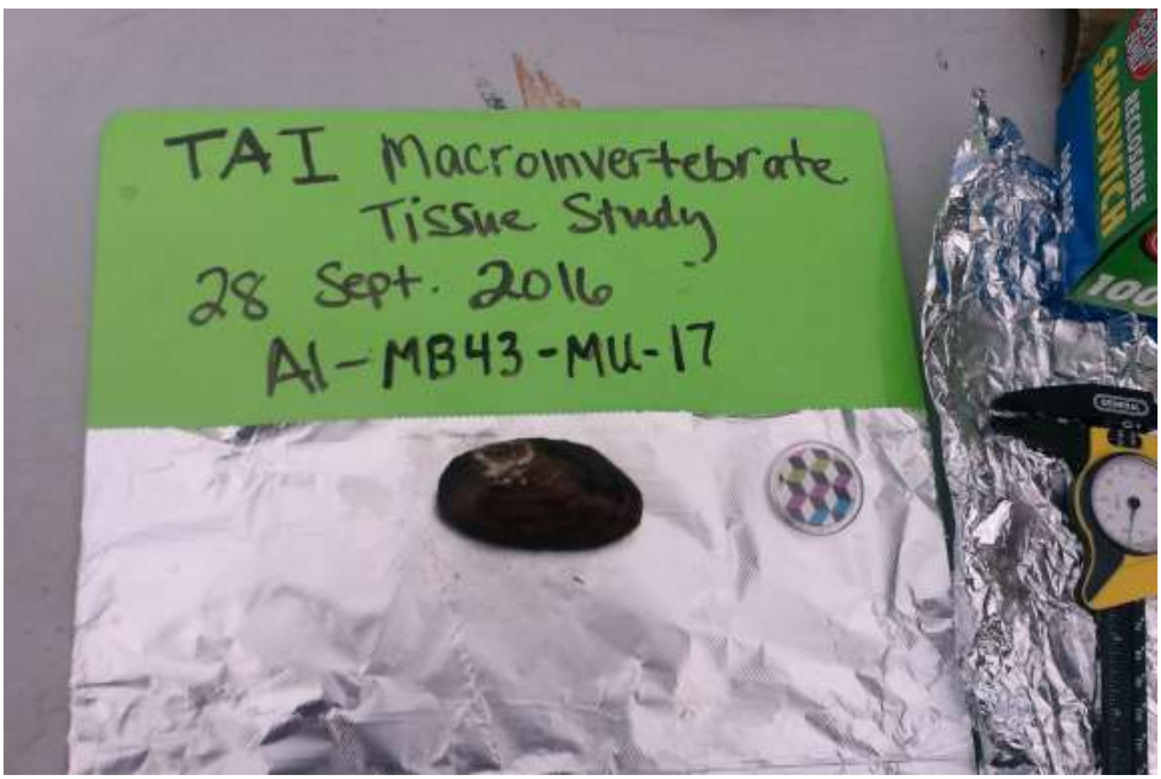
Sample Id: A1-MB43-MU-17

Collection Date:	Sep 28, 2016
Collection Time:	12:45
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	69	mm
Width	37	mm
Breadth	21	mm
Weight	28	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-17'

File Name: A1-MB43-MU-17.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

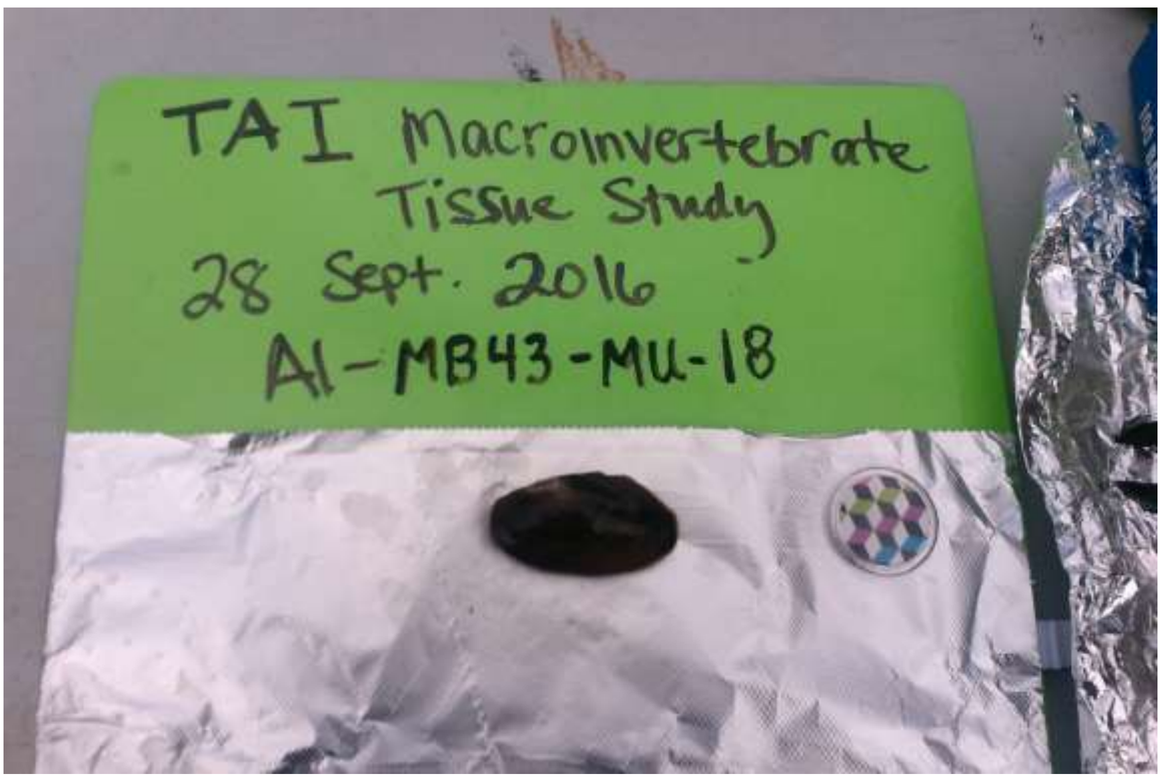
Sample Id: **A1-MB43-MU-18**

Collection Date:	Sep 28, 2016
Collection Time:	12:48
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	55	mm
Width	29	mm
Breadth	19	mm
Weight	17	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-18'

File Name: A1-MB43-MU-18.JPG



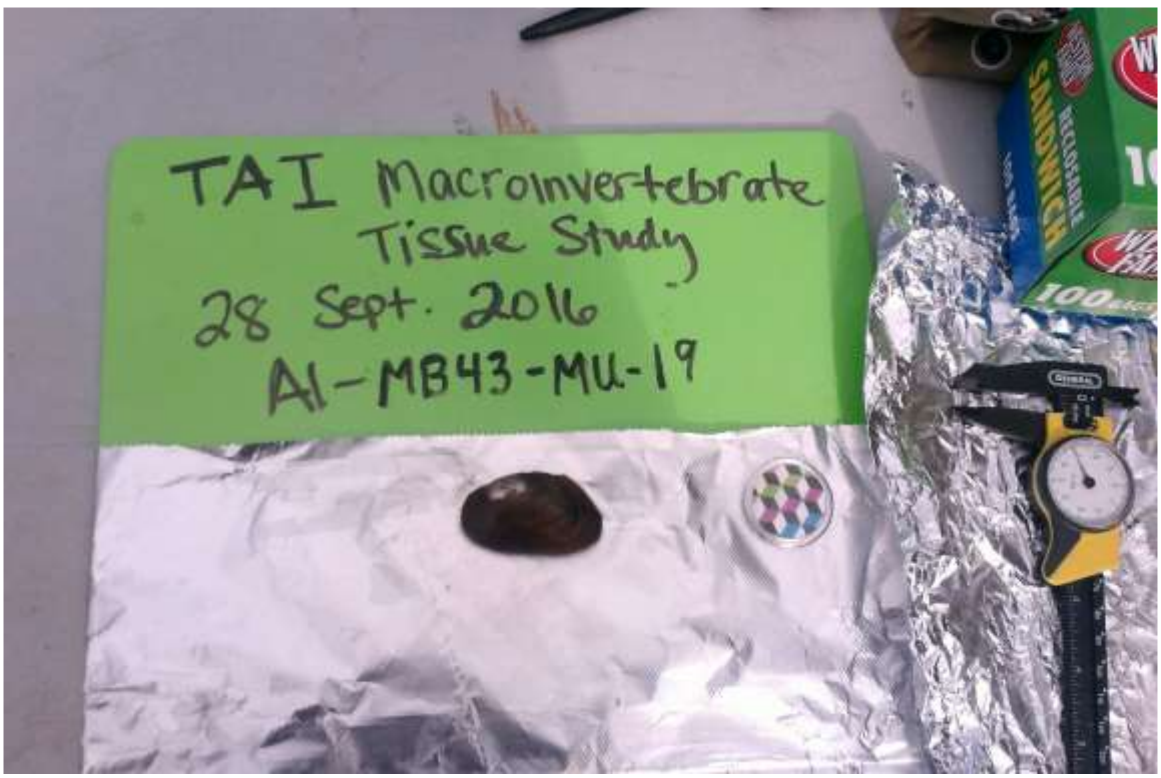
Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A1-MB43-MU-19

Collection Date:	Sep 28, 2016	
Collection Time:	12:50	
Species Type:	MU	
Species Name:	Anodonta sp.	
Measurement	**Value**	**Unit of Measure**
Length (total)	50	mm
Width	29	mm
Breadth	17	mm
Weight	14	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-19'

File Name: A1-MB43-MU-19.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

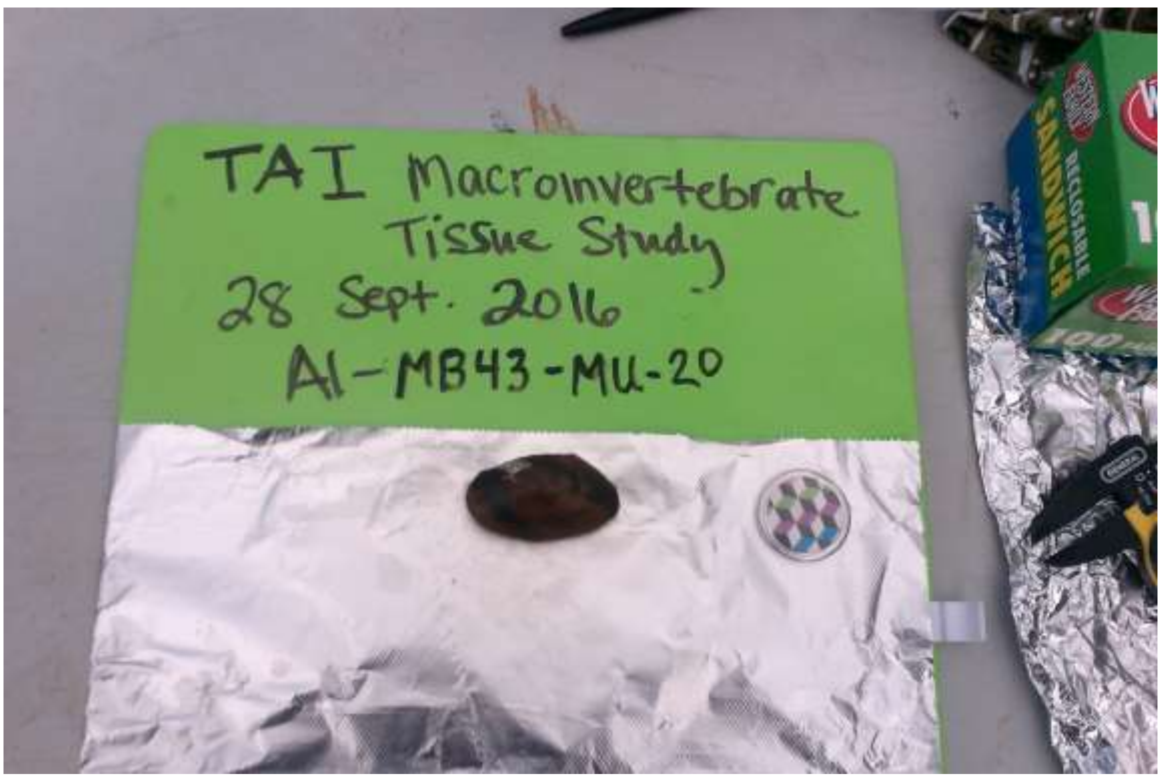
Sample Id: A1-MB43-MU-20

Collection Date:	Sep 28, 2016
Collection Time:	12:53
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	53	mm
Width	31	mm
Breadth	17	mm
Weight	14	g
Health	Live	none

Photos for Sample Id 'A1-MB43-MU-20'

File Name: A1-MB43-MU-20.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

AECOM

Location Id: A2-CT31

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT31 -117.952684, 48.811108

Photos for Location Id 'A2-CT31'

File Name: A2-CT31.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

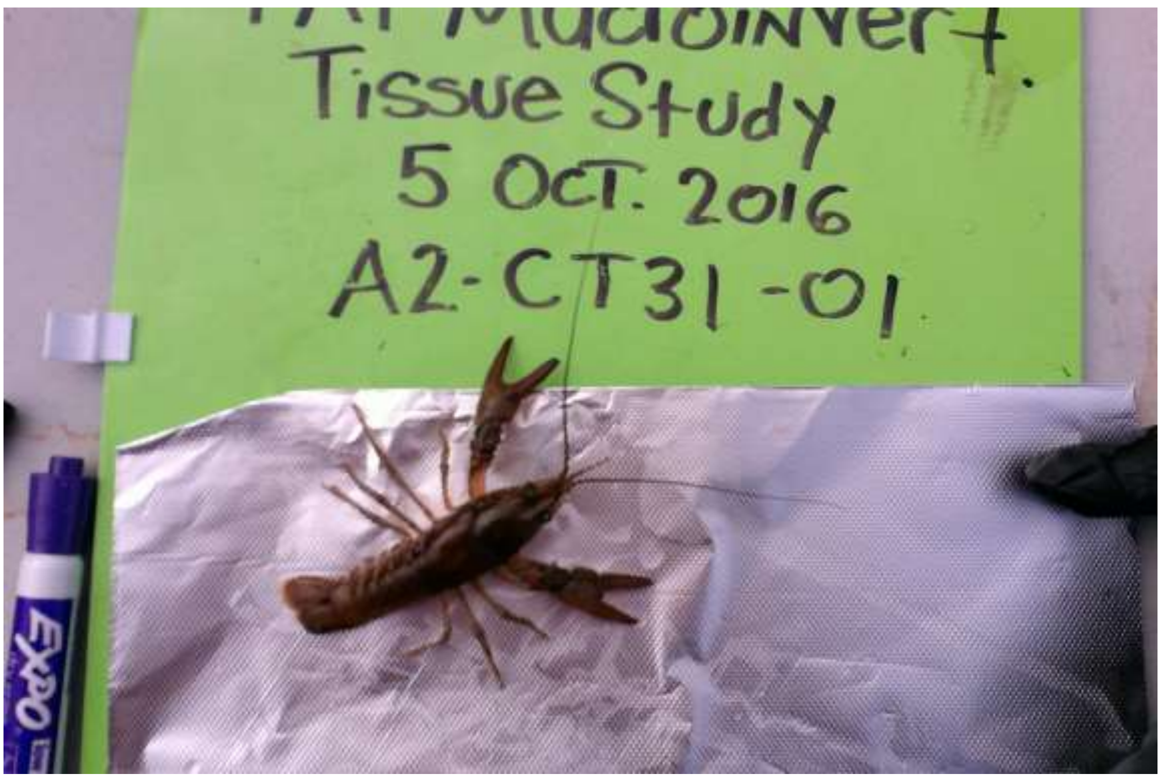
Sample Id: A2-CT31-CR-01

Collection Date:	Oct 05, 2016
Collection Time:	8:15
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	89	mm
Weight	20	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT31-CR-01'

File Name: A2-CT31-CR-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT31-CR-02

Collection Date:	Oct 05, 2016
Collection Time:	8:15
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	46	mm
Length (total)	97	mm
Weight	32	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT31-CR-02'

File Name: A2-CT31-CR-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

AECOM

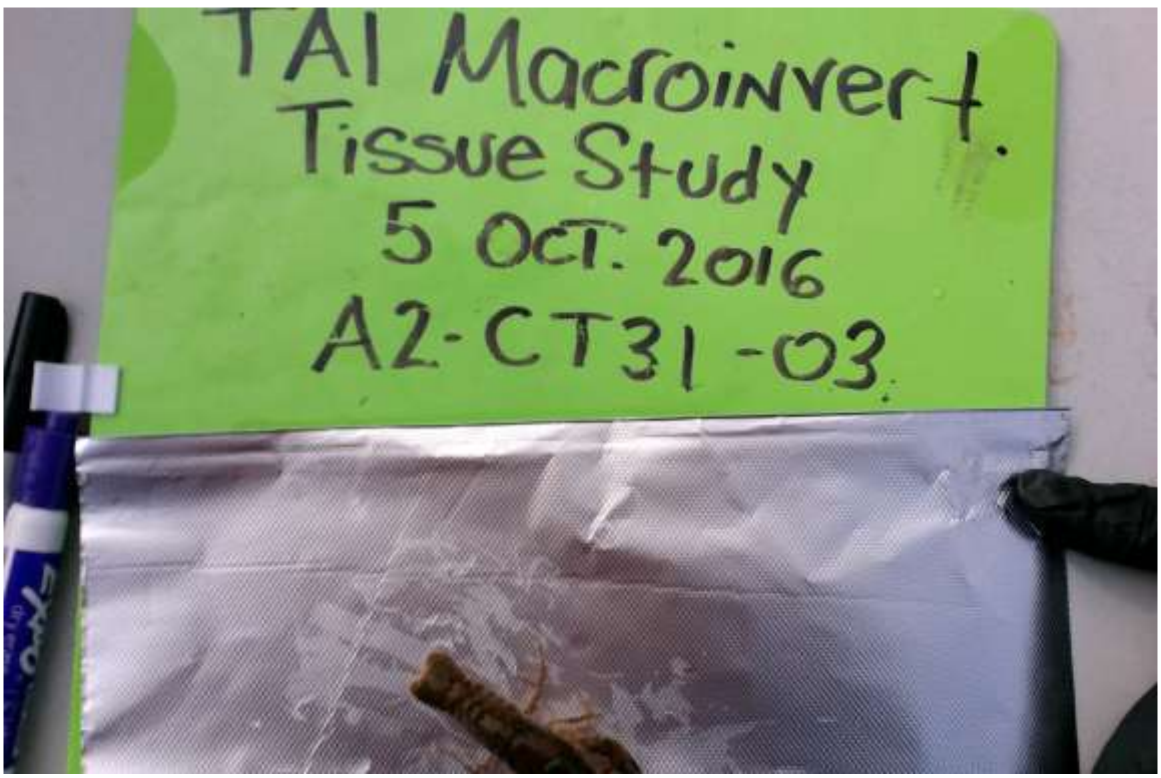
Sample Id: A2-CT31-CR-03

Collection Date:	Oct 05, 2016
Collection Time:	8:15
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	31	mm
Length (total)	66	mm
Weight	7	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT31-CR-03'

File Name: A2-CT31-CR-03.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT32

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT32 -117.953884, 48.811591

Photos for Location Id 'A2-CT32'

File Name: A2-CT32.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

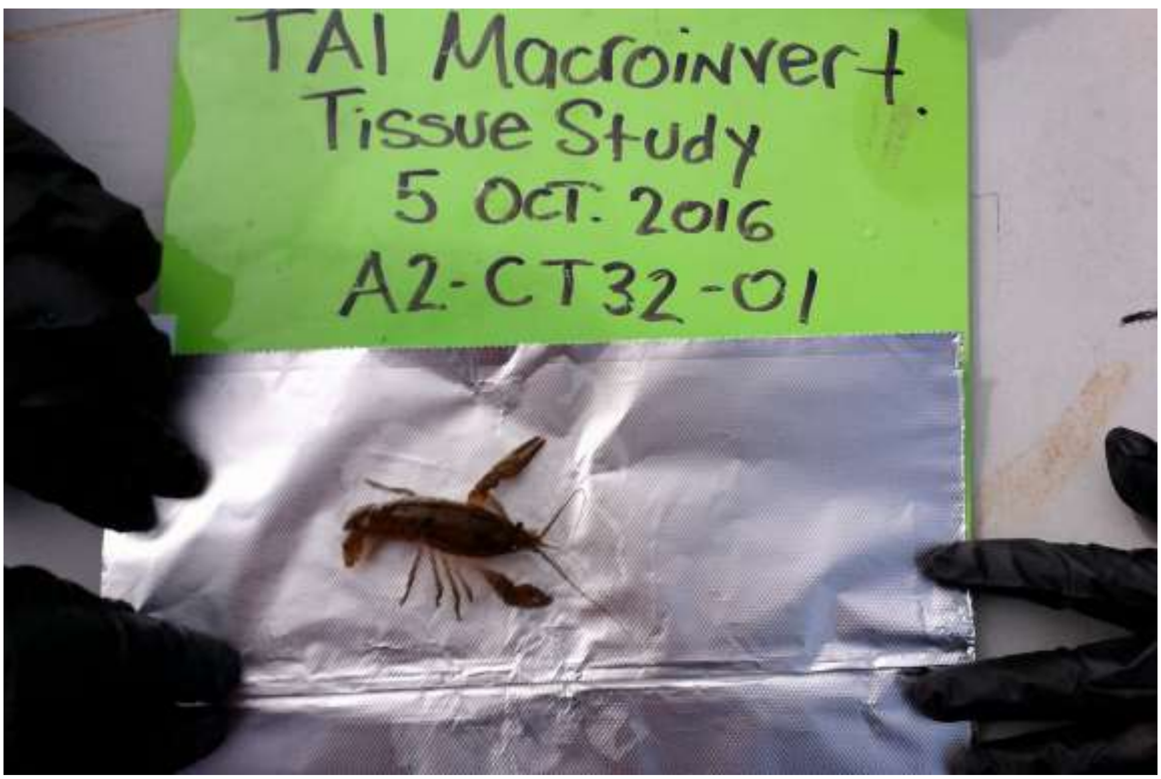
Sample Id: A2-CT32-CR-01

Collection Date:	Oct 05, 2016
Collection Time:	8:20
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	37	mm
Length (total)	75	mm
Weight	12	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT32-CR-01'

File Name: A2-CT32-CR-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT33

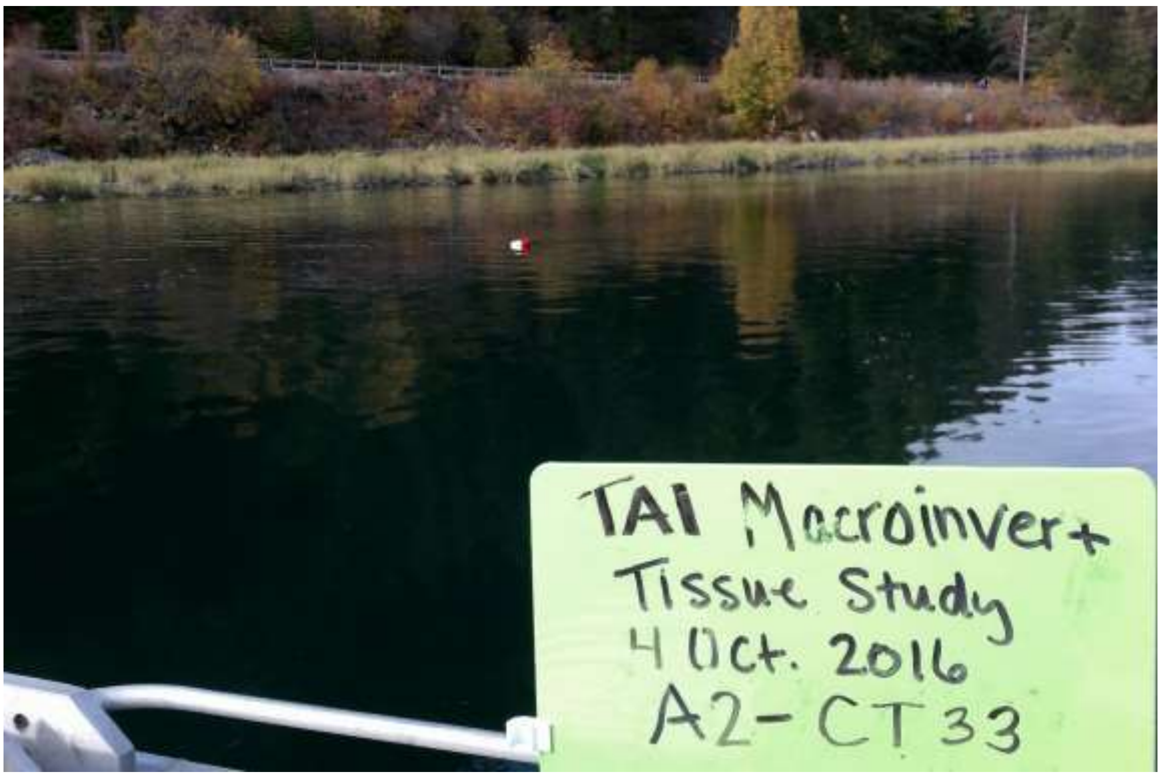
Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT33 -117.95567, 48.812522

Photos for Location Id 'A2-CT33'

File Name: A2-CT33.JPG



No samples were taken at Location Id 'A2-CT33'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT34

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT34 -117.994683, 48.813242

Photos for Location Id 'A2-CT34'

File Name: A2-CT34.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A2-CT34-CR-01**

Collection Date:	Oct 05, 2016
Collection Time:	8:30
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	46	mm
Length (total)	95	mm
Weight	28	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT34-CR-01'

File Name: A2-CT34-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT35

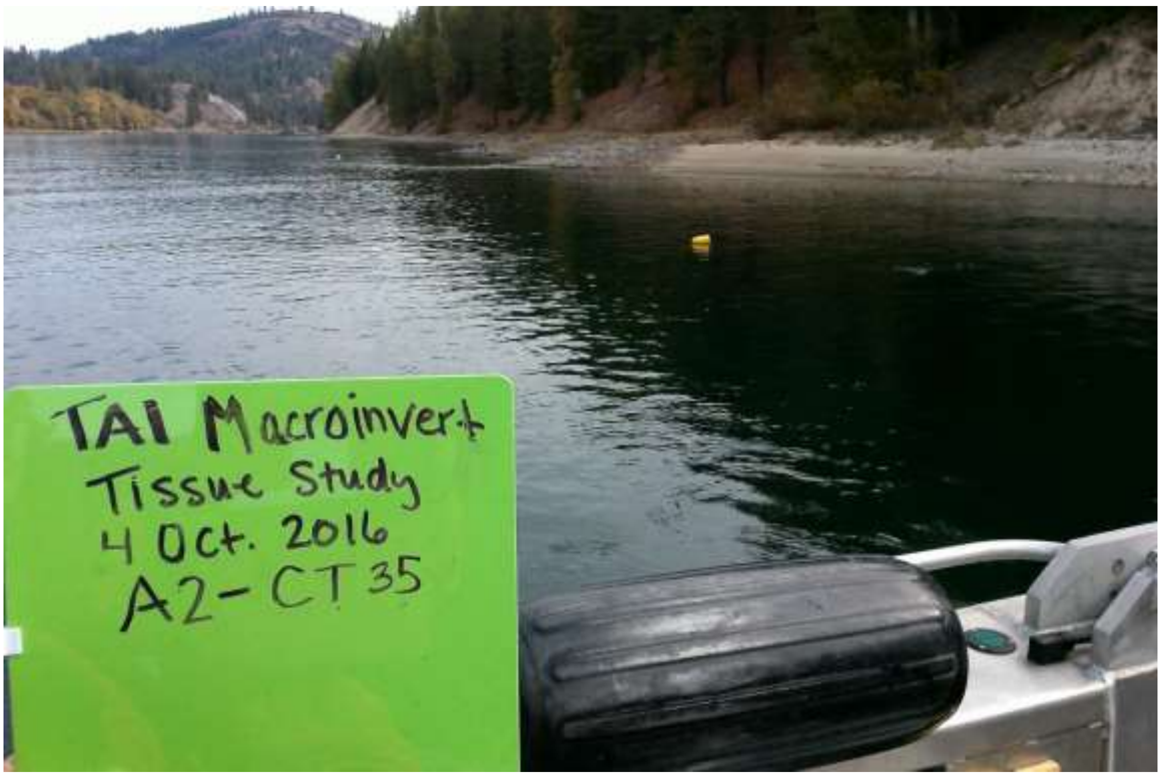
Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT35 -117.995434, 48.812697

Photos for Location Id 'A2-CT35'

File Name: A2-CT35.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT35-CR-01

Collection Date: Oct 05, 2016

Collection Time: 8:33

Species Type: CR

Species Name: Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	49	mm
Length (total)	101	mm
Weight	39	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT35-CR-01'

File Name: A2-CT35-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT36

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT36 -118.007547, 48.79936

Photos for Location Id 'A2-CT36'

File Name: A2-CT36.JPG

No samples were taken at Location Id 'A2-CT36'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT37

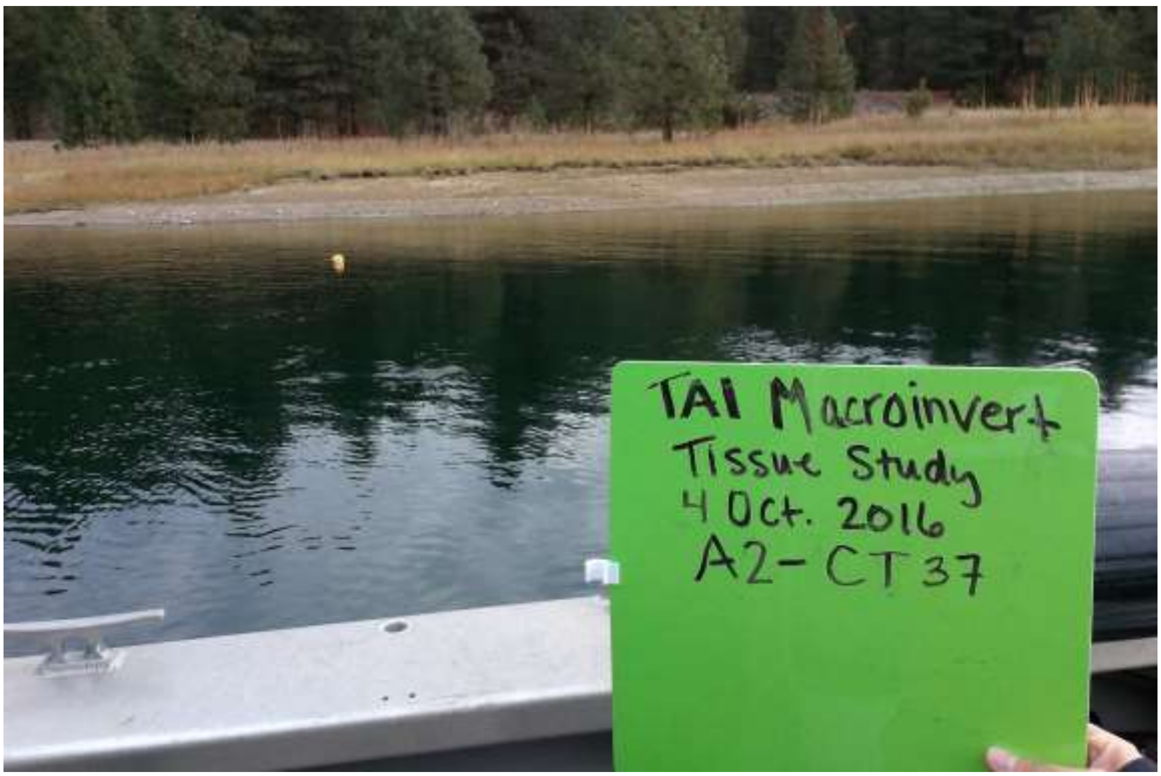
Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT37 -118.007477, 48.79819

Photos for Location Id 'A2-CT37'

File Name: A2-CT37.JPG



No samples were taken at Location Id 'A2-CT37'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT38

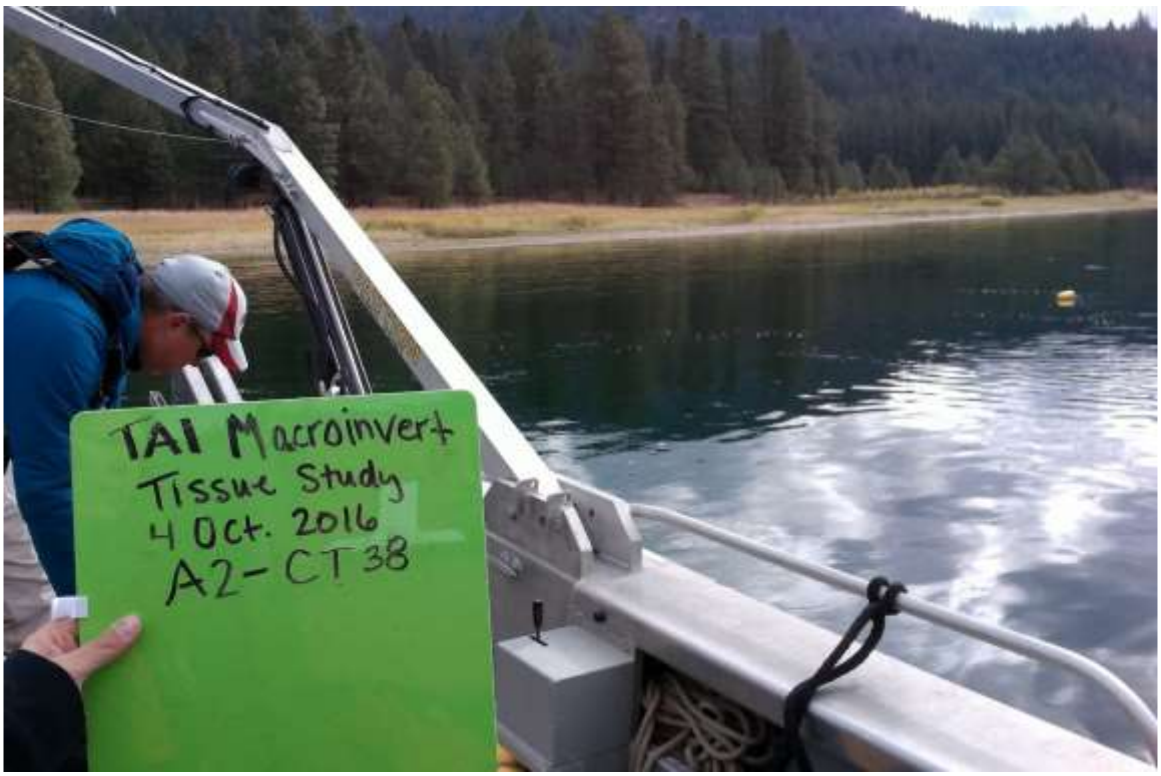
Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT38	-118.006668, 48.796574

Photos for Location Id 'A2-CT38'

File Name: A2-CT38.JPG



No samples were taken at Location Id 'A2-CT38'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT39

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT39 -118.006117, 48.79484

Photos for Location Id 'A2-CT39'

File Name: A2-CT39.JPG

No samples were taken at Location Id 'A2-CT39'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT40

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT40 -118.003396, 48.788866

Photos for Location Id 'A2-CT40'

File Name: A2-CT40.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A2-CT40-CR-01**

Collection Date:	Oct 05, 2016
Collection Time:	8:56
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	39	mm
Length (total)	77	mm
Weight	11	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT40-CR-01'

File Name: A2-CT40-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT41

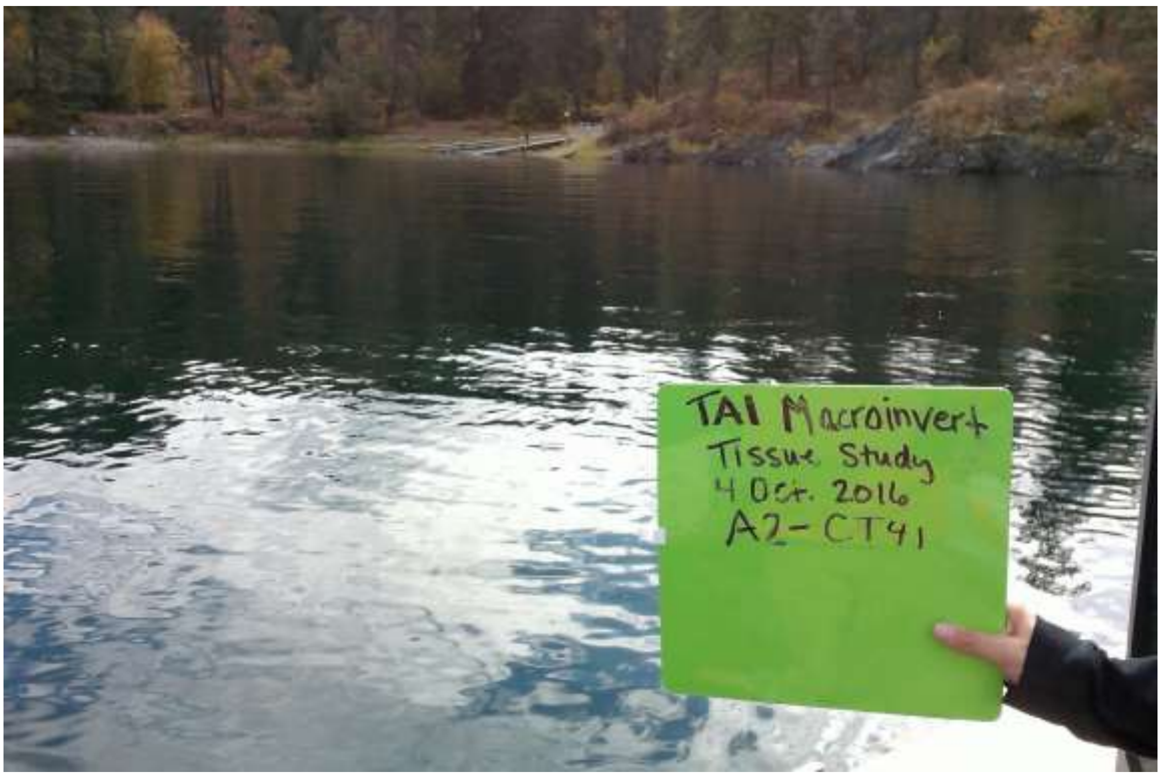
Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT41 -118.003048, 48.787653

Photos for Location Id 'A2-CT41'

File Name: A2-CT41.JPG



No samples were taken at Location Id 'A2-CT41'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **A2-CT42**

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT42	-118.004652, 48.786747

Photos for Location Id 'A2-CT42'

File Name: A2-CT42.JPG

No samples were taken at Location Id 'A2-CT42'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **A2-CT43**

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT43 -118.00449, 48.786542

Photos for Location Id 'A2-CT43'

File Name: A2-CT43.JPG

No samples were taken at Location Id 'A2-CT43'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT44

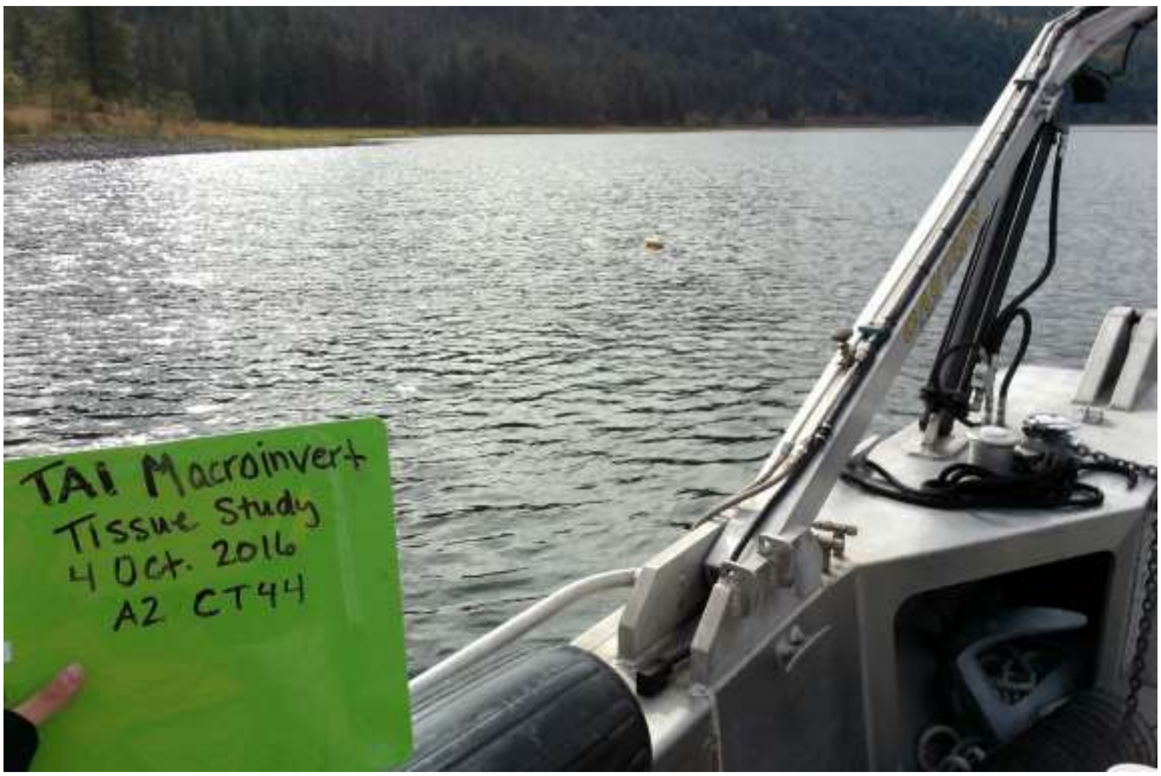
Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT44 -118.00476, 48.785407

Photos for Location Id 'A2-CT44'

File Name: A2-CT44.JPG



No samples were taken at Location Id 'A2-CT44'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT45

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT45 -118.013001, 48.790996

Photos for Location Id 'A2-CT45'

File Name: A2-CT45.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT45-CR-01

Collection Date:	Oct 05, 2016
Collection Time:	9:15
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	48	mm
Length (total)	100	mm
Weight	31	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT45-CR-01'

File Name: A2-CT45-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT45-CR-02

Collection Date:	Oct 05, 2016
Collection Time:	9:15
Species Type:	CR
Species Name:	Pacifastacus leniusculus

Measurement	Value	Unit of Measure
Length (carapace)	54	mm
Length (total)	114	mm
Weight	40	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT45-CR-02'

File Name: A2-CT45-CR-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT45-CR-03

Collection Date:	Oct 05, 2016
Collection Time:	9:15
Species Type:	CR
Species Name:	Pacifastacus leniusculus

Measurement	Value	Unit of Measure
Length (carapace)	52	mm
Length (total)	111	mm
Weight	39	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT45-CR-03'

File Name: A2-CT45-CR-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT45-CR-04

Collection Date:	Oct 05, 2016
Collection Time:	9:15
Species Type:	CR
Species Name:	Pacifastacus leniusculus

Measurement	Value	Unit of Measure
Length (carapace)	51	mm
Length (total)	106	mm
Weight	36	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT45-CR-04'

File Name: A2-CT45-CR-04.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT46

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT46 -118.013108, 48.796676

Photos for Location Id 'A2-CT46'

File Name: A2-CT46.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

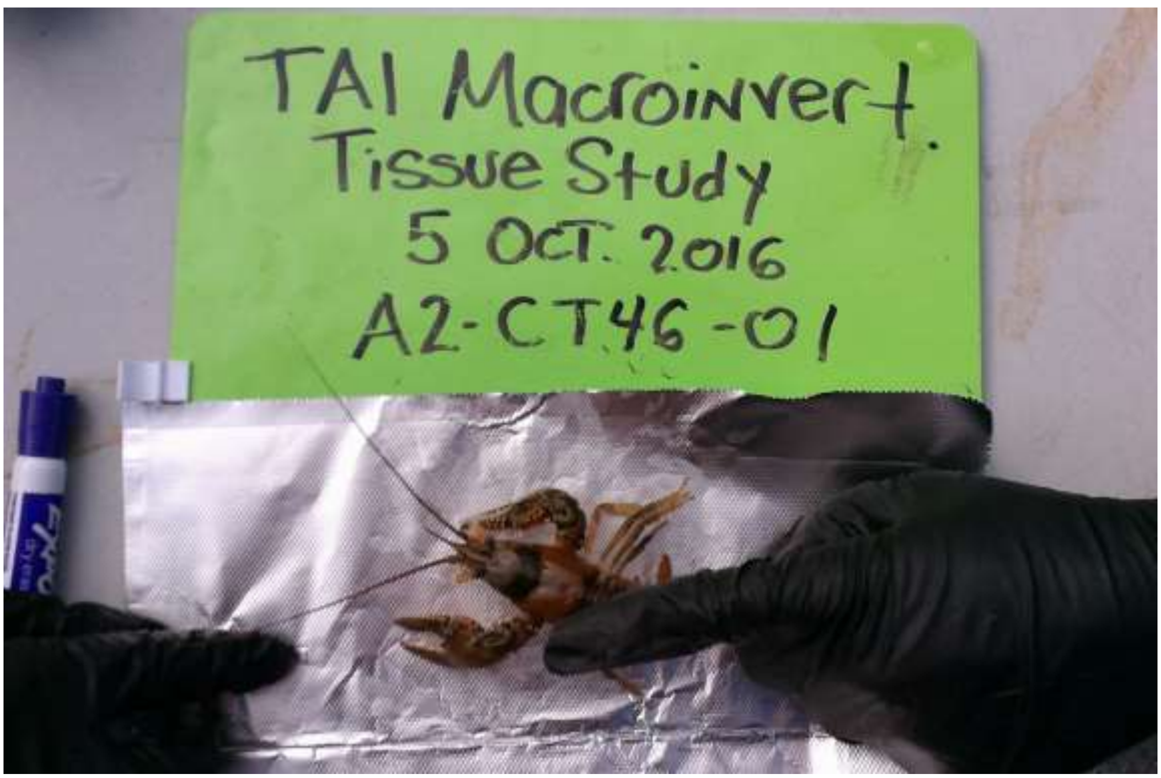
Sample Id: A2-CT46-CR-01

Collection Date:	Oct 05, 2016
Collection Time:	9:24
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	47	mm
Length (total)	91	mm
Weight	36	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT46-CR-01'

File Name: A2-CT46-CR-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT47

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT47 -118.014989, 48.804573

Photos for Location Id 'A2-CT47'

File Name: A2-CT47.JPG

No samples were taken at Location Id 'A2-CT47'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT48

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT48 -118.013283, 48.807809

Photos for Location Id 'A2-CT48'

File Name: A2-CT48.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A2-CT48-CR-01**

Collection Date:	Oct 05, 2016	
Collection Time:	9:34	
Species Type:	CR	
Species Name:	Orconectes virilis	

Measurement	Value	Unit of Measure
Length (carapace)	49	mm
Length (total)	102	mm
Weight	34	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT48-CR-01'

File Name: A2-CT48-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT48-CR-02

Collection Date:	Oct 05, 2016	
Collection Time:	9:34	
Species Type:	CR	
Species Name:	Orconectes virilis	
Measurement	Value	Unit of Measure
Length (carapace)	46	mm
Length (total)	95	mm
Weight	29	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT48-CR-02'

File Name: A2-CT48-CR-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT48-CR-03

Collection Date:	Oct 05, 2016
Collection Time:	9:34
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	44	mm
Length (total)	90	mm
Weight	31	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT48-CR-03'

File Name: A2-CT48-CR-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT49

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT49 -117.988167, 48.819508

Photos for Location Id 'A2-CT49'

File Name: A2-CT49.JPG

No samples were taken at Location Id 'A2-CT49'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT50

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT50 -117.988145, 48.819156

Photos for Location Id 'A2-CT50'

File Name: A2-CT50.JPG

No samples were taken at Location Id 'A2-CT50'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT51

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT51 -117.981513, 48.82033

Photos for Location Id 'A2-CT51'

File Name: A2-CT51.JPG

No samples were taken at Location Id 'A2-CT51'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT52

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT52 -117.982206, 48.819925

Photos for Location Id 'A2-CT52'

File Name: A2-CT52.JPG

No samples were taken at Location Id 'A2-CT52'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT53

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT53 -117.979141, 48.82034

Photos for Location Id 'A2-CT53'

File Name: A2-CT53.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT53-CR-01

Collection Date:	Oct 05, 2016
Collection Time:	10:03
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	51	mm
Length (total)	107	mm
Weight	47	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT53-CR-01'

File Name: A2-CT53-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **A2-CT54**

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT54 -117.978257, 48.821856

Photos for Location Id 'A2-CT54'

File Name: A2-CT54.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT54-CR-01

Collection Date:	Oct 05, 2016
Collection Time:	10:12
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	51	mm
Length (total)	103	mm
Weight	42	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT54-CR-01'

File Name: A2-CT54-CR-01.JPG

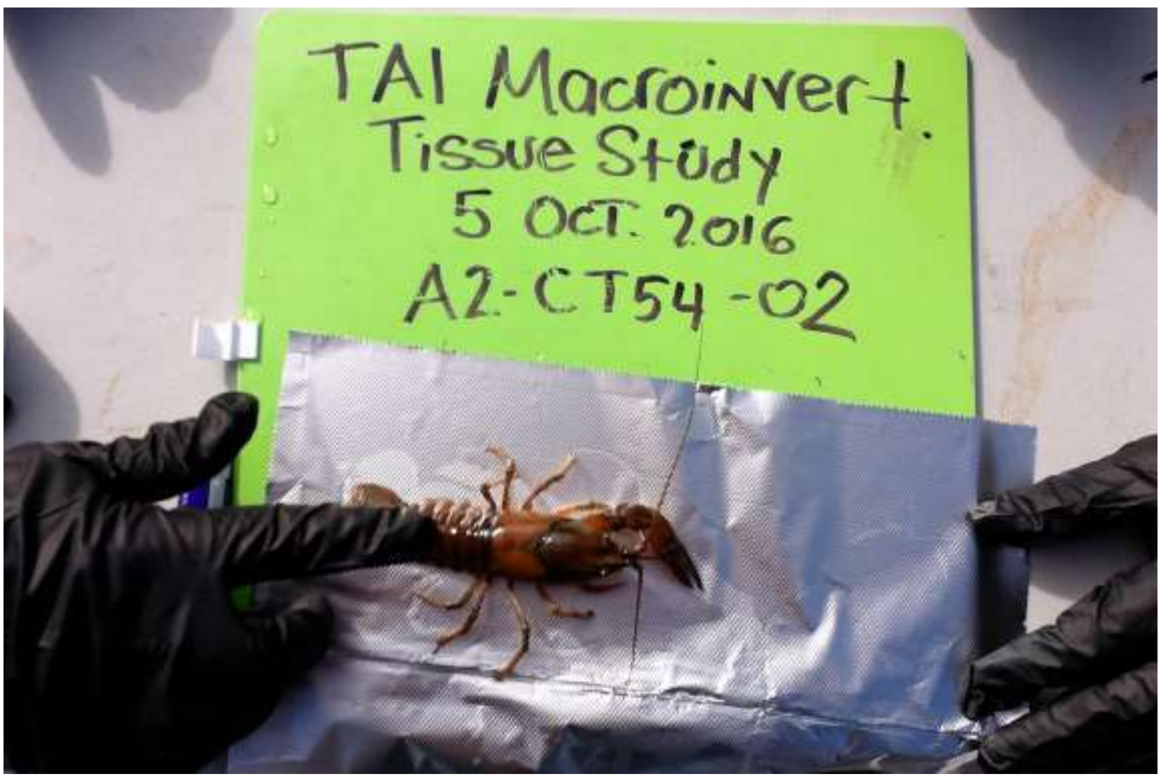
Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT54-CR-02

Collection Date:	Oct 05, 2016	
Collection Time:	10:12	
Species Type:	CR	
Species Name:	Orconectes virilis	
Measurement	Value	Unit of Measure
Length (carapace)	50	mm
Length (total)	107	mm
Weight	38	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT54-CR-02'

File Name: A2-CT54-CR-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT55

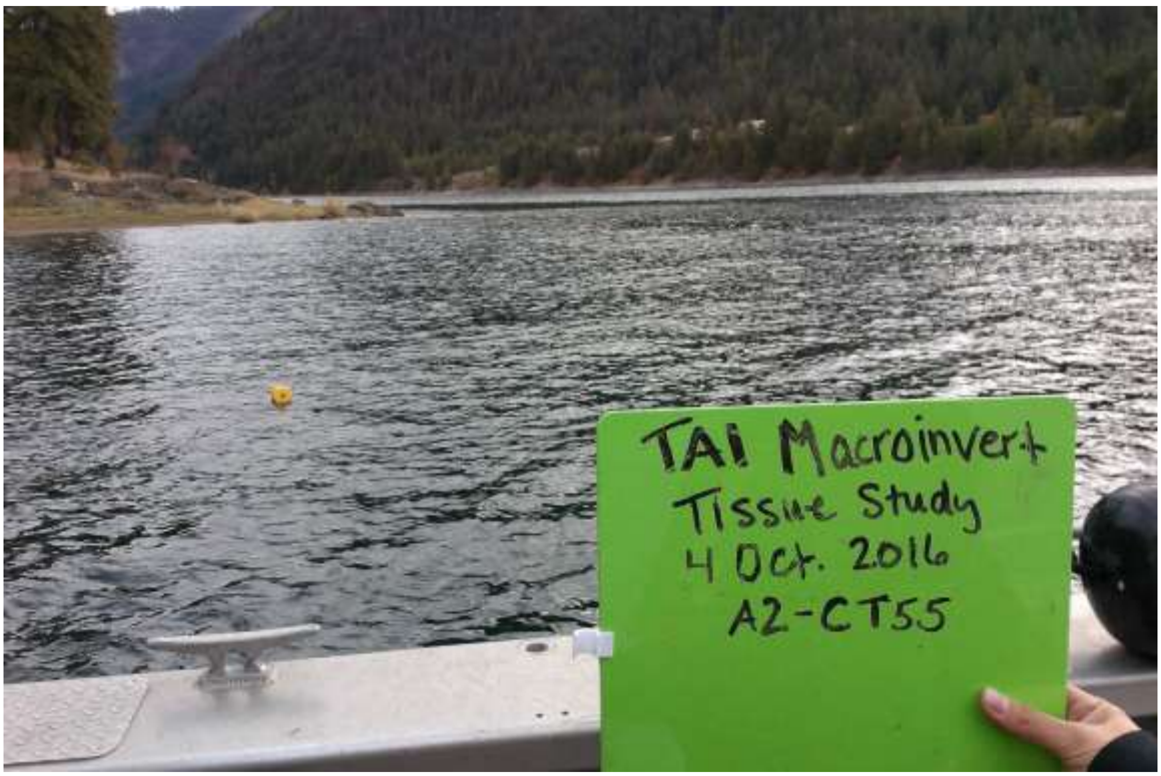
Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT55 -117.973708, 48.819163

Photos for Location Id 'A2-CT55'

File Name: A2-CT55.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A2-CT55-CR-01**

Collection Date:	Oct 05, 2016
Collection Time:	10:20
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	53	mm
Length (total)	111	mm
Weight	42	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT55-CR-01'

File Name: A2-CT55-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT56

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT56 -117.967, 48.817583

Photos for Location Id 'A2-CT56'

File Name: A2-CT56.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT56-CR-01

Collection Date:	Oct 05, 2016
Collection Time:	10:25
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	47	mm
Length (total)	98	mm
Weight	26	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT56-CR-01'

File Name: A2-CT56-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

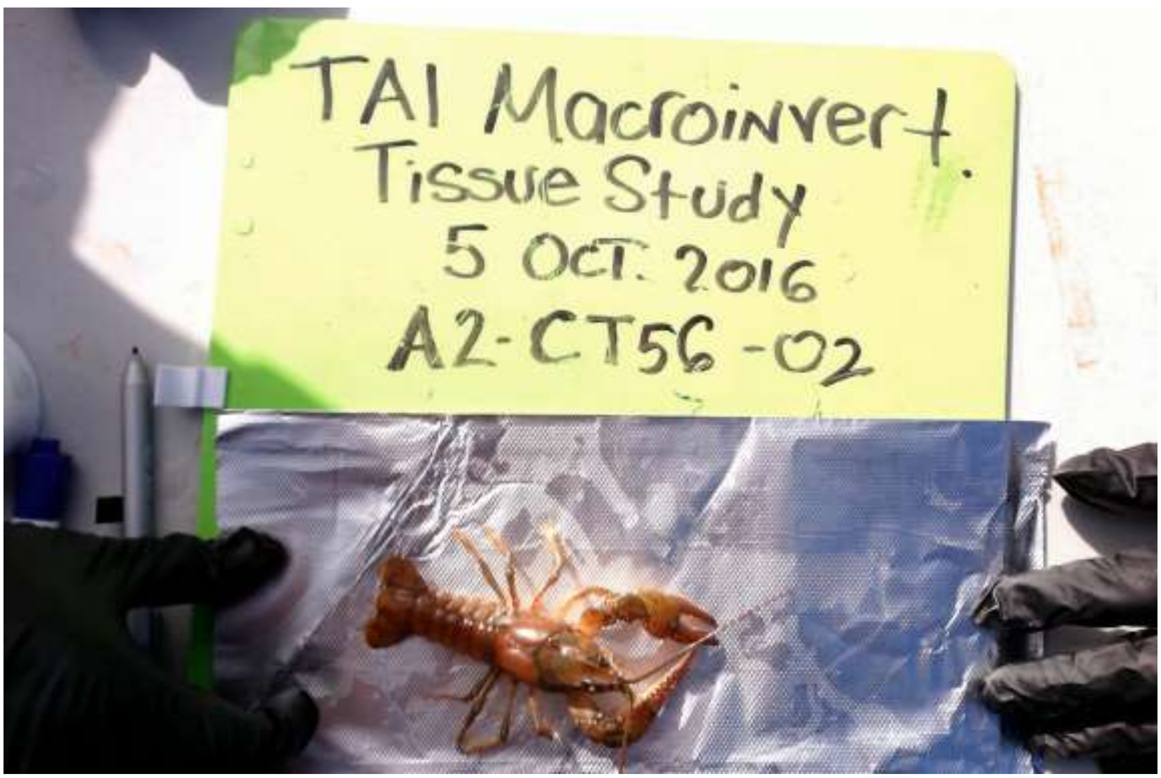
Sample Id: A2-CT56-CR-02

Collection Date:	Oct 05, 2016
Collection Time:	10:25
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	47	mm
Length (total)	95	mm
Weight	31	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT56-CR-02'

File Name: A2-CT56-CR-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **A2-CT57**

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT57 -117.957039, 48.815884

Photos for Location Id 'A2-CT57'

File Name: A2-CT57.JPG

No samples were taken at Location Id 'A2-CT57'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT58

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT58	-117.939714, 48.818243

Photos for Location Id 'A2-CT58'

File Name: A2-CT58.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A2-CT58-CR-01

Collection Date:	Oct 05, 2016
Collection Time:	10:39
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	64	mm
Length (total)	129	mm
Weight	89	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT58-CR-01'

File Name: A2-CT58-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT59

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT59	-117.938184, 48.819295

Photos for Location Id 'A2-CT59'

File Name: A2-CT59.JPG

No samples were taken at Location Id 'A2-CT59'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT60

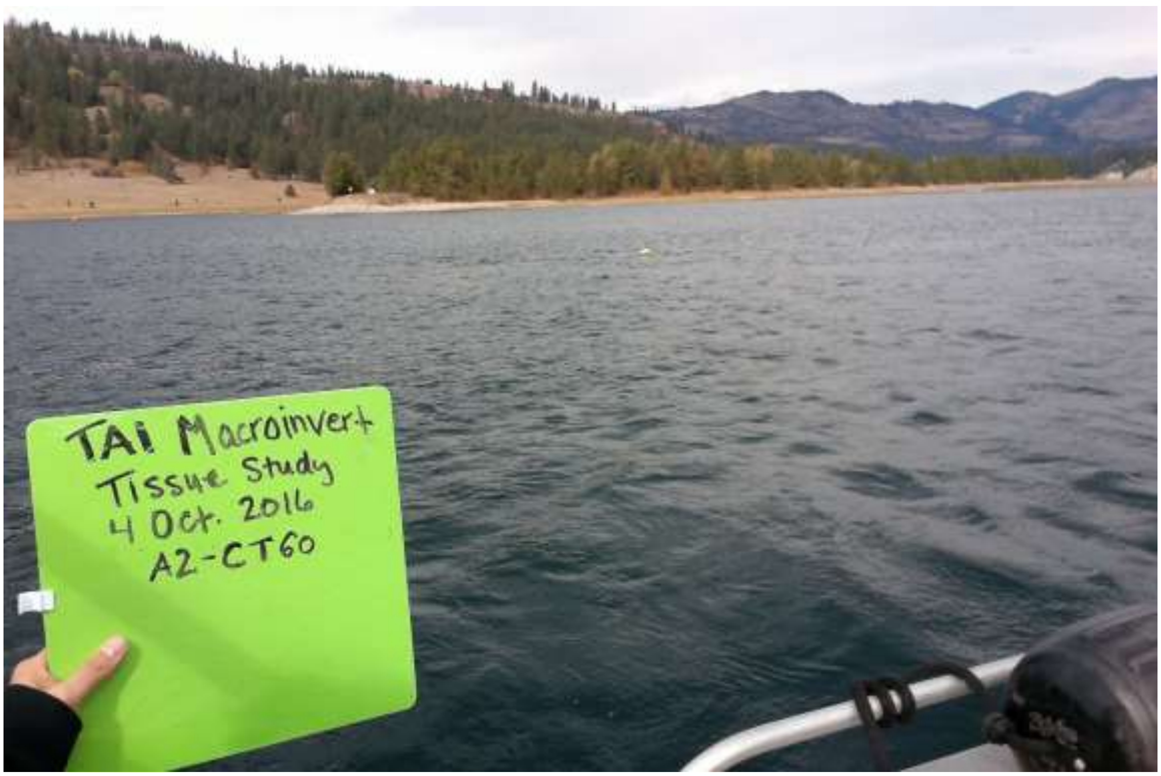
Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT60 -117.934202, 48.818751

Photos for Location Id 'A2-CT60'

File Name: A2-CT60.JPG



AECOM

No samples were taken at Location Id 'A2-CT60'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT61

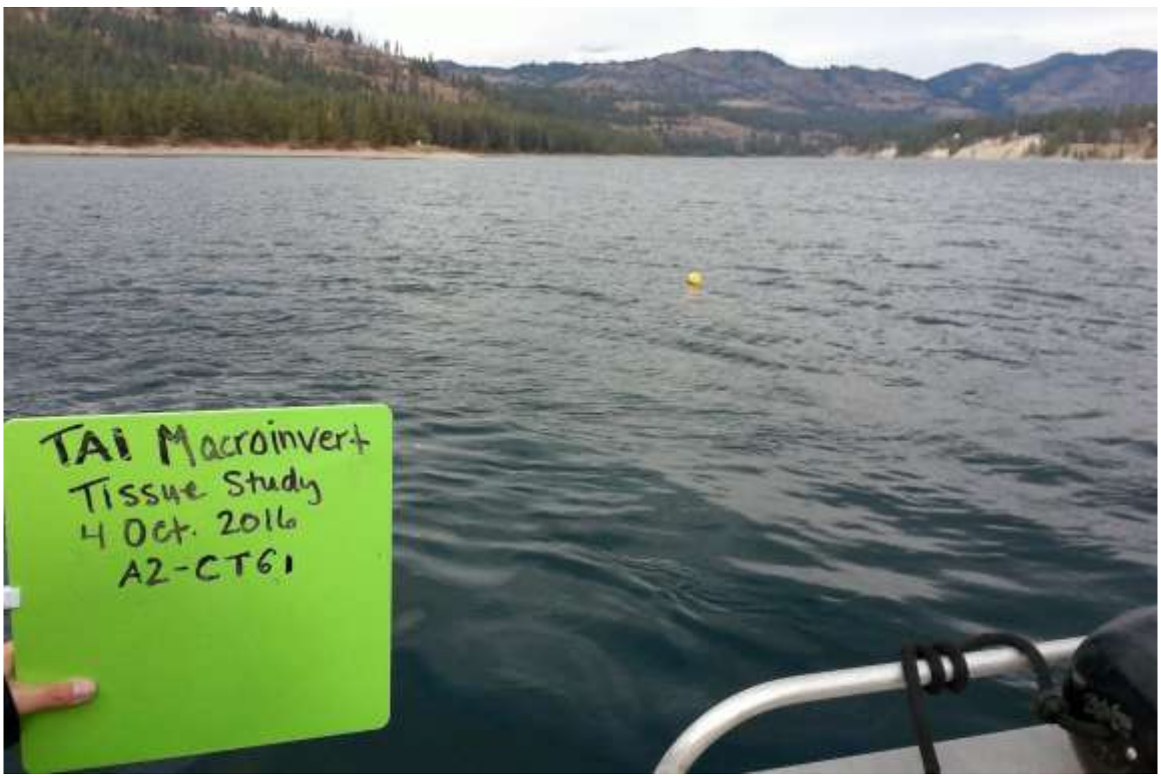
Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT61 -117.929194, 48.821592

Photos for Location Id 'A2-CT61'

File Name: A2-CT61.JPG



No samples were taken at Location Id 'A2-CT61'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT62

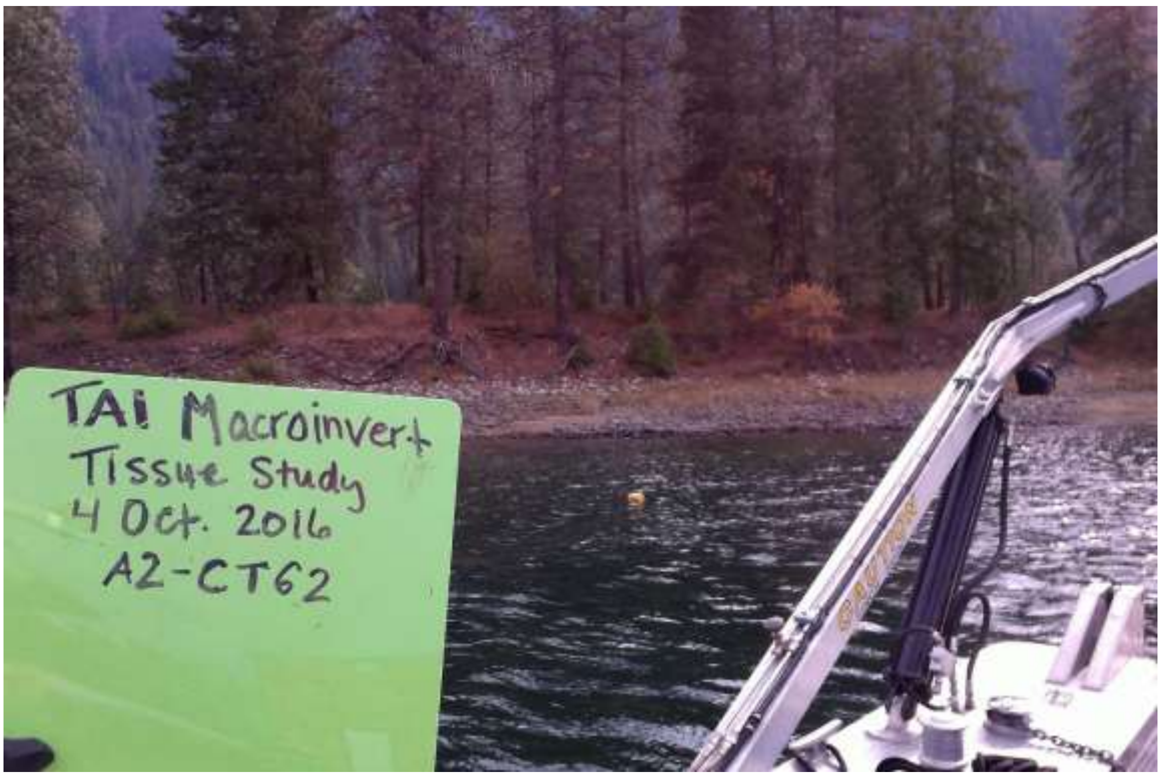
Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT62 -117.945287, 48.811305

Photos for Location Id 'A2-CT62'

File Name: A2-CT62.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

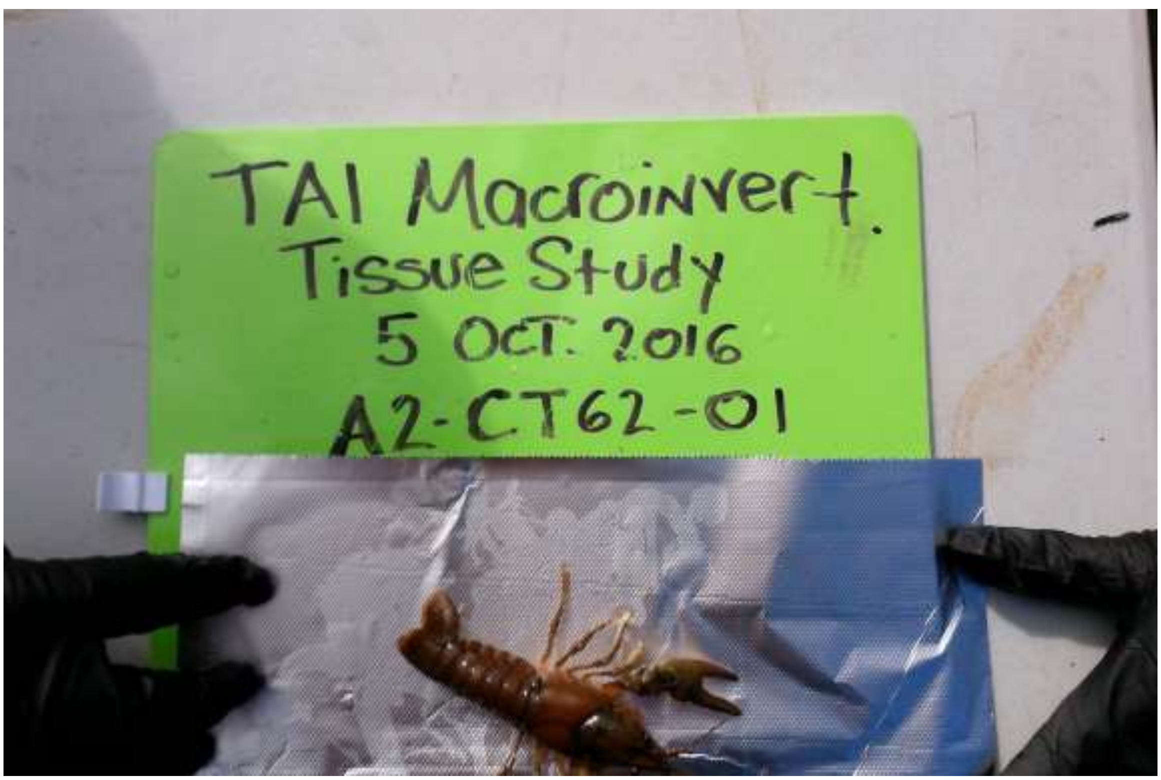
Sample Id: **A2-CT62-CR-01**

Collection Date:	Oct 05, 2016
Collection Time:	10:58
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	50	mm
Length (total)	104	mm
Weight	34	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A2-CT62-CR-01'

File Name: A2-CT62-CR-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A2-CT63

Location Type: Crayfish trap (CT)

Location Coordinates:

A2-CT63 -117.948889, 48.810658

Photos for Location Id 'A2-CT63'

File Name: A2-CT63.JPG

No samples were taken at Location Id 'A2-CT63'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT31

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT31 -118.110115, 48.653296

Photos for Location Id 'A3-CT31'

File Name: A3-CT31.JPG

No samples were taken at Location Id 'A3-CT31'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT32

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT32 -118.110641, 48.654006

Photos for Location Id 'A3-CT32'

File Name: A3-CT32.JPG

No samples were taken at Location Id 'A3-CT32'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **A3-CT33**

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT33 -118.10963, 48.653523

Photos for Location Id 'A3-CT33'

File Name: A3-CT33.JPG

No samples were taken at Location Id 'A3-CT33'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT34

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT34	-118.108771, 48.654875

Photos for Location Id 'A3-CT34'

File Name: A3-CT34.JPG

No samples were taken at Location Id 'A3-CT34'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT35

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT35 -118.10787, 48.655915

Photos for Location Id 'A3-CT35'

File Name: A3-CT35.JPG

No samples were taken at Location Id 'A3-CT35'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT36

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT36 -118.08687, 48.655531

Photos for Location Id 'A3-CT36'

File Name: A3-CT36.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

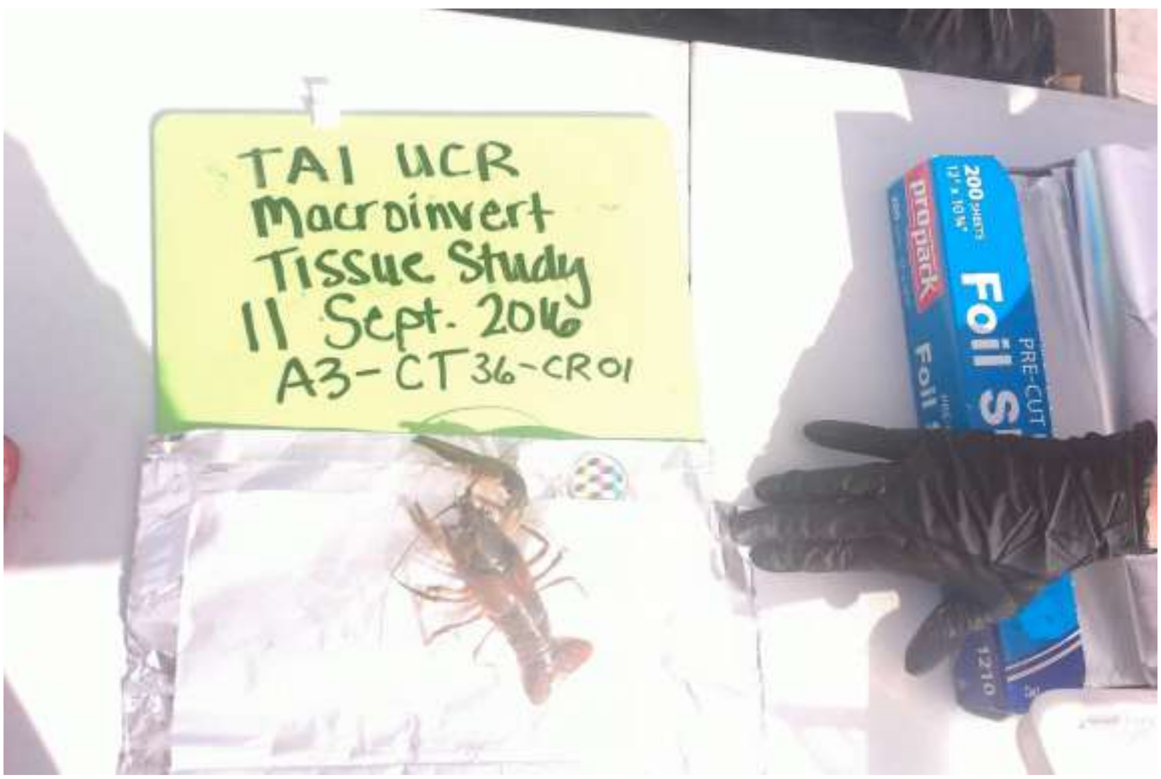
Sample Id: A3-CT36-CR-01

Collection Date:	Sep 11, 2016
Collection Time:	8:41
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	63	mm
Length (total)	121	mm
Weight	55	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT36-CR-01'

File Name: A3-CT36-CR-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT36-CR-02

Collection Date:	Sep 11, 2016
Collection Time:	8:41
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	52	mm
Length (total)	104	mm
Weight	40	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT36-CR-02'

File Name: A3-CT36-CR-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

AECOM

Location Id: A3-CT37

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT37 -118.08594, 48.653697

Photos for Location Id 'A3-CT37'

File Name: A3-CT37.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

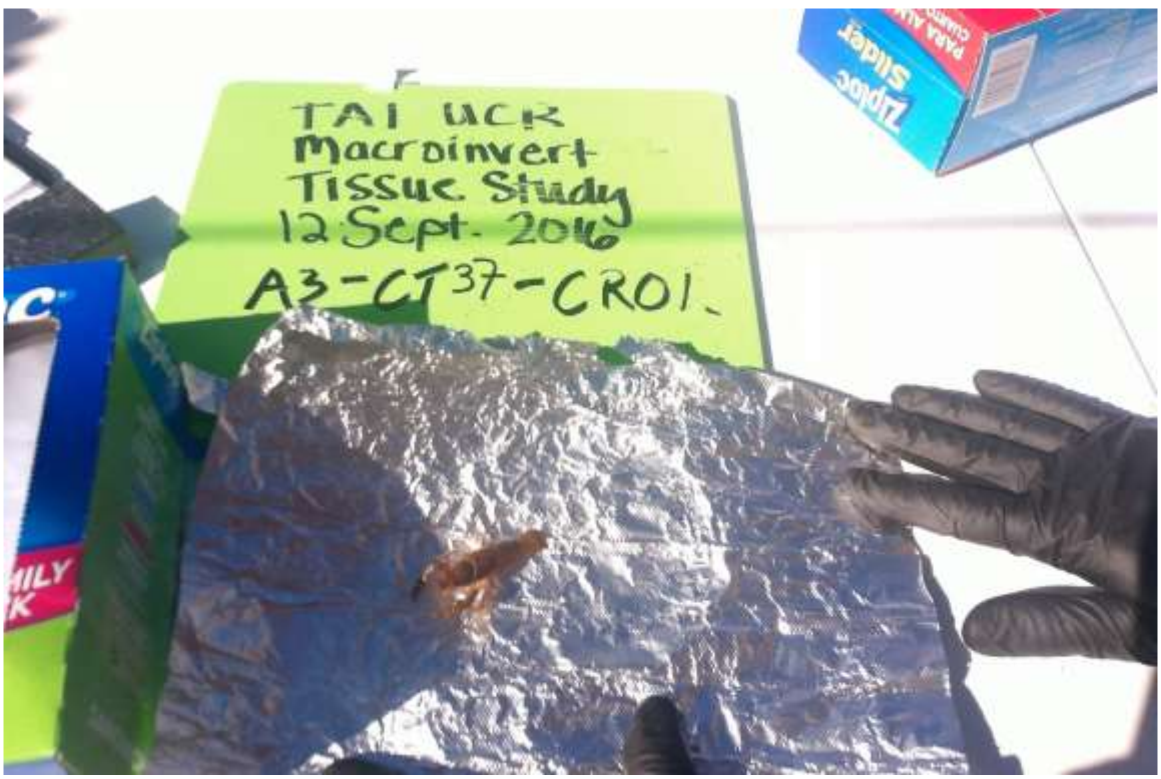
Sample Id: A3-CT37-CR-01

Collection Date:	Sep 12, 2016	
Collection Time:	13:48	
Species Type:	CR	
Species Name:	Orconectes virilis	

Measurement	Value	Unit of Measure
Length (carapace)	25	mm
Length (total)	56	mm
Weight	4	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT37-CR-01'

File Name: A3-CT37-CR-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT38

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT38 -118.086046, 48.652377

Photos for Location Id 'A3-CT38'

File Name: A3-CT38.JPG

No samples were taken at Location Id 'A3-CT38'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT39

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT39	-118.080869, 48.630611

Photos for Location Id 'A3-CT39'

File Name: A3-CT39.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

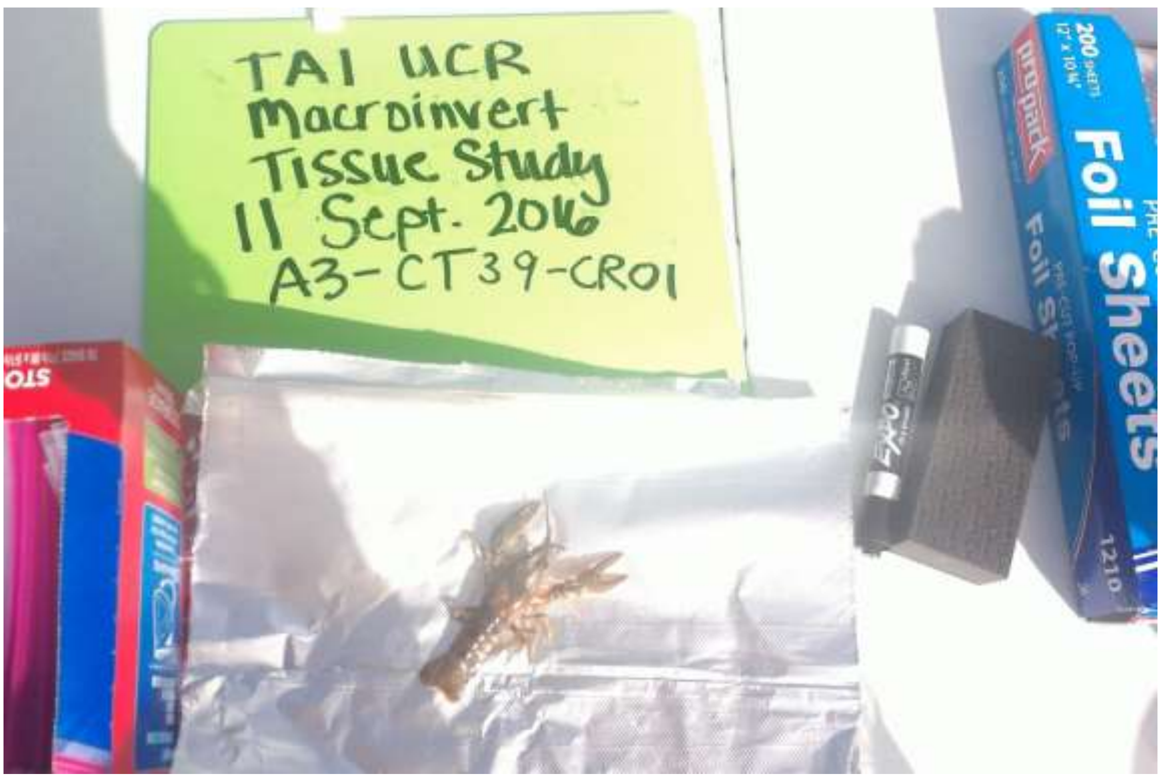
Sample Id: A3-CT39-CR-01

Collection Date:	Sep 11, 2016
Collection Time:	8:55
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	35	mm
Length (total)	74	mm
Weight	19	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT39-CR-01'

File Name: A3-CT39-CR-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT40

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT40	-118.079588, 48.630116

Photos for Location Id 'A3-CT40'

File Name: A3-CT40.JPG

No samples were taken at Location Id 'A3-CT40'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT41

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT41 -118.073837, 48.625017

Photos for Location Id 'A3-CT41'

File Name: A3-CT41.JPG

No samples were taken at Location Id 'A3-CT41'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT42

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT42 -118.074341, 48.624181

Photos for Location Id 'A3-CT42'

File Name: A3-CT42.JPG

No samples were taken at Location Id 'A3-CT42'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT43

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT43 -118.074015, 48.622846

Photos for Location Id 'A3-CT43'

File Name: A3-CT43.JPG

AECOM

No samples were taken at Location Id 'A3-CT43'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT44

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT44 -118.078643, 48.616637

Photos for Location Id 'A3-CT44'

File Name: A3-CT44.JPG

No samples were taken at Location Id 'A3-CT44'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT45

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT45	-118.079607, 48.616352

Photos for Location Id 'A3-CT45'

File Name: A3-CT45.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT45-CR-01

Collection Date:	Sep 12, 2016
Collection Time:	11:17
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	32	mm
Length (total)	67	mm
Weight	8	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT45-CR-01'

File Name: A3-CT45-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT45-CR-02

Collection Date:	Sep 12, 2016
Collection Time:	11:17
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	23	mm
Length (total)	55	mm
Weight	5	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT45-CR-02'

File Name: A3-CT45-CR-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT46

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT46	-118.124837, 48.622435

Photos for Location Id 'A3-CT46'

File Name: A3-CT46.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT46-CR-01

Collection Date:	Sep 11, 2016
Collection Time:	9:27
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	44	mm
Length (total)	83	mm
Weight	23	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT46-CR-01'

File Name: A3-CT46-CR-01.JPG

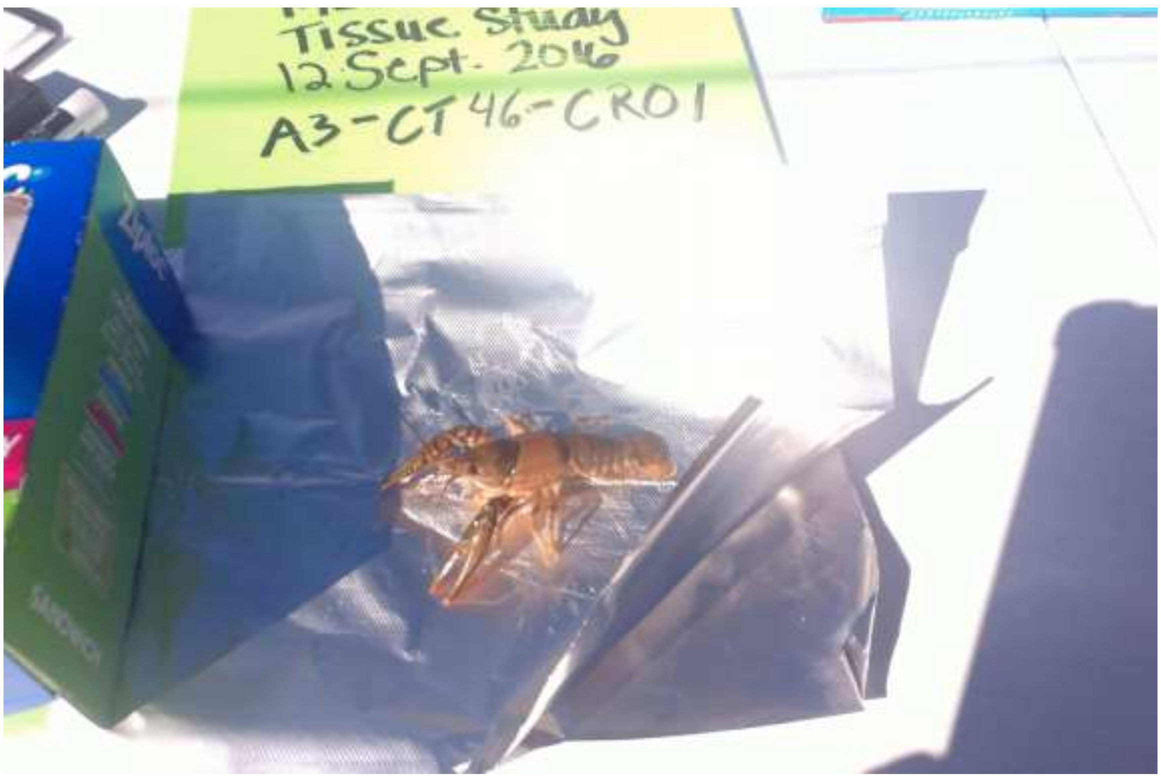
Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT46-CR-02

Collection Date:	Sep 12, 2016	
Collection Time:	11:28	
Species Type:	CR	
Species Name:	Orconectes virilis	
Measurement	Value	Unit of Measure
Length (carapace)	45	mm
Length (total)	94	mm
Weight	24	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT46-CR-02'

File Name: A3-CT46-CR-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT46-CR-03

Collection Date:	Sep 12, 2016
Collection Time:	11:28
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	43	mm
Length (total)	93	mm
Weight	23	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT46-CR-03'

File Name: A3-CT46-CR-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT47

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT47 -118.128265, 48.618827

Photos for Location Id 'A3-CT47'

File Name: A3-CT47.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT47-CR-01

Collection Date:	Sep 11, 2016
Collection Time:	9:33
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	20	mm
Length (total)	41	mm
Weight	2	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT47-CR-01'

File Name: A3-CT47-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT48

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT48 -118.132107, 48.612401

Photos for Location Id 'A3-CT48'

File Name: A3-CT48.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT48-CR-01

Collection Date:	Sep 12, 2016	
Collection Time:	11:42	
Species Type:	CR	
Species Name:	Orconectes virilis	

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	84	mm
Weight	19	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT48-CR-01'

File Name: A3-CT48-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A3-CT48-CR-02**

Collection Date:	Sep 12, 2016
Collection Time:	11:42
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	16	mm
Length (total)	34	mm
Weight	1	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT48-CR-02'

File Name: A3-CT48-CR-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT49

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT49 -118.131859, 48.611929

Photos for Location Id 'A3-CT49'

File Name: A3-CT49.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT49-CR-01

Collection Date:	Sep 12, 2016
Collection Time:	11:45
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	26	mm
Length (total)	56	mm
Weight	5	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT49-CR-01'

File Name: A3-CT49-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT50

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT50	-118.130786, 48.611665

Photos for Location Id 'A3-CT50'

File Name: A3-CT50.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT50-CR-01

Collection Date:	Sep 11, 2016
Collection Time:	9:47
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	37	mm
Length (total)	84	mm
Weight	20	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT50-CR-01'

File Name: A3-CT50-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

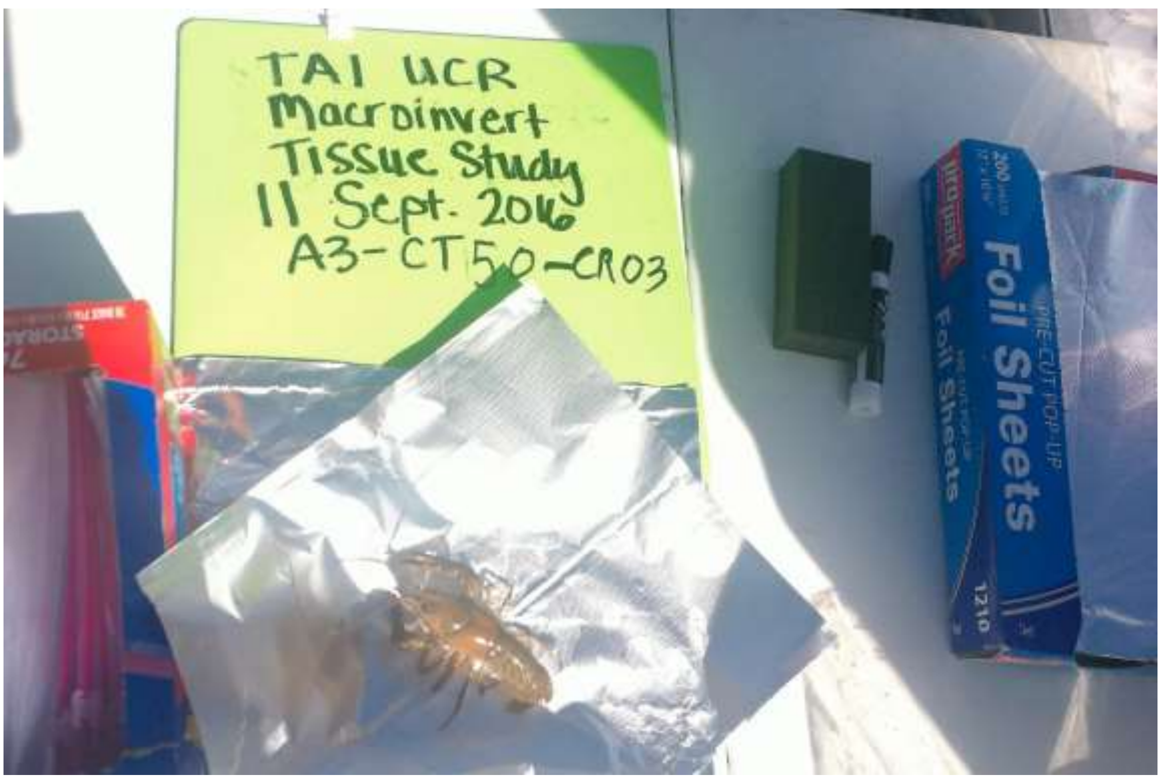
Sample Id: A3-CT50-CR-02

Collection Date:	Sep 11, 2016
Collection Time:	9:47
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	47	mm
Length (total)	92	mm
Weight	29	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT50-CR-02'

File Name: A3-CT50-CR-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A3-CT50-CR-03**

Collection Date:	Sep 11, 2016
Collection Time:	9:47
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	45	mm
Length (total)	88	mm
Weight	28	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT50-CR-03'

File Name: A3-CT50-CR-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT51

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT51 -118.13446, 48.587874

Photos for Location Id 'A3-CT51'

File Name: A3-CT51.JPG

No samples were taken at Location Id 'A3-CT51'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT52

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT52 -118.135339, 48.584782

Photos for Location Id 'A3-CT52'

File Name: A3-CT52.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

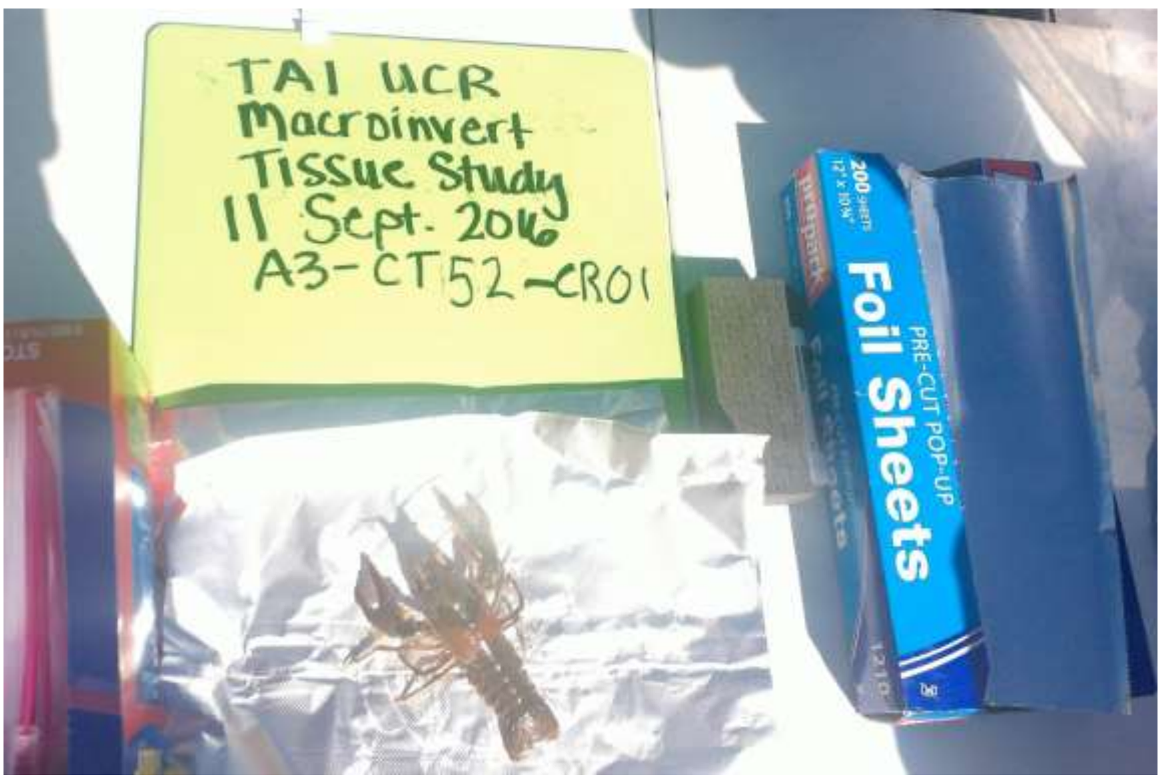
Sample Id: A3-CT52-CR-01

Collection Date:	Sep 11, 2016	
Collection Time:	10:02	
Species Type:	CR	
Species Name:	Orconectes virilis	

Measurement	Value	Unit of Measure
Length (carapace)	54	mm
Length (total)	111	mm
Weight	46	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT52-CR-01'

File Name: A3-CT52-CR-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT53

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT53 -118.133719, 48.586009

Photos for Location Id 'A3-CT53'

File Name: A3-CT53.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT53-CR-01

Collection Date:	Sep 12, 2016
Collection Time:	12:18
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	23	mm
Length (total)	49	mm
Weight	3	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT53-CR-01'

File Name: A3-CT53-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT54

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT54 -118.132408, 48.584835

Photos for Location Id 'A3-CT54'

File Name: A3-CT54.JPG

No samples were taken at Location Id 'A3-CT54'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT55

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT55 -118.119142, 48.57864

Photos for Location Id 'A3-CT55'

File Name: A3-CT55.JPG

No samples were taken at Location Id 'A3-CT55'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT56

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT56 -118.122575, 48.580535

Photos for Location Id 'A3-CT56'

File Name: A3-CT56.JPG

No samples were taken at Location Id 'A3-CT56'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **A3-CT57**

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT57 -118.122894, 48.583614

Photos for Location Id 'A3-CT57'

File Name: A3-CT57.JPG

No samples were taken at Location Id 'A3-CT57'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT58

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT58 -118.123116, 48.58593

Photos for Location Id 'A3-CT58'

File Name: A3-CT58.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A3-CT58-CR-01**

Collection Date:	Sep 11, 2016
Collection Time:	10:27
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	35	mm
Length (total)	76	mm
Weight	15	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT58-CR-01'

File Name: A3-CT58-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

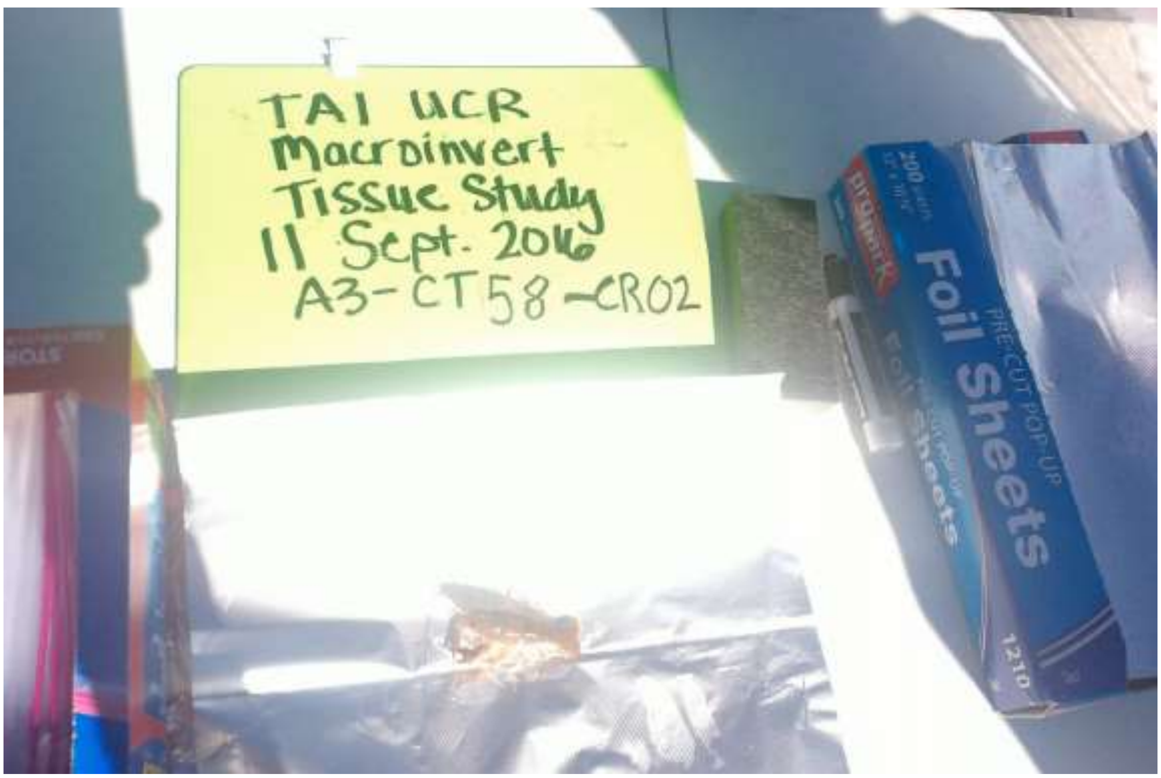
Sample Id: **A3-CT58-CR-02**

Collection Date:	Sep 11, 2016
Collection Time:	10:27
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	30	mm
Length (total)	65	mm
Weight	7	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT58-CR-02'

File Name: A3-CT58-CR-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT59

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT59 -118.123688, 48.588468

Photos for Location Id 'A3-CT59'

File Name: A3-CT59.JPG

No samples were taken at Location Id 'A3-CT59'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT60

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT60 -118.124232, 48.592297

Photos for Location Id 'A3-CT60'

File Name: A3-CT60.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

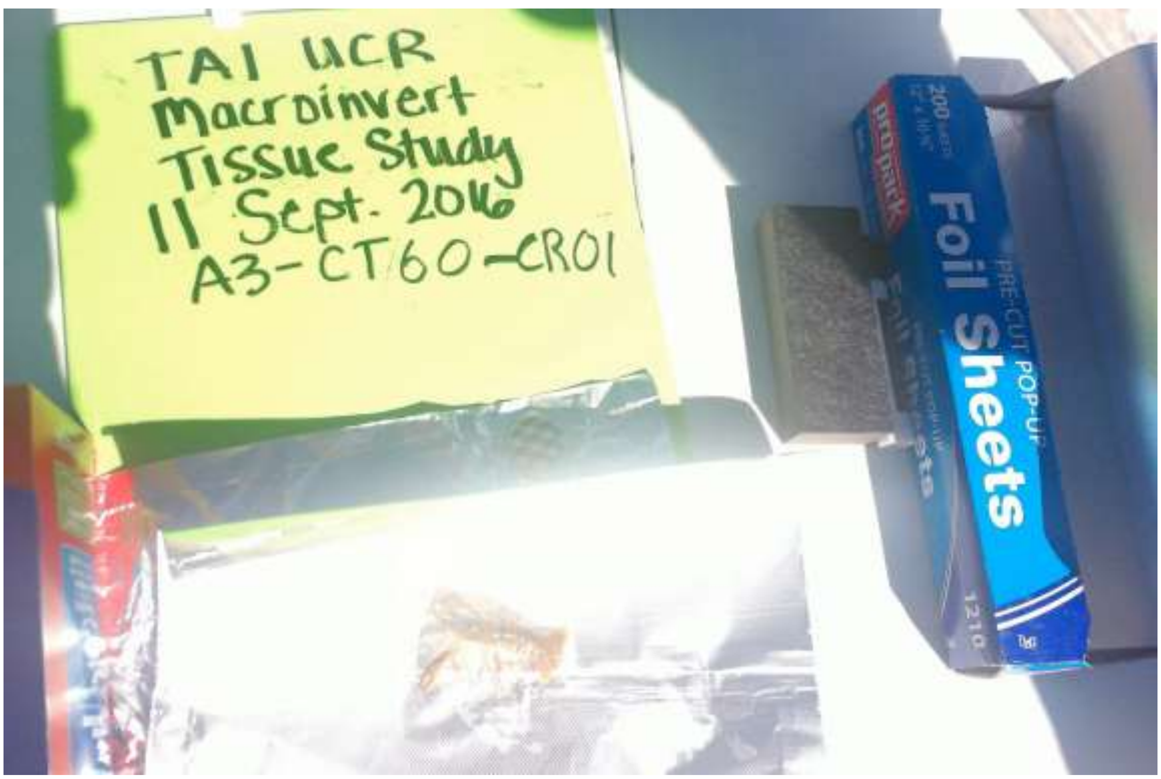
Sample Id: A3-CT60-CR-01

Collection Date:	Sep 11, 2016
Collection Time:	10:36
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	31	mm
Length (total)	66	mm
Weight	9	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT60-CR-01'

File Name: A3-CT60-CR-01.JPG



Location Id: **A3-CT61**

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT61	-118.073416, 48.624917

Photos for Location Id 'A3-CT61'

File Name: A3-CT61.JPG

No samples were taken at Location Id 'A3-CT61'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT62

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT62 -118.073652, 48.624027

Photos for Location Id 'A3-CT62'

File Name: A3-CT62.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-CT62-CR-01

Collection Date:	Sep 12, 2016
Collection Time:	11:05
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	47	mm
Length (total)	101	mm
Weight	30	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT62-CR-01'

File Name: A3-CT62-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-CT63

Location Type: Crayfish trap (CT)

Location Coordinates:

A3-CT63 -118.078473, 48.61612

Photos for Location Id 'A3-CT63'

File Name: A3-CT63.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A3-CT63-CR-01**

Collection Date:	Sep 12, 2016
Collection Time:	11:14
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	26	mm
Length (total)	56	mm
Weight	4	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A3-CT63-CR-01'

File Name: A3-CT63-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A3-MB14

Location Type: Mussel beach (MB)

Location Coordinates:

A3-MB14 -118.114063, 48.630978

Photos for Location Id 'A3-MB14'

File Name: A3-MB14.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-MB14-MU-01

Collection Date:	Sep 29, 2016
Collection Time:	11:07
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	53	mm
Width	30	mm
Breadth	17	mm
Weight	14	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-01'

File Name: A3-MB14-MU-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A3-MB14-MU-02**

Collection Date:	Sep 29, 2016
Collection Time:	11:11
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	61	mm
Width	33	mm
Breadth	19	mm
Weight	19	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-02'

File Name: A3-MB14-MU-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

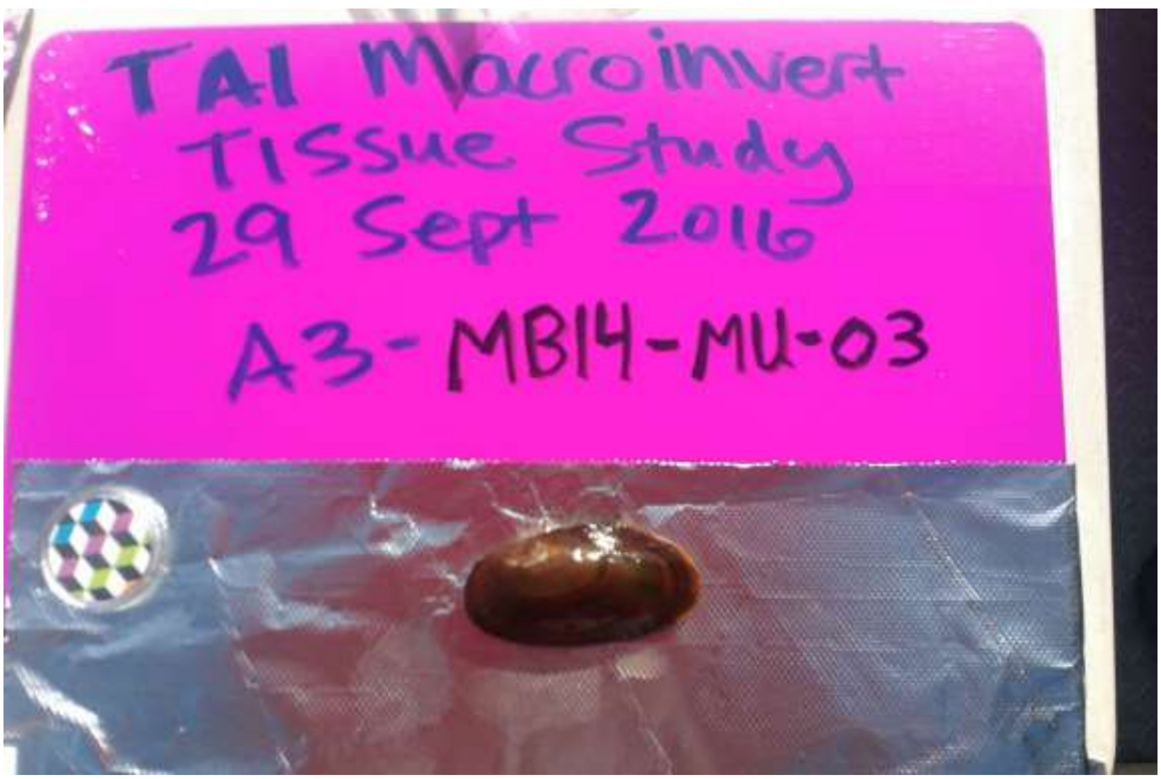
Sample Id: A3-MB14-MU-03

Collection Date:	Sep 29, 2016
Collection Time:	11:15
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	61	mm
Width	33	mm
Breadth	19	mm
Weight	19	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-03'

File Name: A3-MB14-MU-03.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

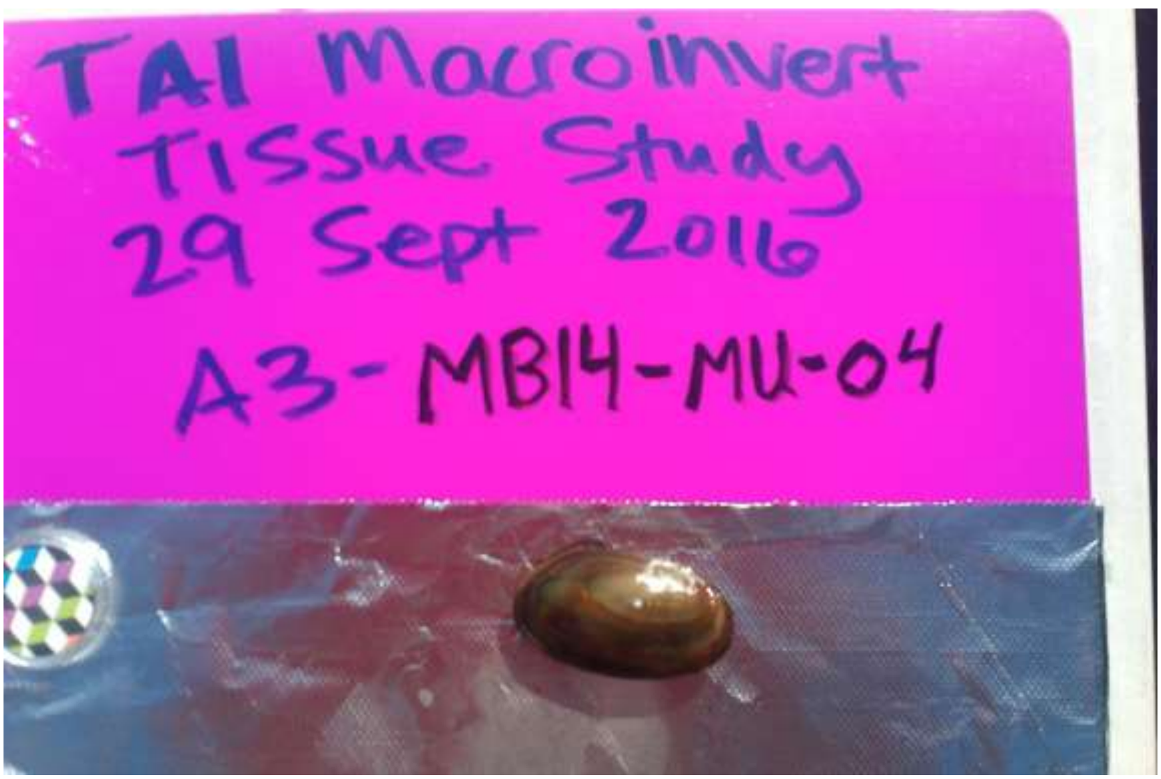
Sample Id: A3-MB14-MU-04

Collection Date:	Sep 29, 2016
Collection Time:	11:18
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	53	mm
Width	30	mm
Breadth	17	mm
Weight	14	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-04'

File Name: A3-MB14-MU-04.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

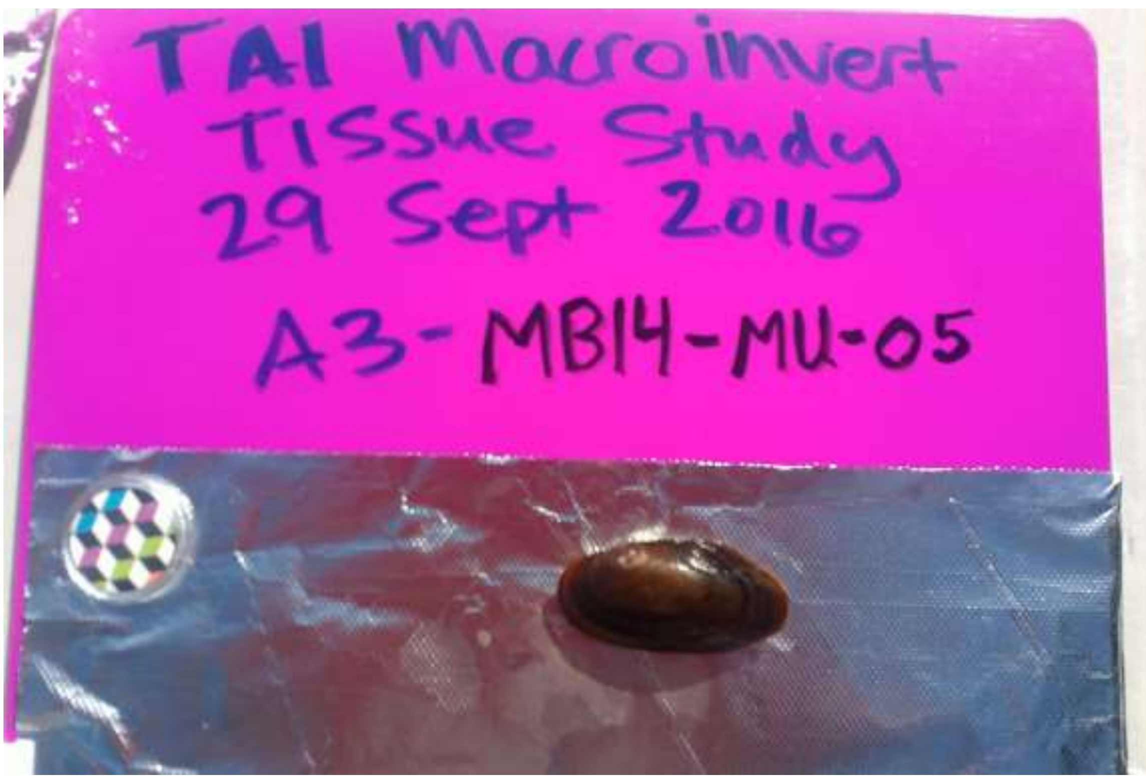
Sample Id: A3-MB14-MU-05

Collection Date:	Sep 29, 2016
Collection Time:	11:21
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	58	mm
Width	33	mm
Breadth	20	mm
Weight	19	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-05'

File Name: A3-MB14-MU-05.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-MB14-MU-06

Collection Date:	Sep 29, 2016
Collection Time:	11:25
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	43	mm
Width	25	mm
Breadth	14	mm
Weight	9	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-06'

File Name: A3-MB14-MU-06.JPG

Sample Id: **A3-MB14-MU-07**

Collection Date:	Sep 29, 2016
Collection Time:	11:39
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	48	mm
Width	27	mm
Breadth	13	mm
Weight	9	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-07'

File Name: A3-MB14-MU-07.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A3-MB14-MU-08**

Collection Date:	Sep 29, 2016
Collection Time:	11:43
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	51	mm
Width	28	mm
Breadth	14	mm
Weight	12	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-08'

File Name: A3-MB14-MU-08.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-MB14-MU-09

Collection Date:	Sep 29, 2016
Collection Time:	11:46
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	53	mm
Width	31	mm
Breadth	17	mm
Weight	15	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-09'

File Name: A3-MB14-MU-09.JPG

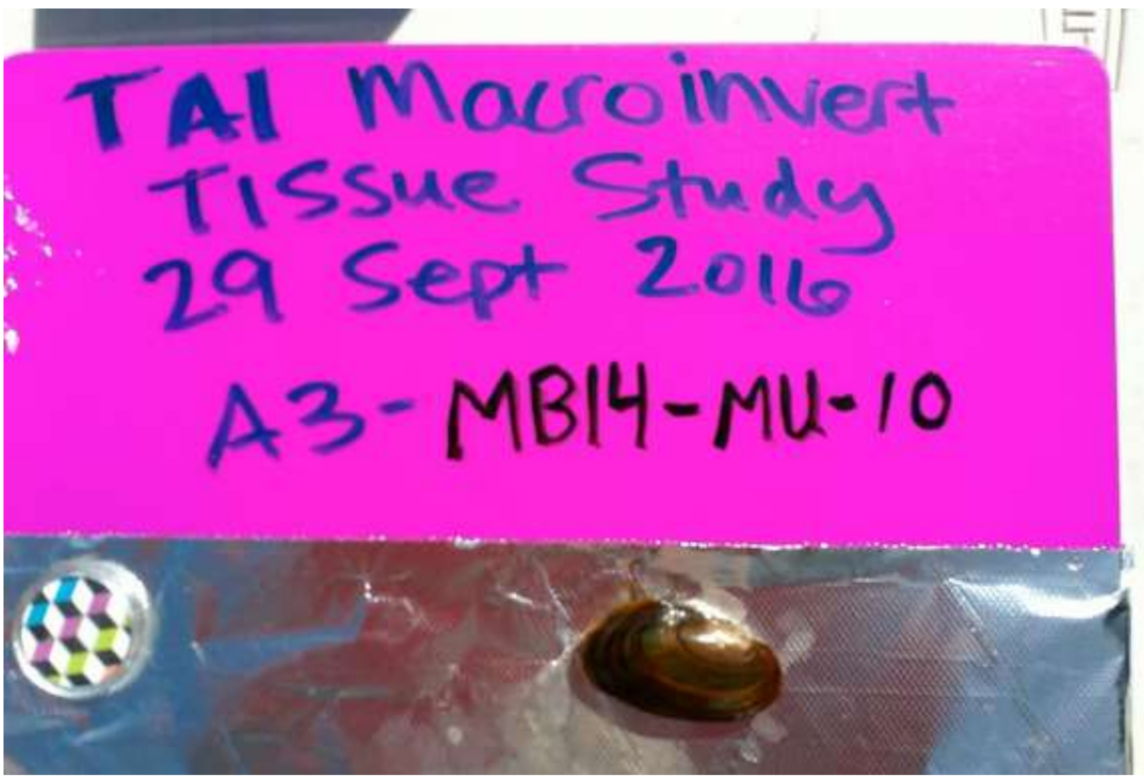
Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A3-MB14-MU-10**

Collection Date:	Sep 29, 2016	
Collection Time:	11:49	
Species Type:	MU	
Species Name:	Anodonta sp.	
Measurement	Value	Unit of Measure
Length (total)	48	mm
Width	28	mm
Breadth	15	mm
Weight	12	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-10'

File Name: A3-MB14-MU-10.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

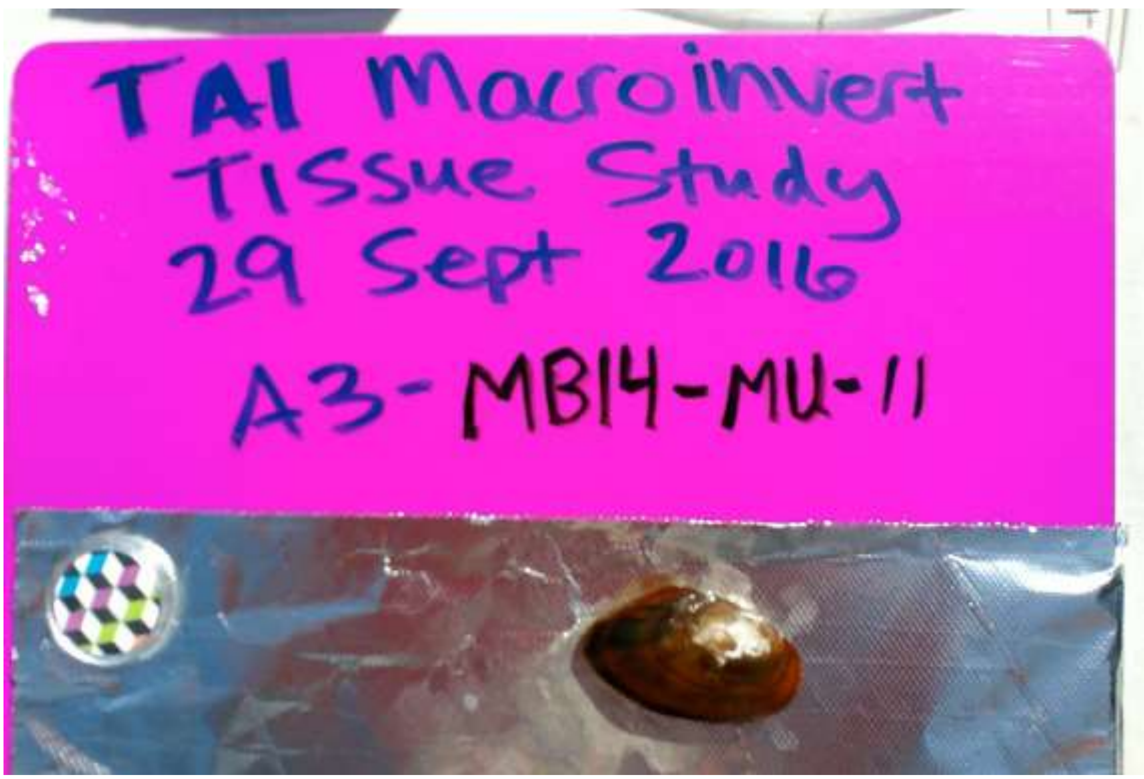
Sample Id: A3-MB14-MU-11

Collection Date:	Sep 29, 2016
Collection Time:	11:52
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	55	mm
Width	33	mm
Breadth	17	mm
Weight	15	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-11'

File Name: A3-MB14-MU-11.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

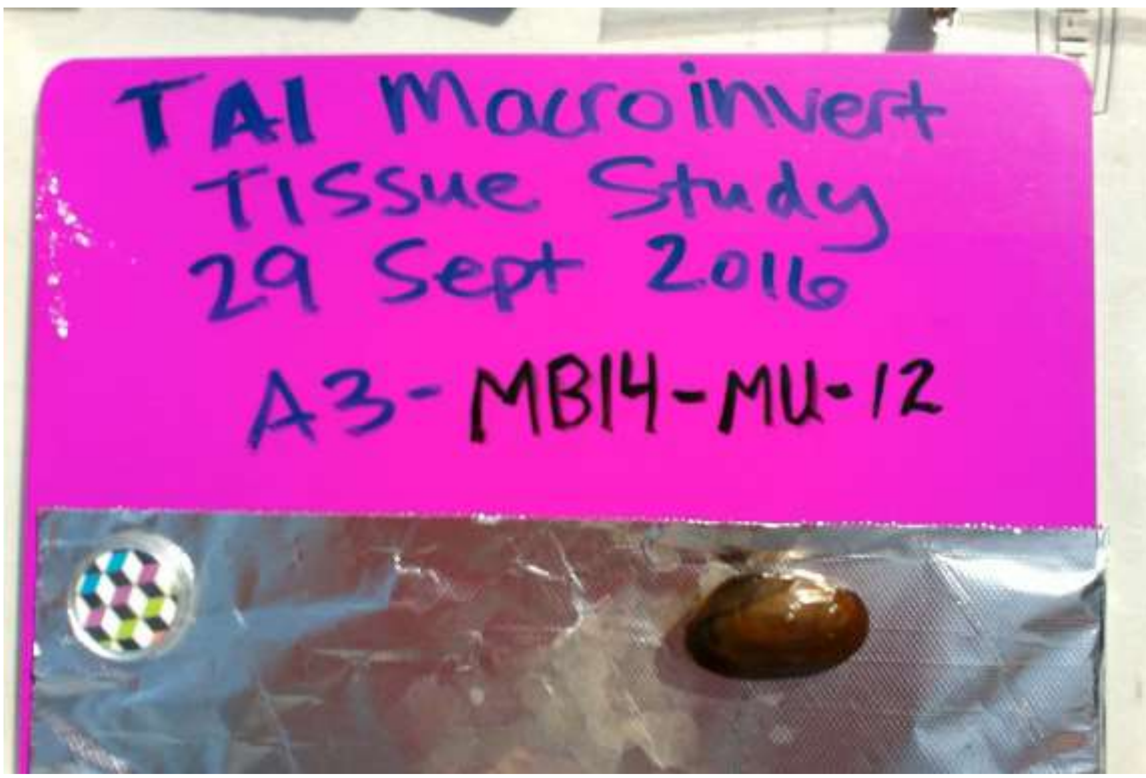
Sample Id: A3-MB14-MU-12

Collection Date:	Sep 29, 2016
Collection Time:	11:55
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	49	mm
Width	28	mm
Breadth	16	mm
Weight	13	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-12'

File Name: A3-MB14-MU-12.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

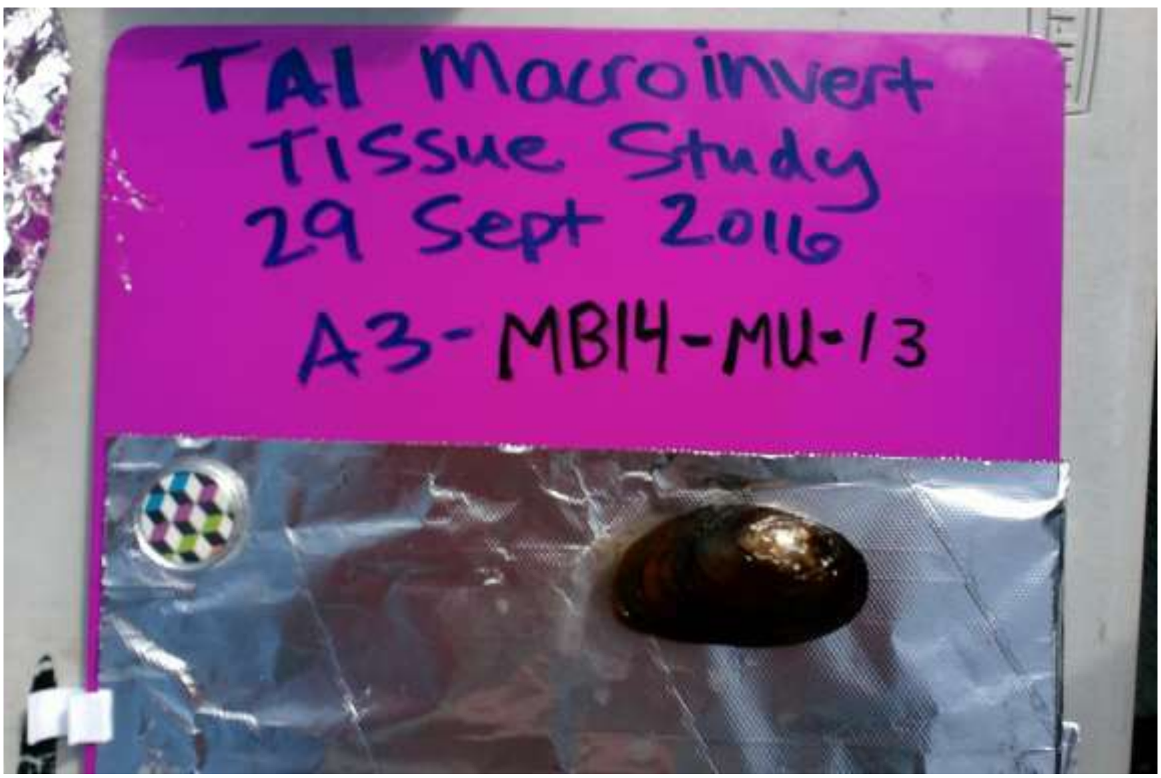
Sample Id: A3-MB14-MU-13

Collection Date:	Sep 29, 2016
Collection Time:	11:58
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	74	mm
Width	42	mm
Breadth	23	mm
Weight	41	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-13'

File Name: A3-MB14-MU-13.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-MB14-MU-14

Collection Date:	Sep 29, 2016
Collection Time:	12:02
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	81	mm
Width	42	mm
Breadth	25	mm
Weight	48	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-14'

File Name: A3-MB14-MU-14.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

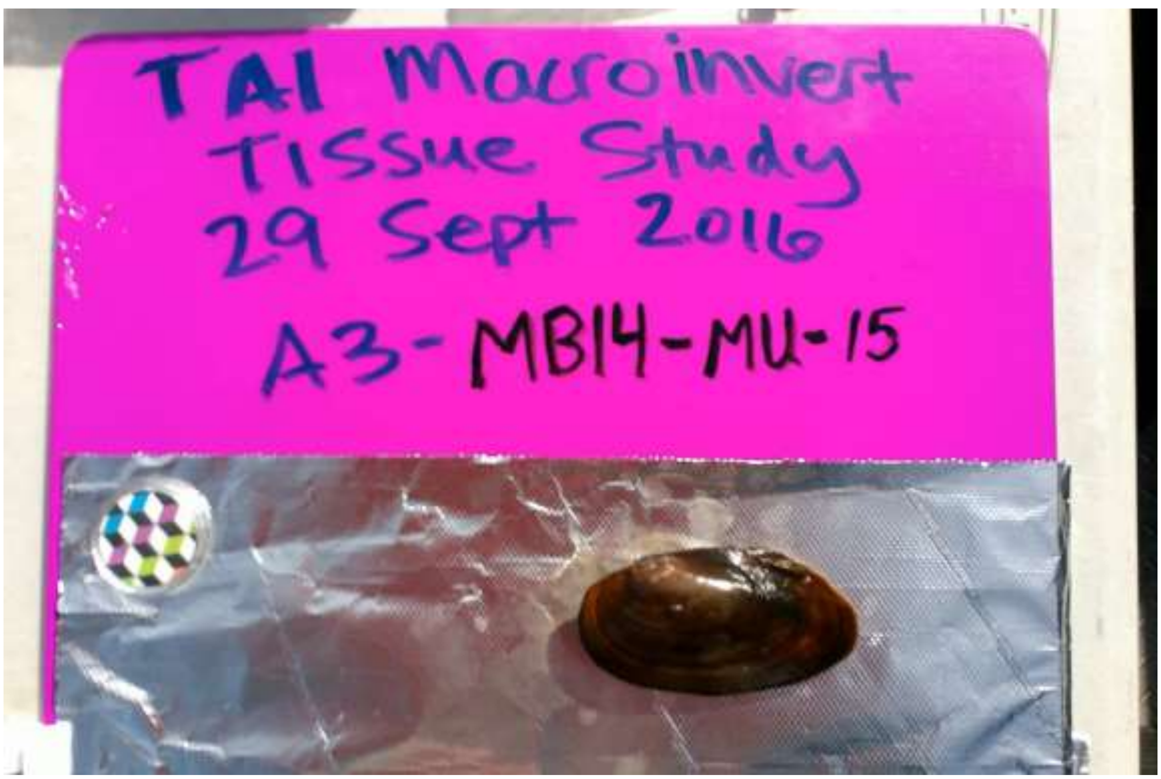
Sample Id: **A3-MB14-MU-15**

Collection Date:	Sep 29, 2016
Collection Time:	12:05
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	78	mm
Width	42	mm
Breadth	25	mm
Weight	44	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-15'

File Name: A3-MB14-MU-15.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A3-MB14-MU-16**

Collection Date:	Sep 29, 2016
Collection Time:	12:09
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	87	mm
Width	45	mm
Breadth	30	mm
Weight	60	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-16'

File Name: A3-MB14-MU-16.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

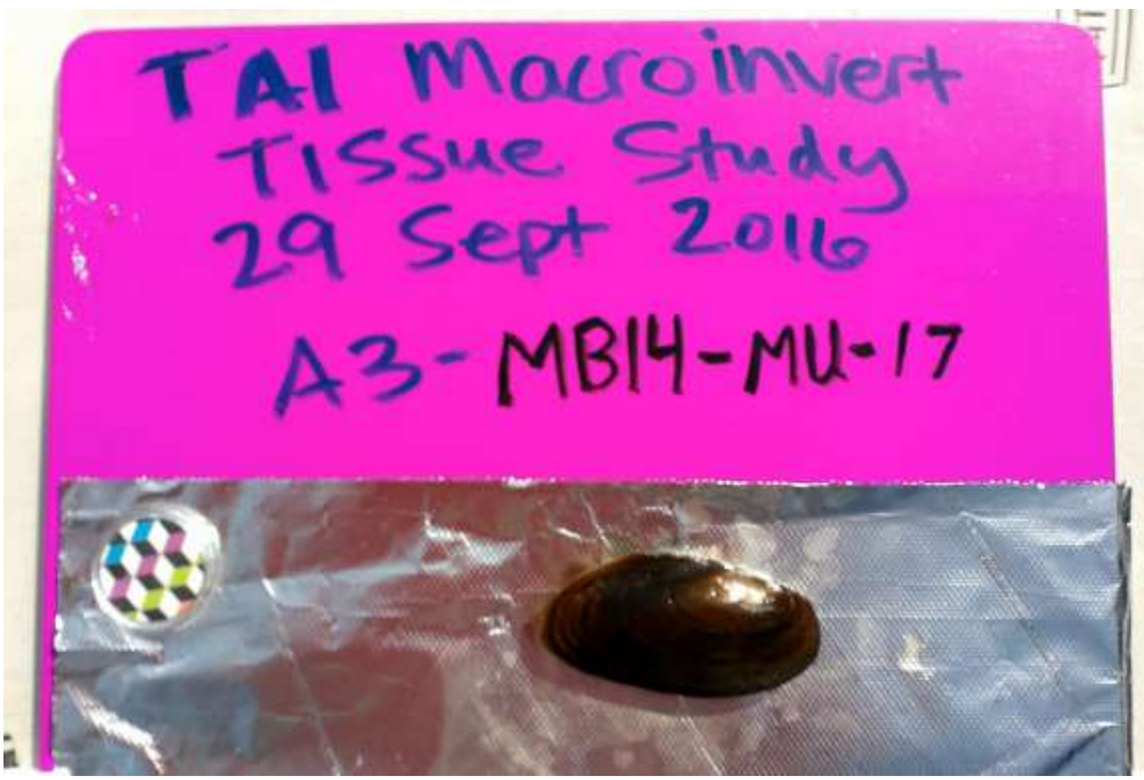
Sample Id: A3-MB14-MU-17

Collection Date:	Sep 29, 2016
Collection Time:	12:13
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	70	mm
Width	36	mm
Breadth	22	mm
Weight	32	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-17'

File Name: A3-MB14-MU-17.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

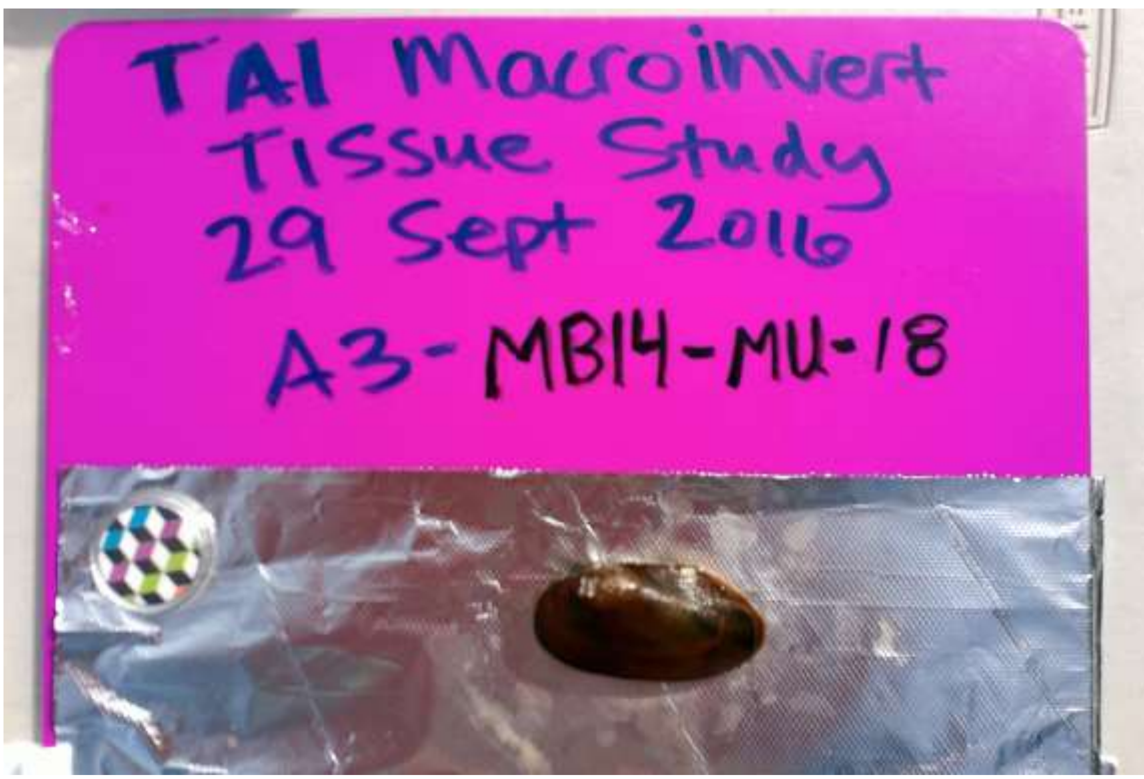
Sample Id: A3-MB14-MU-18

Collection Date:	Sep 29, 2016
Collection Time:	12:17
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	62	mm
Width	33	mm
Breadth	20	mm
Weight	24	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-18'

File Name: A3-MB14-MU-18.JPG



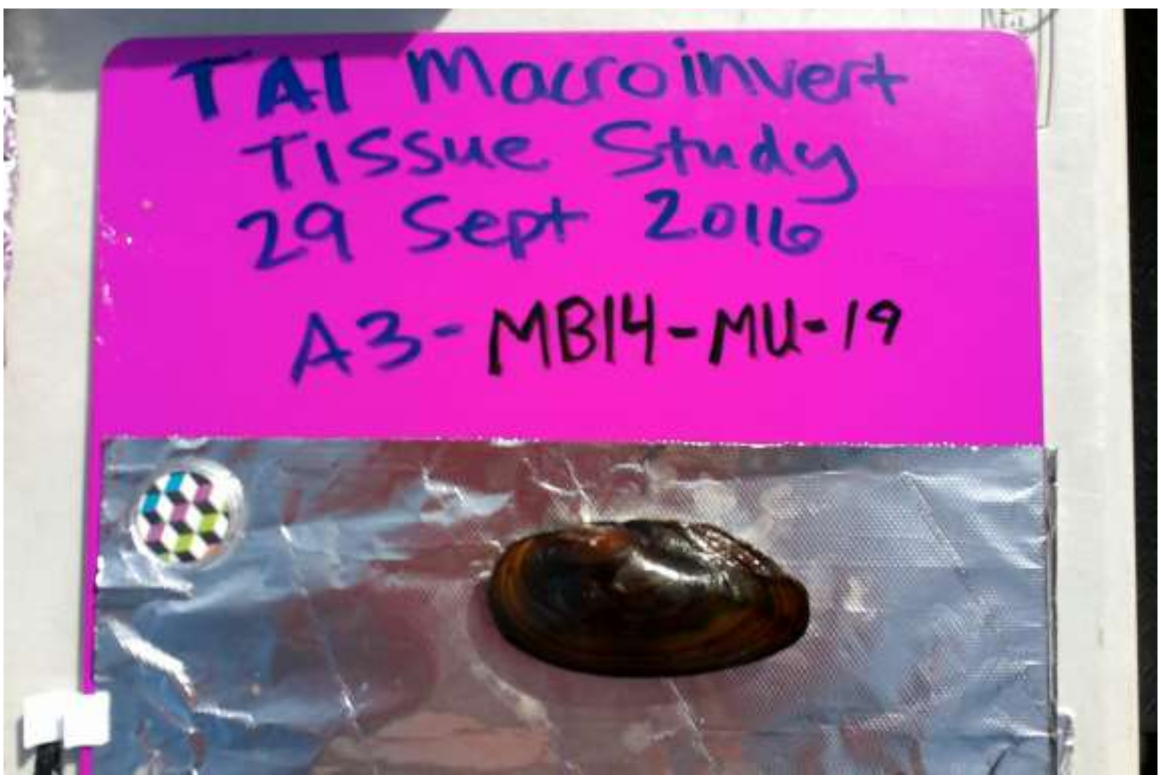
Sample Id: **A3-MB14-MU-19**

Collection Date:	Sep 29, 2016	
Collection Time:	12:21	
Species Type:	MU	
Species Name:	Anodonta sp.	

Measurement	Value	Unit of Measure
Length (total)	93	mm
Width	46	mm
Breadth	32	mm
Weight	65	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-19'

File Name: A3-MB14-MU-19.JPG



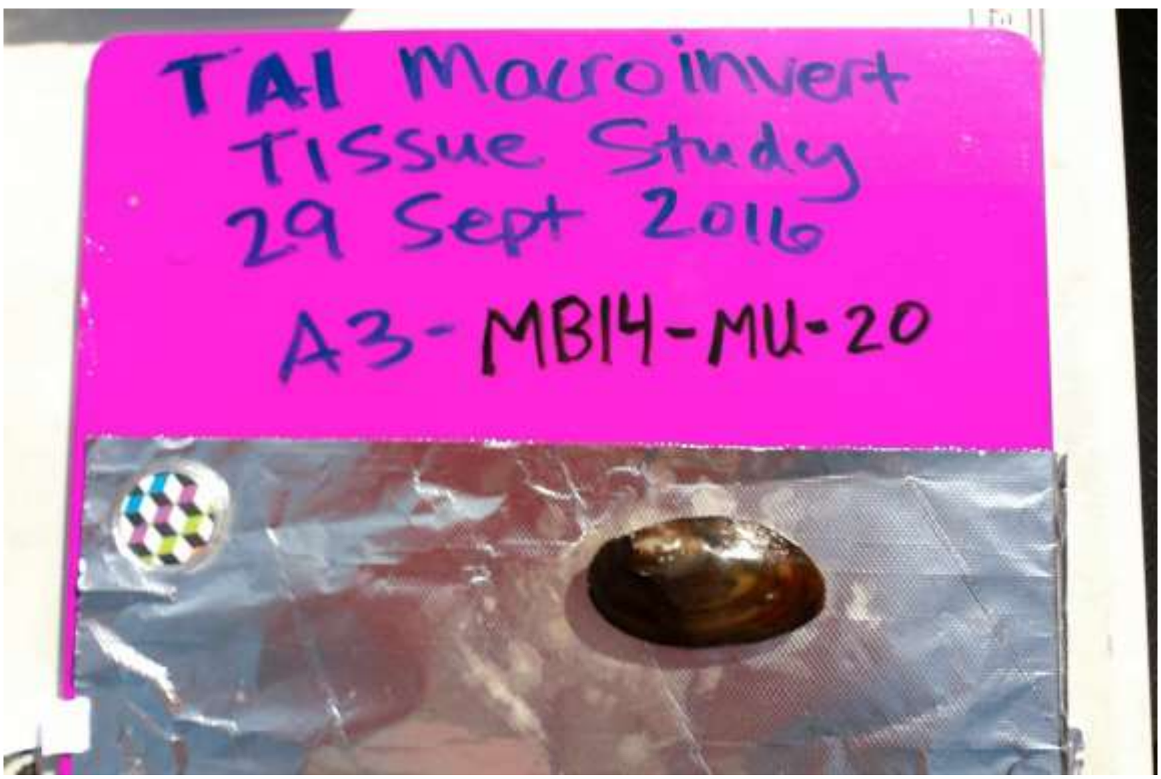
Sample Id: A3-MB14-MU-20

Collection Date:	Sep 29, 2016
Collection Time:	12:25
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	66	mm
Width	38	mm
Breadth	20	mm
Weight	25	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-20'

File Name: A3-MB14-MU-20.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A3-MB14-MU-21**

Collection Date:	Sep 29, 2016
Collection Time:	12:28
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	63	mm
Width	35	mm
Breadth	21	mm
Weight	26	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-21'

File Name: A3-MB14-MU-21.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A3-MB14-MU-22

Collection Date:	Sep 29, 2016
Collection Time:	12:31
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	61	mm
Width	32	mm
Breadth	19	mm
Weight	19	g
Health	Live	none

Photos for Sample Id 'A3-MB14-MU-22'

File Name: A3-MB14-MU-22.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT31

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT31 -118.140289, 48.247291

Photos for Location Id 'A4-CT31'

File Name: A4-CT31.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

AECOM

Sample Id: **A4-CT31-CR-01**

Collection Date:	Sep 08, 2016
Collection Time:	9:29
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	87	mm
Weight	25	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT31-CR-01'

File Name: A4-CT31-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

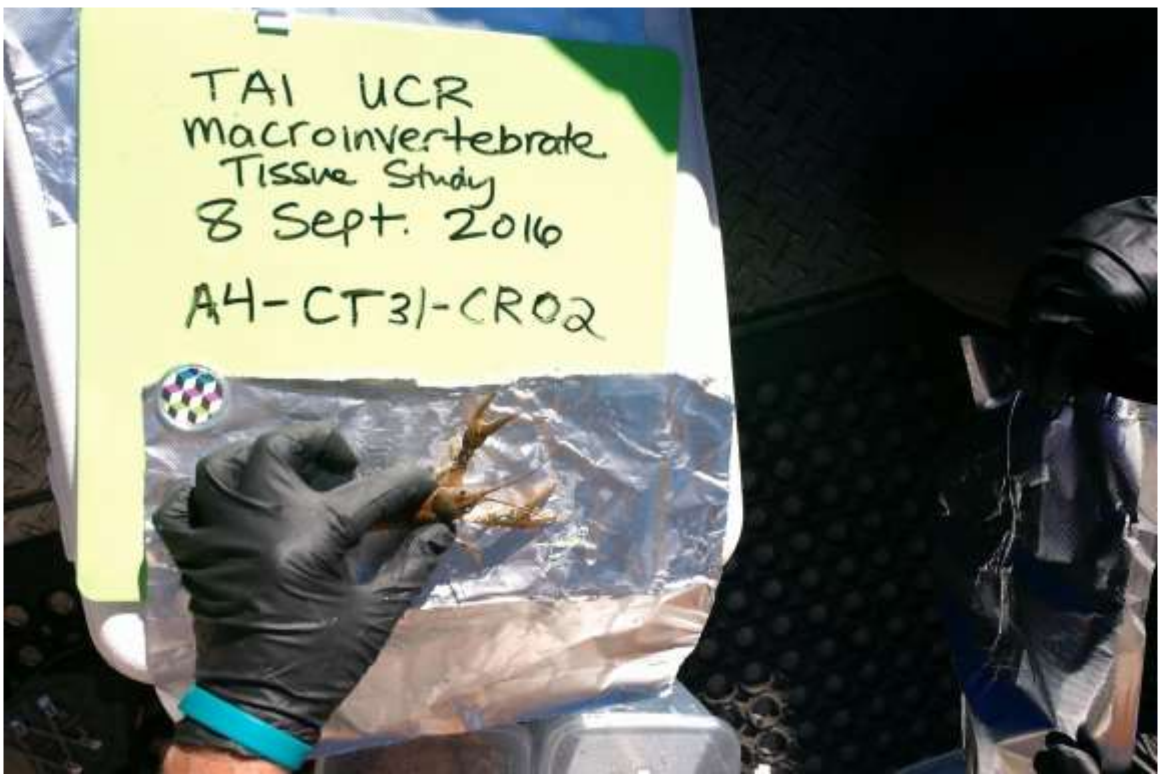
Sample Id: A4-CT31-CR-02

Collection Date:	Sep 08, 2016	
Collection Time:	9:35	
Species Type:	CR	
Species Name:	Orconectes virilis	

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	83	mm
Weight	20	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT31-CR-02'

File Name: A4-CT31-CR-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A4-CT31-CR-03**

Collection Date:	Sep 08, 2016
Collection Time:	9:41
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	52	mm
Length (total)	104	mm
Weight	35	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT31-CR-03'

File Name: A4-CT31-CR-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT31-CR-04

Collection Date:	Sep 08, 2016	
Collection Time:	9:43	
Species Type:	CR	
Species Name:	Orconectes virilis	

Measurement	Value	Unit of Measure
Length (carapace)	32	mm
Length (total)	84	mm
Weight	23	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT31-CR-04'

File Name: A4-CT31-CR-04.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT31-CR-05

Collection Date:	Sep 08, 2016
Collection Time:	9:47
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	84	mm
Weight	25	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT31-CR-05'

File Name: A4-CT31-CR-05.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT31-CR-06

Collection Date:	Sep 08, 2016
Collection Time:	9:49
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	83	mm
Weight	20	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT31-CR-06'

File Name: A4-CT31-CR-06.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT31-CR-07

Collection Date:	Sep 08, 2016
Collection Time:	9:52
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	84	mm
Weight	25	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT31-CR-07'

File Name: A4-CT31-CR-07.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT32

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT32 -118.140151, 48.247606

Photos for Location Id 'A4-CT32'

File Name: A4-CT32.JPG

No samples were taken at Location Id 'A4-CT32'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT33

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT33 -118.139864, 48.248669

Photos for Location Id 'A4-CT33'

File Name: A4-CT33.JPG

No samples were taken at Location Id 'A4-CT33'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT34

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT34 -118.15341, 48.25451

Photos for Location Id 'A4-CT34'

File Name: A4-CT34.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT34-CR-01

Collection Date:	Sep 08, 2016
Collection Time:	9:58
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	94	mm
Weight	26	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT34-CR-01'

File Name: A4-CT34-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT34-CR-02

Collection Date:	Sep 08, 2016
Collection Time:	10:01
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	94	mm
Weight	27	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT34-CR-02'

File Name: A4-CT34-CR-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A4-CT34-CR-03**

Collection Date:	Sep 08, 2016
Collection Time:	10:07
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	94	mm
Weight	24	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT34-CR-03'

File Name: A4-CT34-CR-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT34-CR-04

Collection Date:	Sep 08, 2016	
Collection Time:	10:09	
Species Type:	CR	
Species Name:	Orconectes virilis	

Measurement	Value	Unit of Measure
Length (carapace)	52	mm
Length (total)	107	mm
Weight	45	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT34-CR-04'

File Name: A4-CT34-CR-04.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT34-CR-05

Collection Date:	Sep 08, 2016
Collection Time:	10:12
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	94	mm
Weight	25	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT34-CR-05'

File Name: A4-CT34-CR-05.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT34-CR-06

Collection Date:	Sep 08, 2016
Collection Time:	10:14
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	94	mm
Weight	30	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT34-CR-06'

File Name: A4-CT34-CR-06.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT34-CR-07

Collection Date:	Sep 08, 2016
Collection Time:	10:16
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	94	mm
Weight	25	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT34-CR-07'

File Name: A4-CT34-CR-07.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT34-CR-08

Collection Date:	Sep 08, 2016
Collection Time:	10:18
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	83	mm
Weight	26	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT34-CR-08'

File Name: A4-CT34-CR-08.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT34-CR-09

Collection Date:	Sep 08, 2016
Collection Time:	10:21
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	52	mm
Length (total)	104	mm
Weight	47	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT34-CR-09'

File Name: A4-CT34-CR-09.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT34-CR-10

Collection Date:	Sep 08, 2016
Collection Time:	10:24
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	52	mm
Length (total)	94	mm
Weight	41	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT34-CR-10'

File Name: A4-CT34-CR-10.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT35

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT35 -118.152442, 48.253735

Photos for Location Id 'A4-CT35'

File Name: A4-CT35.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT35-CR-01

Collection Date:	Sep 08, 2016
Collection Time:	11:39
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	32	mm
Length (total)	73	mm
Weight	15	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT35-CR-01'

File Name: A4-CT35-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT35-CR-02

Collection Date:	Sep 08, 2016
Collection Time:	11:44
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	52	mm
Length (total)	104	mm
Weight	42	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT35-CR-02'

File Name: A4-CT35-CR-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT35-CR-03

Collection Date:	Sep 08, 2016
Collection Time:	11:47
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	52	mm
Length (total)	105	mm
Weight	52	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT35-CR-03'

File Name: A4-CT35-CR-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A4-CT35-CR-04**

Collection Date:	Sep 08, 2016
Collection Time:	11:50
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	94	mm
Weight	27	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT35-CR-04'

File Name: A4-CT35-CR-04.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT35-CR-05

Collection Date:	Sep 08, 2016
Collection Time:	11:54
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	52	mm
Length (total)	94	mm
Weight	38	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT35-CR-05'

File Name: A4-CT35-CR-05.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

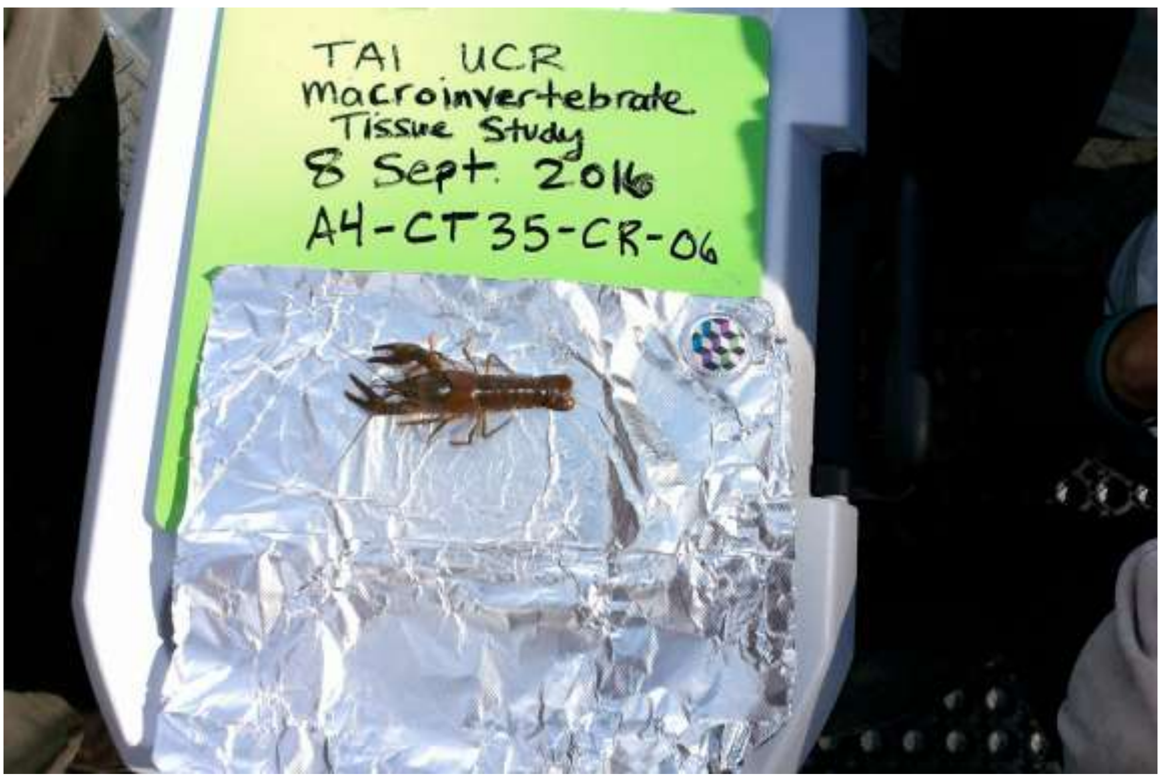
Sample Id: A4-CT35-CR-06

Collection Date:	Sep 08, 2016
Collection Time:	11:58
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	43	mm
Length (total)	87	mm
Weight	21	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT35-CR-06'

File Name: A4-CT35-CR-06.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT35-CR-07

Collection Date:	Sep 08, 2016
Collection Time:	12:01
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	43	mm
Length (total)	91	mm
Weight	30	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT35-CR-07'

File Name: A4-CT35-CR-07.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT36

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT36 -118.150866, 48.253506

Photos for Location Id 'A4-CT36'

File Name: A4-CT36.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT36-CR-01

Collection Date:	Sep 08, 2016
Collection Time:	12:08
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	44	mm
Length (total)	88	mm
Weight	26	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT36-CR-01'

File Name: A4-CT36-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT36-CR-02

Collection Date:	Sep 08, 2016
Collection Time:	12:12
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	43	mm
Length (total)	90	mm
Weight	23	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT36-CR-02'

File Name: A4-CT36-CR-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT36-CR-03

Collection Date:	Sep 08, 2016
Collection Time:	12:19
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	47	mm
Length (total)	91	mm
Weight	32	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT36-CR-03'

File Name: A4-CT36-CR-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-CT36-CR-04

Collection Date:	Sep 08, 2016
Collection Time:	12:22
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	45	mm
Length (total)	91	mm
Weight	26	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'A4-CT36-CR-04'

File Name: A4-CT36-CR-04.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT37

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT37 -118.151132, 48.257475

Photos for Location Id 'A4-CT37'

File Name: A4-CT37.JPG

No samples were taken at Location Id 'A4-CT37'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT38

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT38 -118.150601, 48.259251

Photos for Location Id 'A4-CT38'

File Name: A4-CT38.JPG

No samples were taken at Location Id 'A4-CT38'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT39

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT39 -118.147036, 48.258844

Photos for Location Id 'A4-CT39'

File Name: A4-CT39.JPG

No samples were taken at Location Id 'A4-CT39'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT40

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT40	-118.146575, 48.265129

Photos for Location Id 'A4-CT40'

File Name: A4-CT40.JPG

No samples were taken at Location Id 'A4-CT40'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT41

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT41	-118.158977, 48.287163

Photos for Location Id 'A4-CT41'

File Name: A4-CT41.JPG

No samples were taken at Location Id 'A4-CT41'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT42

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT42 -118.157289, 48.284524

Photos for Location Id 'A4-CT42'

File Name: A4-CT42.JPG

No samples were taken at Location Id 'A4-CT42'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT43

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT43 -118.156345, 48.283011

Photos for Location Id 'A4-CT43'

File Name: A4-CT43.JPG

No samples were taken at Location Id 'A4-CT43'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT44

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT44	-118.171671, 48.293654

Photos for Location Id 'A4-CT44'

File Name: A4-CT44.JPG

No samples were taken at Location Id 'A4-CT44'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT45

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT45 -118.171484, 48.296087

Photos for Location Id 'A4-CT45'

File Name: A4-CT45.JPG

No samples were taken at Location Id 'A4-CT45'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT46

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT46 -118.174874, 48.297504

Photos for Location Id 'A4-CT46'

File Name: A4-CT46.JPG

No samples were taken at Location Id 'A4-CT46'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT47

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT47 -118.180253, 48.29391

Photos for Location Id 'A4-CT47'

File Name: A4-CT47.JPG

No samples were taken at Location Id 'A4-CT47'

Location Id: A4-CT48

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT48 -118.179337, 48.309236

Photos for Location Id 'A4-CT48'

File Name: A4-CT48.JPG

No samples were taken at Location Id 'A4-CT48'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT49

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT49 -118.186559, 48.305712

Photos for Location Id 'A4-CT49'

File Name: A4-CT49.JPG

No samples were taken at Location Id 'A4-CT49'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT50

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT50 -118.197409, 48.305113

Photos for Location Id 'A4-CT50'

File Name: A4-CT50.JPG

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No samples were taken at Location Id 'A4-CT50'

Location Id: **A4-CT51**

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT51 -118.192301, 48.304629

Photos for Location Id 'A4-CT51'

File Name: A4-CT51.JPG

No samples were taken at Location Id 'A4-CT51'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT52

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT52 -118.159837, 48.339437

Photos for Location Id 'A4-CT52'

File Name: A4-CT52.JPG

No samples were taken at Location Id 'A4-CT52'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT53

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT53 -118.158439, 48.336862

Photos for Location Id 'A4-CT53'

File Name: A4-CT53.JPG

No samples were taken at Location Id 'A4-CT53'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT54

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT54 -118.156368, 48.333076

Photos for Location Id 'A4-CT54'

File Name: A4-CT54.JPG

No samples were taken at Location Id 'A4-CT54'

Location Id: A4-CT55

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT55	-118.154725, 48.328337

Photos for Location Id 'A4-CT55'

File Name: A4-CT55.JPG

No samples were taken at Location Id 'A4-CT55'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT56

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT56 -118.153132, 48.323796

Photos for Location Id 'A4-CT56'

File Name: A4-CT56.JPG

No samples were taken at Location Id 'A4-CT56'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT57

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT57	-118.149086, 48.307601

Photos for Location Id 'A4-CT57'

File Name: A4-CT57.JPG

No samples were taken at Location Id 'A4-CT57'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT58

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT58	-118.150365, 48.306844

Photos for Location Id 'A4-CT58'

File Name: A4-CT58.JPG

No samples were taken at Location Id 'A4-CT58'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT59

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT59 -118.148335, 48.296526

Photos for Location Id 'A4-CT59'

File Name: A4-CT59.JPG

No samples were taken at Location Id 'A4-CT59'

Location Id: A4-CT60

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT60 -118.147964, 48.295322

Photos for Location Id 'A4-CT60'

File Name: A4-CT60.JPG

No samples were taken at Location Id 'A4-CT60'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-CT61

Location Type: Crayfish trap (CT)

Location Coordinates:

A4-CT61 -118.147677, 48.292338

Photos for Location Id 'A4-CT61'

File Name: A4-CT61.JPG

No samples were taken at Location Id 'A4-CT61'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-MB18

Location Type: Mussel beach (MB)

Location Coordinates:

A4-MB18 -118.186803, 48.328125

Photos for Location Id 'A4-MB18'

File Name: A4-MB18.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-MB18-MU-01

Collection Date: Sep 30, 2016

Collection Time: 11:40

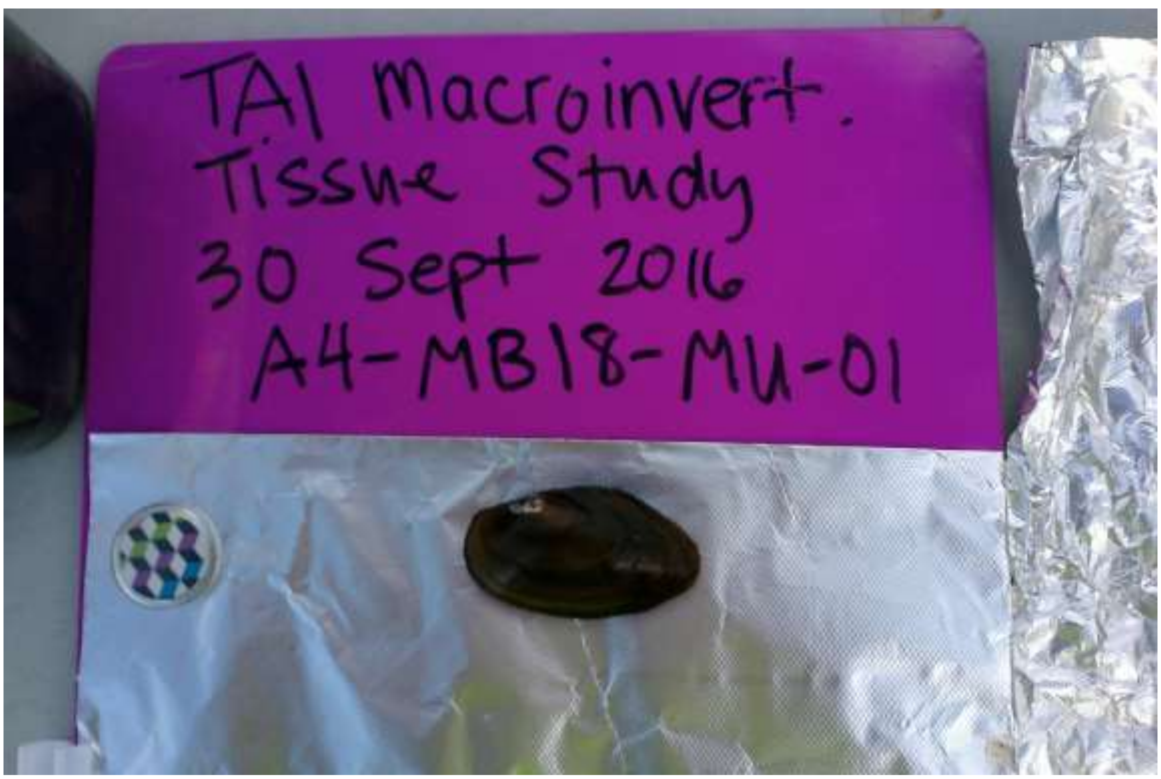
Species Type: MU

Species Name: Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	71	mm
Width	41	mm
Breadth	25	mm
Weight	35	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-01'

File Name: A4-MB18-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-MB18-MU-02

Collection Date:	Sep 30, 2016
Collection Time:	11:46
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	75	mm
Width	42	mm
Breadth	27	mm
Weight	42	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-02'

File Name: A4-MB18-MU-02.JPG

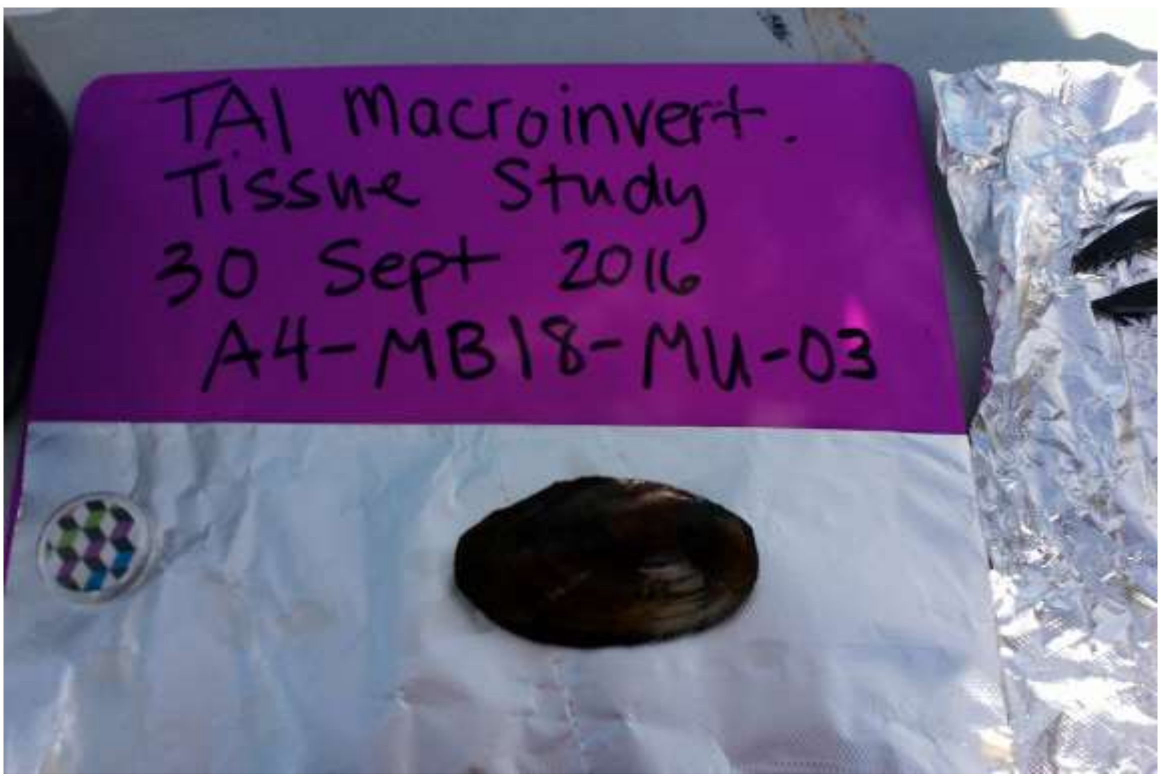
Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-MB18-MU-03

Collection Date:	Sep 30, 2016	
Collection Time:	11:50	
Species Type:	MU	
Species Name:	Anodonta sp.	
Measurement	Value	Unit of Measure
Length (total)	85	mm
Width	48	mm
Breadth	30	mm
Weight	58	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-03'

File Name: A4-MB18-MU-03.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

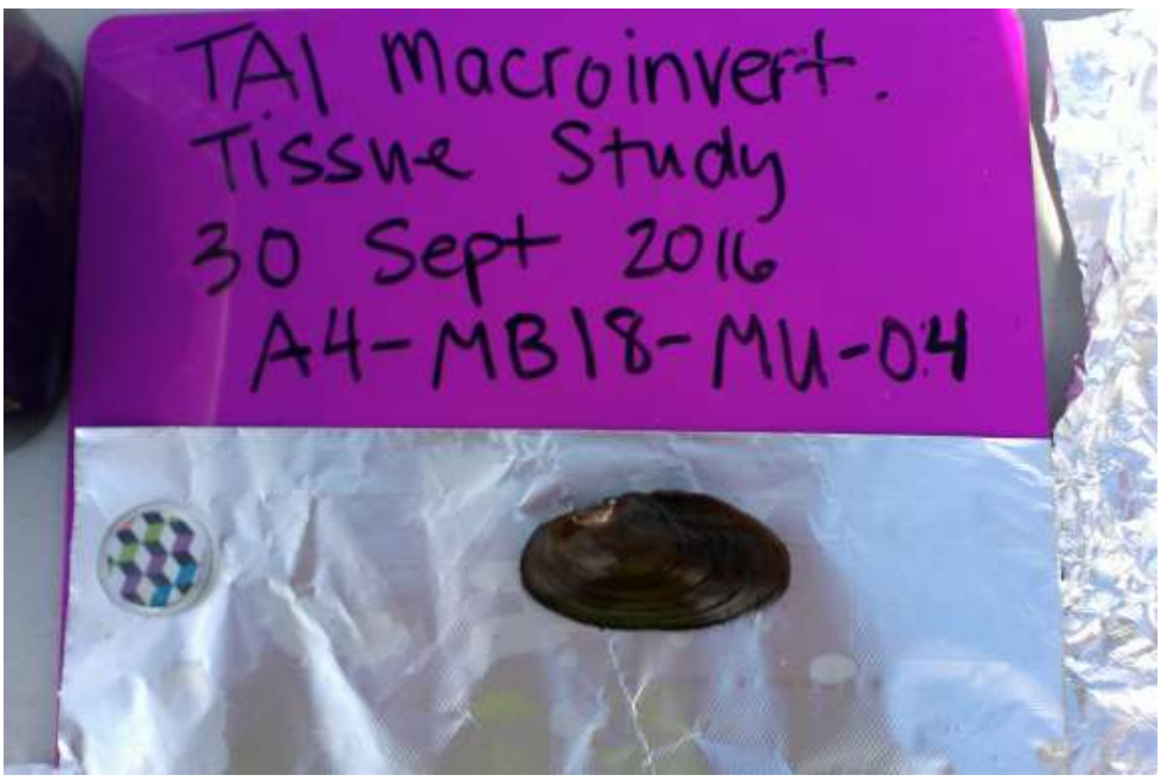
Sample Id: A4-MB18-MU-04

Collection Date:	Sep 30, 2016
Collection Time:	11:53
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	75	mm
Width	43	mm
Breadth	27	mm
Weight	42	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-04'

File Name: A4-MB18-MU-04.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

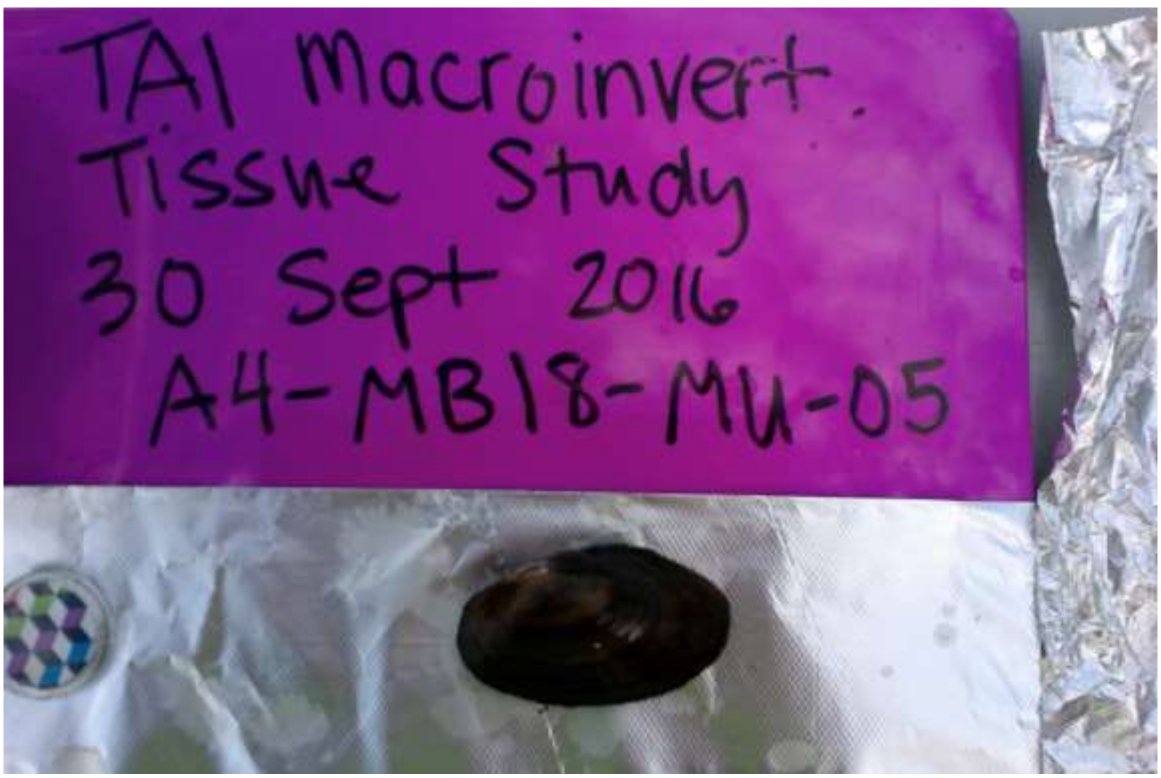
Sample Id: **A4-MB18-MU-05**

Collection Date:	Sep 30, 2016
Collection Time:	11:55
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	70	mm
Width	41	mm
Breadth	25	mm
Weight	35	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-05'

File Name: A4-MB18-MU-05.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A4-MB18-MU-06**

Collection Date:	Sep 30, 2016
Collection Time:	11:59
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	77	mm
Width	44	mm
Breadth	25	mm
Weight	44	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-06'

File Name: A4-MB18-MU-06.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A4-MB18-MU-07**

Collection Date:	Sep 30, 2016
Collection Time:	12:02
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	76	mm
Width	41	mm
Breadth	28	mm
Weight	45	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-07'

File Name: A4-MB18-MU-07.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A4-MB18-MU-08**

Collection Date:	Sep 30, 2016
Collection Time:	12:05
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	79	mm
Width	45	mm
Breadth	26	mm
Weight	50	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-08'

File Name: A4-MB18-MU-08.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

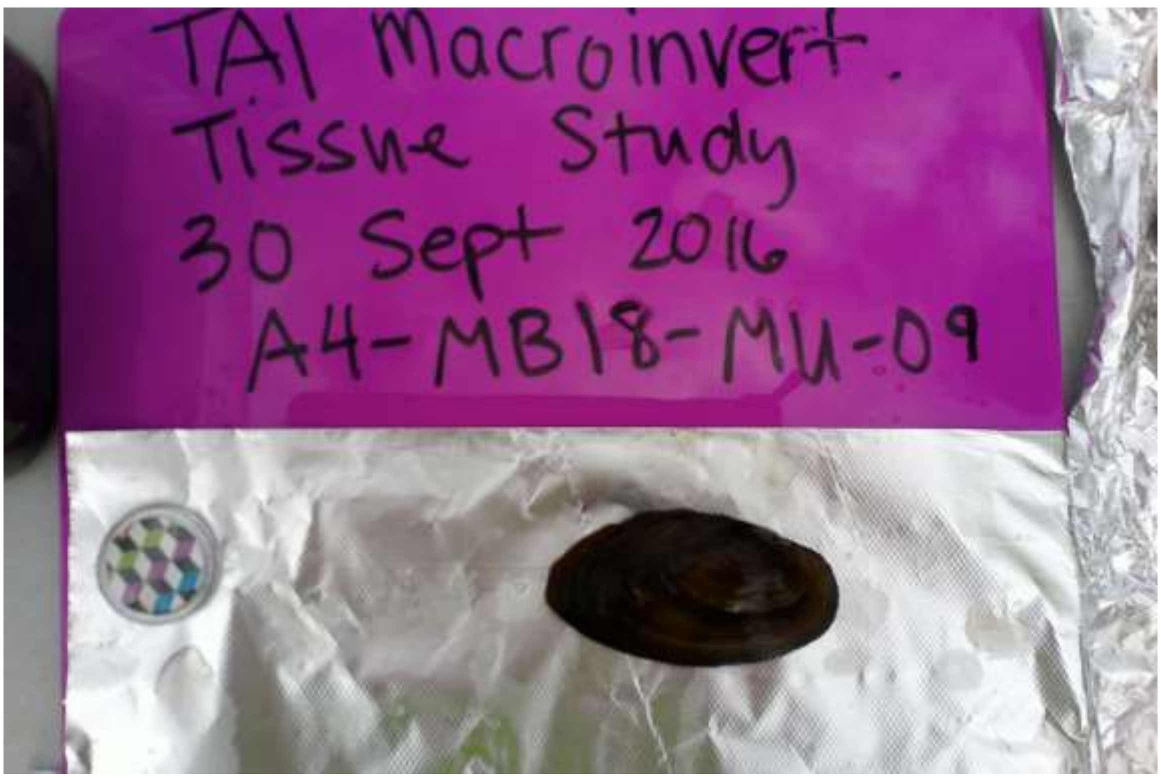
Sample Id: **A4-MB18-MU-09**

Collection Date:	Sep 30, 2016
Collection Time:	12:07
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	80	mm
Width	45	mm
Breadth	26	mm
Weight	46	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-09'

File Name: A4-MB18-MU-09.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-MB18-MU-10

Collection Date:	Sep 30, 2016
Collection Time:	12:11
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	75	mm
Width	44	mm
Breadth	26	mm
Weight	41	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-10'

File Name: A4-MB18-MU-10.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

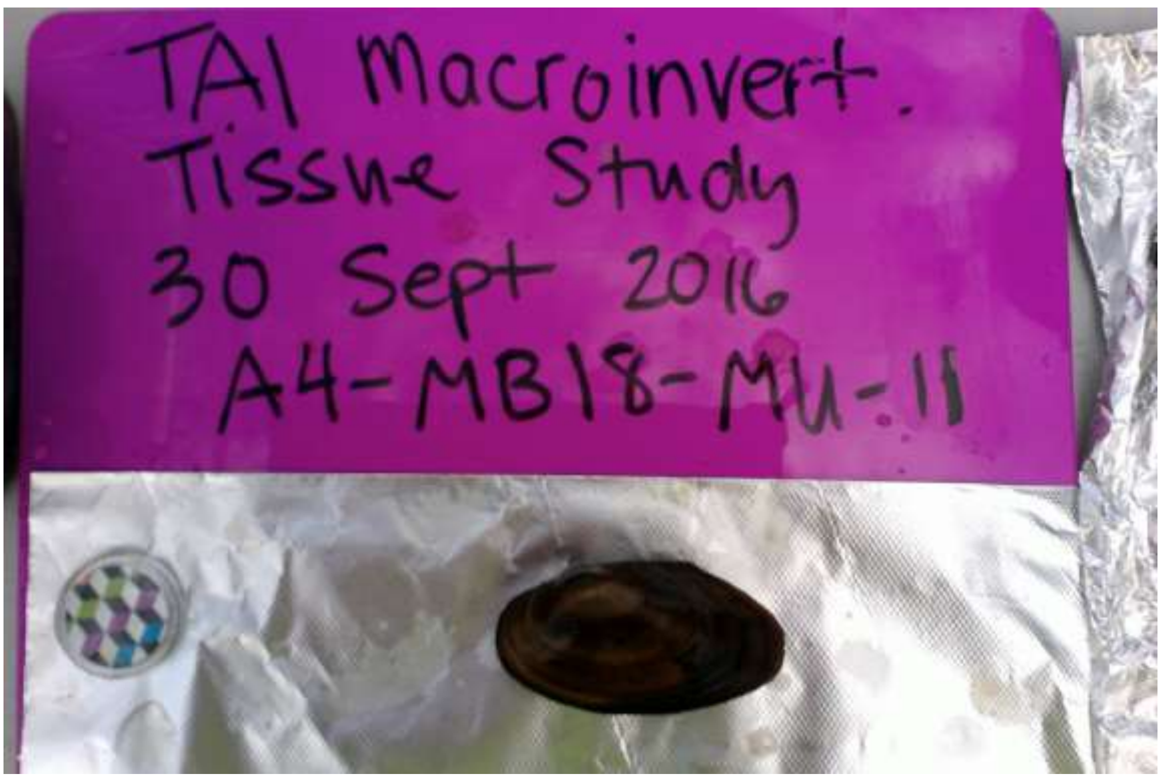
Sample Id: **A4-MB18-MU-11**

Collection Date:	Sep 30, 2016
Collection Time:	12:14
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	75	mm
Width	40	mm
Breadth	27	mm
Weight	44	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-11'

File Name: A4-MB18-MU-11.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

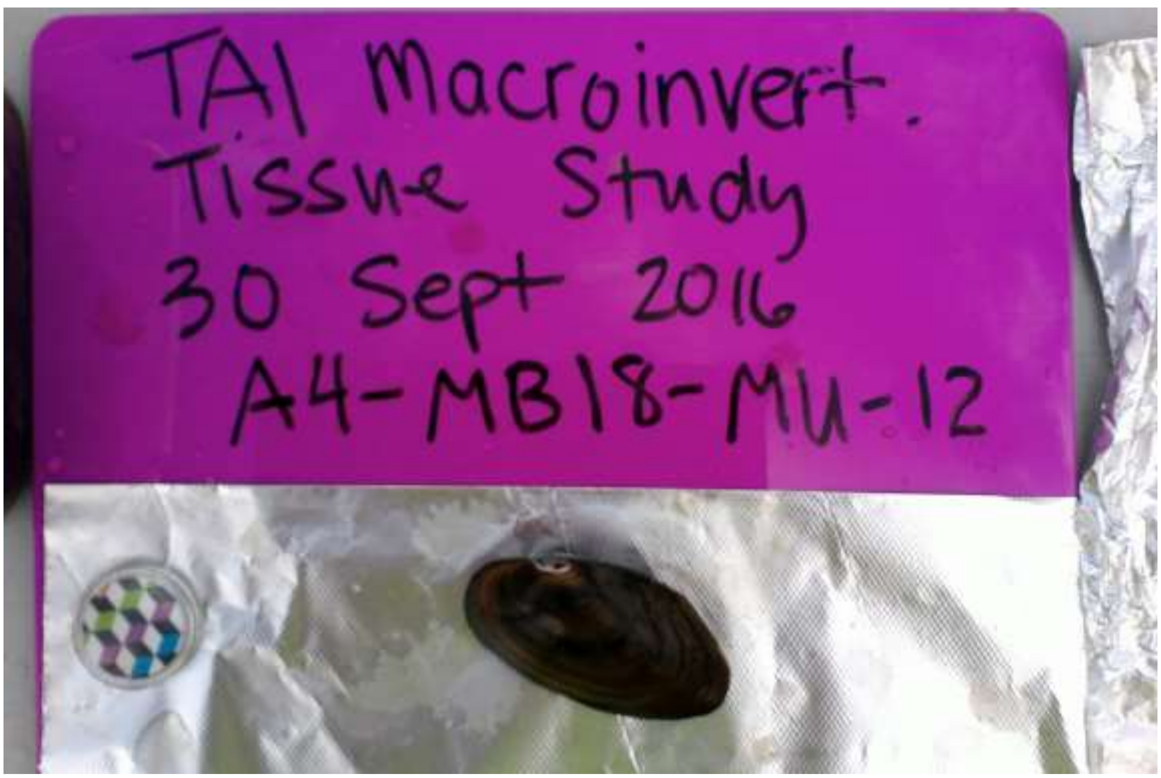
Sample Id: A4-MB18-MU-12

Collection Date:	Sep 30, 2016
Collection Time:	12:17
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	74	mm
Width	42	mm
Breadth	26	mm
Weight	39	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-12'

File Name: A4-MB18-MU-12.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

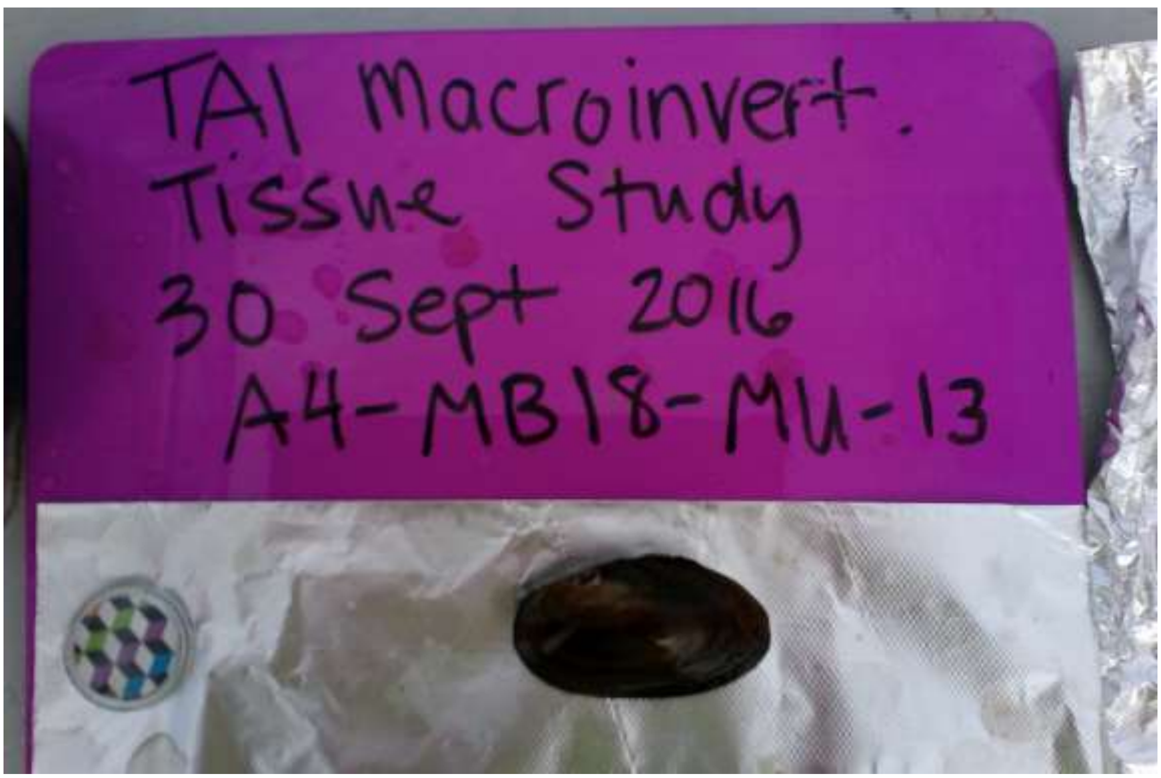
Sample Id: A4-MB18-MU-13

Collection Date:	Sep 30, 2016
Collection Time:	12:20
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	67	mm
Width	40	mm
Breadth	23	mm
Weight	33	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-13'

File Name: A4-MB18-MU-13.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

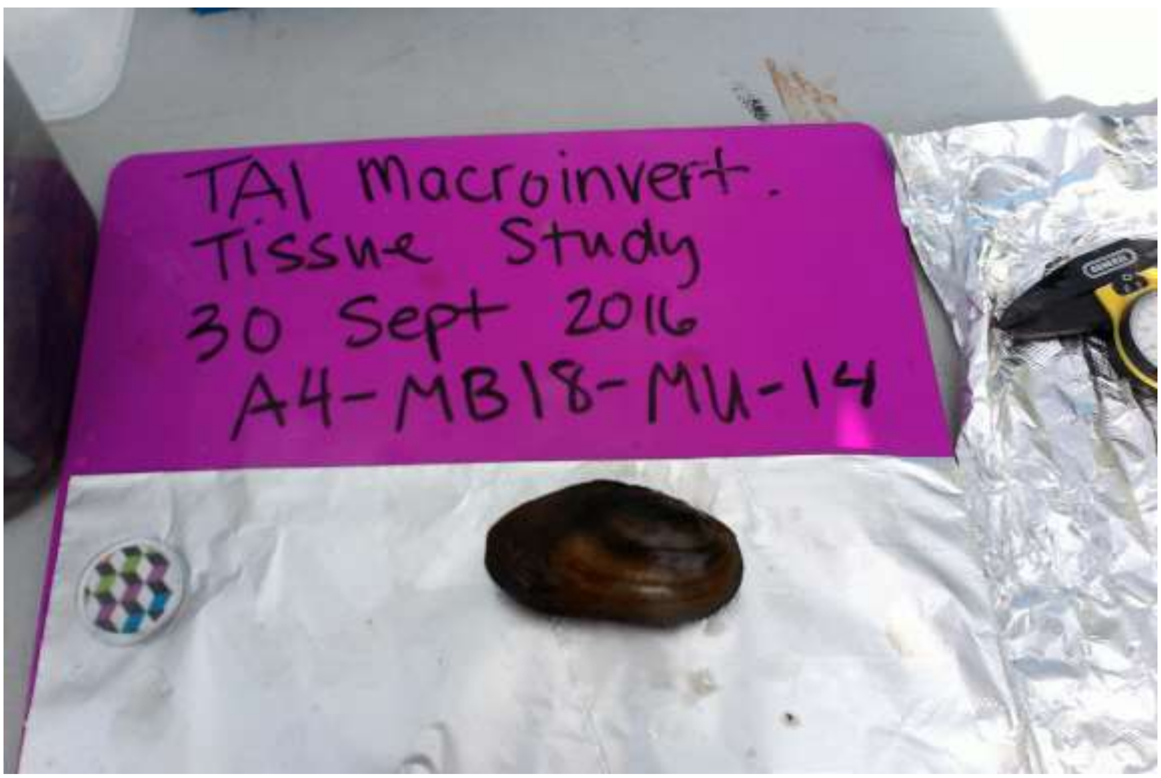
Sample Id: A4-MB18-MU-14

Collection Date:	Sep 30, 2016
Collection Time:	12:24
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	77	mm
Width	41	mm
Breadth	27	mm
Weight	48	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-14'

File Name: A4-MB18-MU-14.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

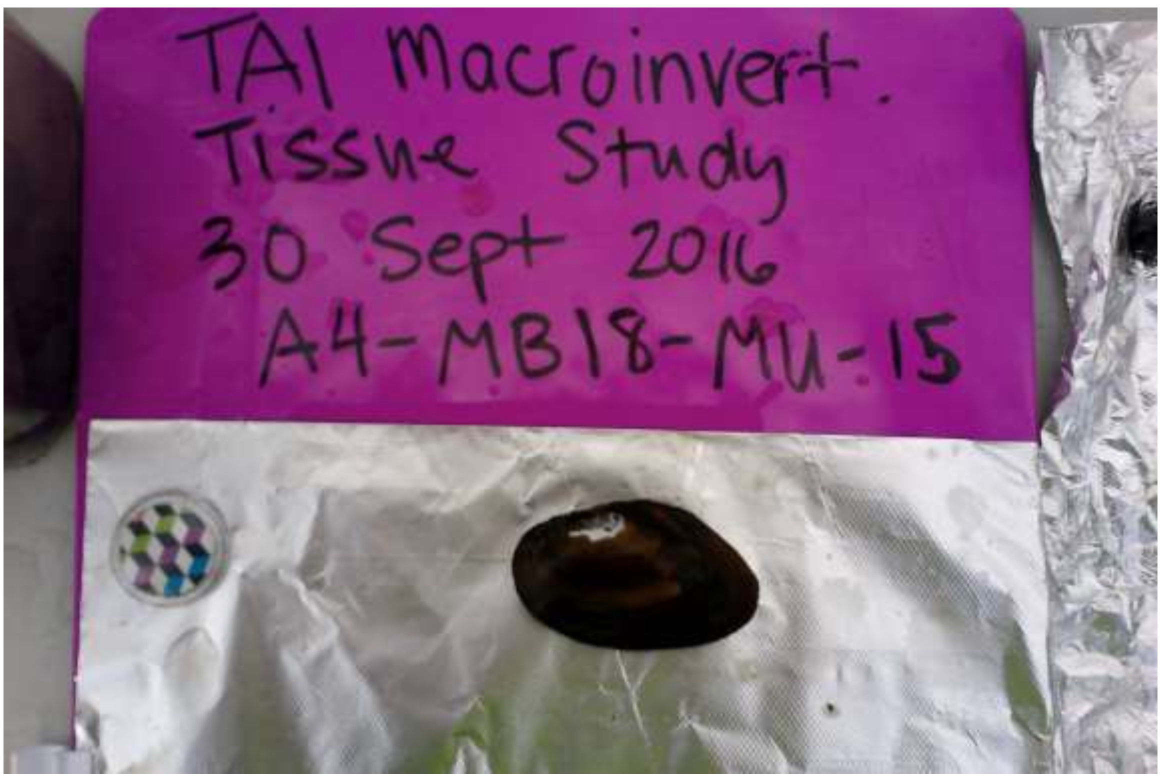
Sample Id: A4-MB18-MU-15

Collection Date:	Sep 30, 2016
Collection Time:	12:27
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	72	mm
Width	43	mm
Breadth	21	mm
Weight	38	g
Health	Live	none

Photos for Sample Id 'A4-MB18-MU-15'

File Name: A4-MB18-MU-15.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A4-MB19

Location Type: Mussel beach (MB)

Location Coordinates:

A4-MB19	-118.161431, 48.291307

Photos for Location Id 'A4-MB19'

File Name: A4-MB19.JPG

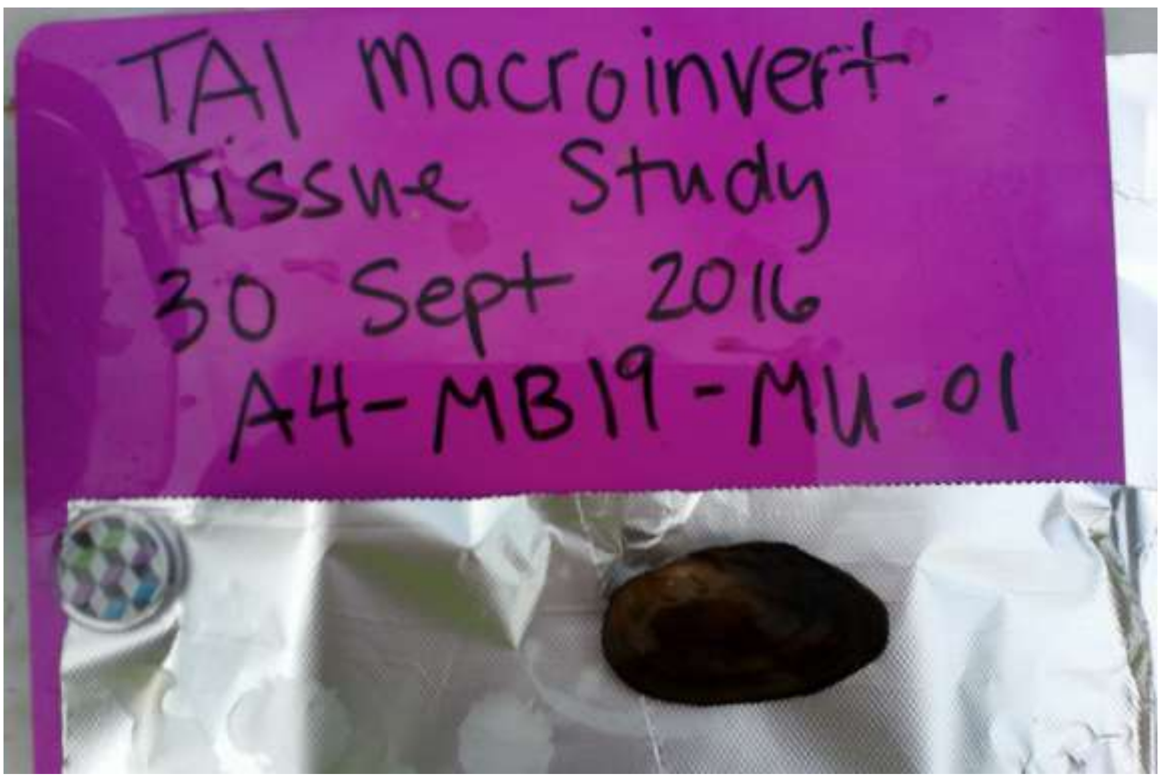
Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-MB19-MU-01

Collection Date:	Sep 30, 2016	
Collection Time:	12:34	
Species Type:	MU	
Species Name:	Anodonta sp.	
Measurement	Value	Unit of Measure
Length (total)	72	mm
Width	42	mm
Breadth	24	mm
Weight	36	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-01'

File Name: A4-MB19-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

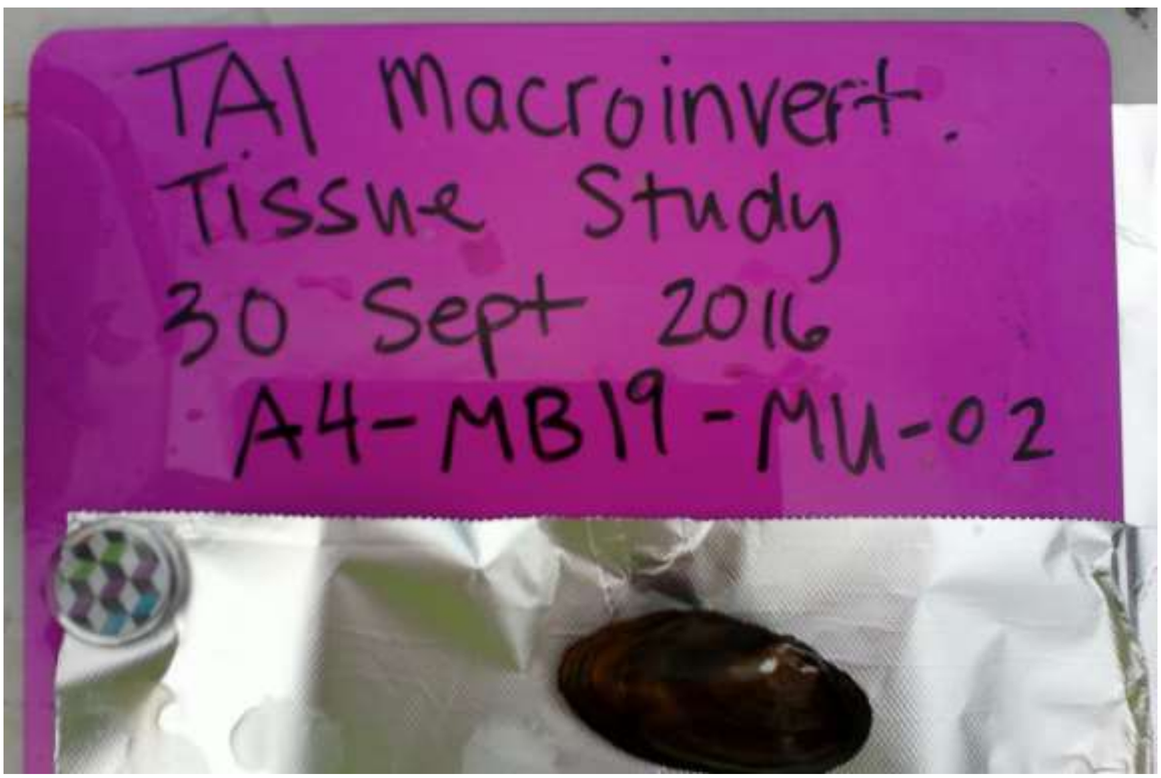
Sample Id: **A4-MB19-MU-02**

Collection Date:	Sep 30, 2016
Collection Time:	12:38
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	78	mm
Width	43	mm
Breadth	28	mm
Weight	46	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-02'

File Name: A4-MB19-MU-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-MB19-MU-03

Collection Date:	Sep 30, 2016
Collection Time:	12:41
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	69	mm
Width	38	mm
Breadth	29	mm
Weight	34	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-03'

File Name: A4-MB19-MU-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-MB19-MU-04

Collection Date: Sep 30, 2016

Collection Time: 12:45

Species Type: MU

Species Name: Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	82	mm
Width	46	mm
Breadth	30	mm
Weight	55	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-04'

File Name: A4-MB19-MU-04.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

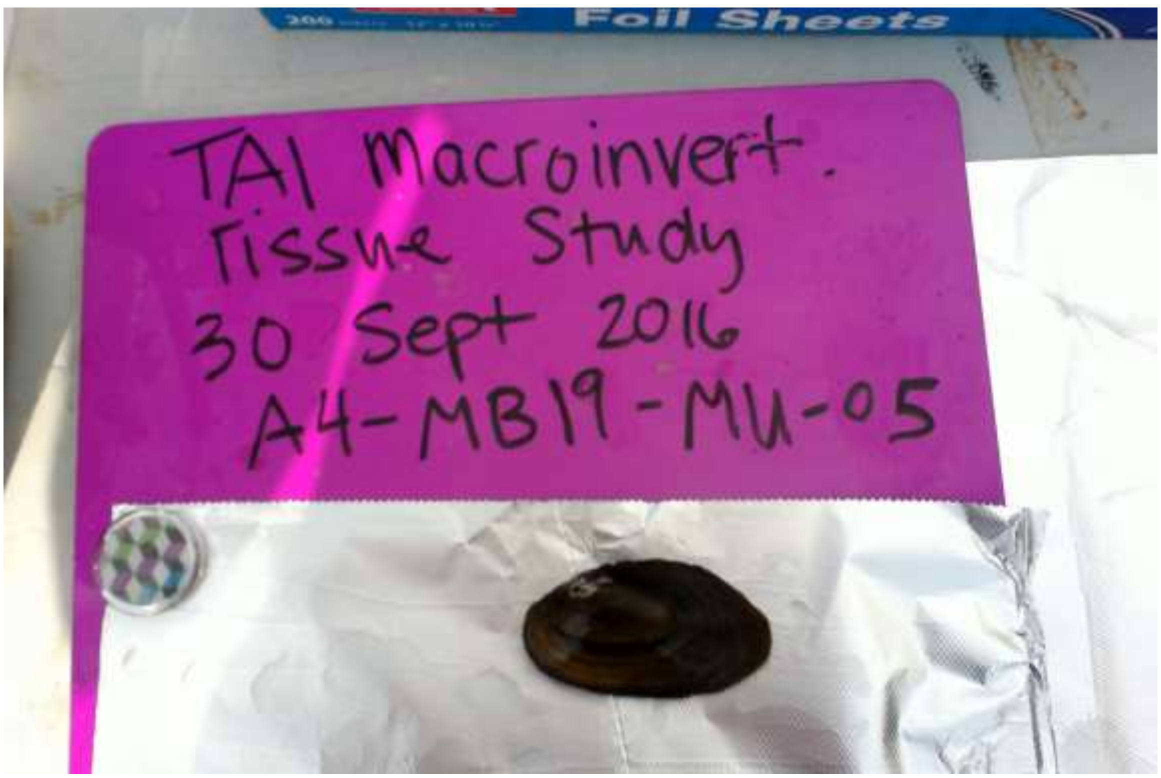
Sample Id: A4-MB19-MU-05

Collection Date:	Sep 30, 2016
Collection Time:	12:48
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	73	mm
Width	41	mm
Breadth	27	mm
Weight	39	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-05'

File Name: A4-MB19-MU-05.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-MB19-MU-06

Collection Date: Sep 30, 2016

Collection Time: 12:51

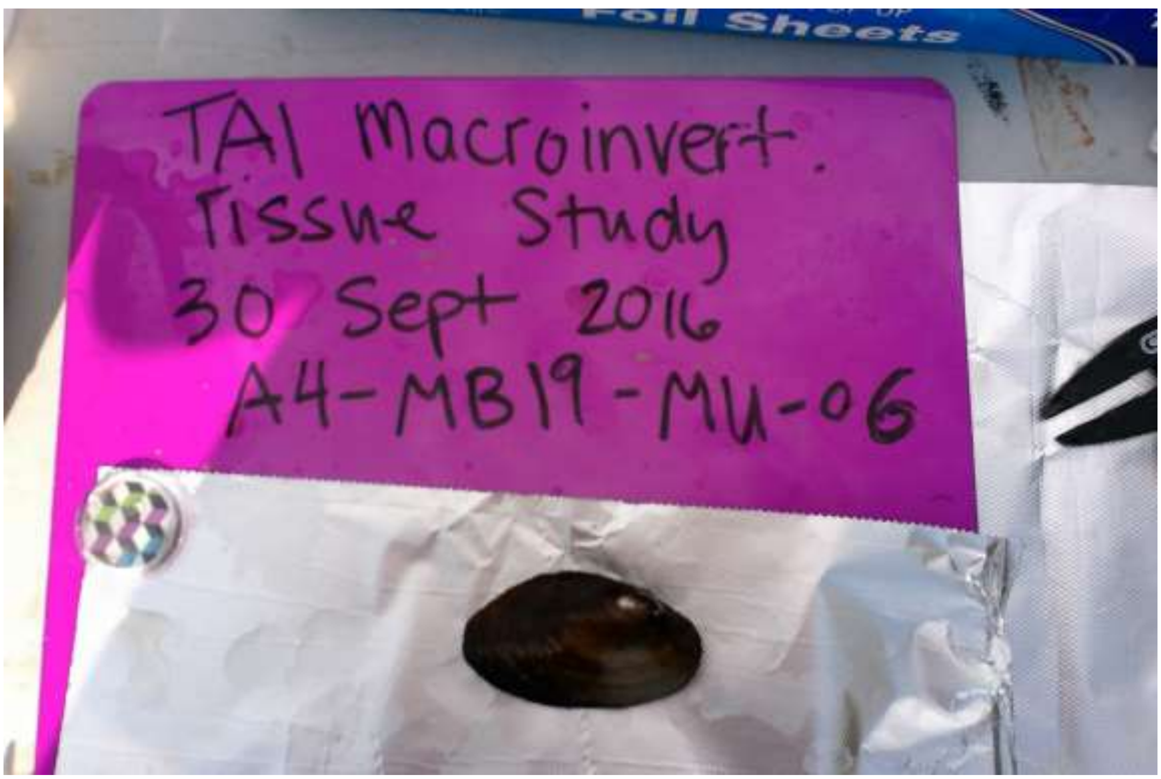
Species Type: MU

Species Name: Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	72	mm
Width	43	mm
Breadth	24	mm
Weight	36	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-06'

File Name: A4-MB19-MU-06.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

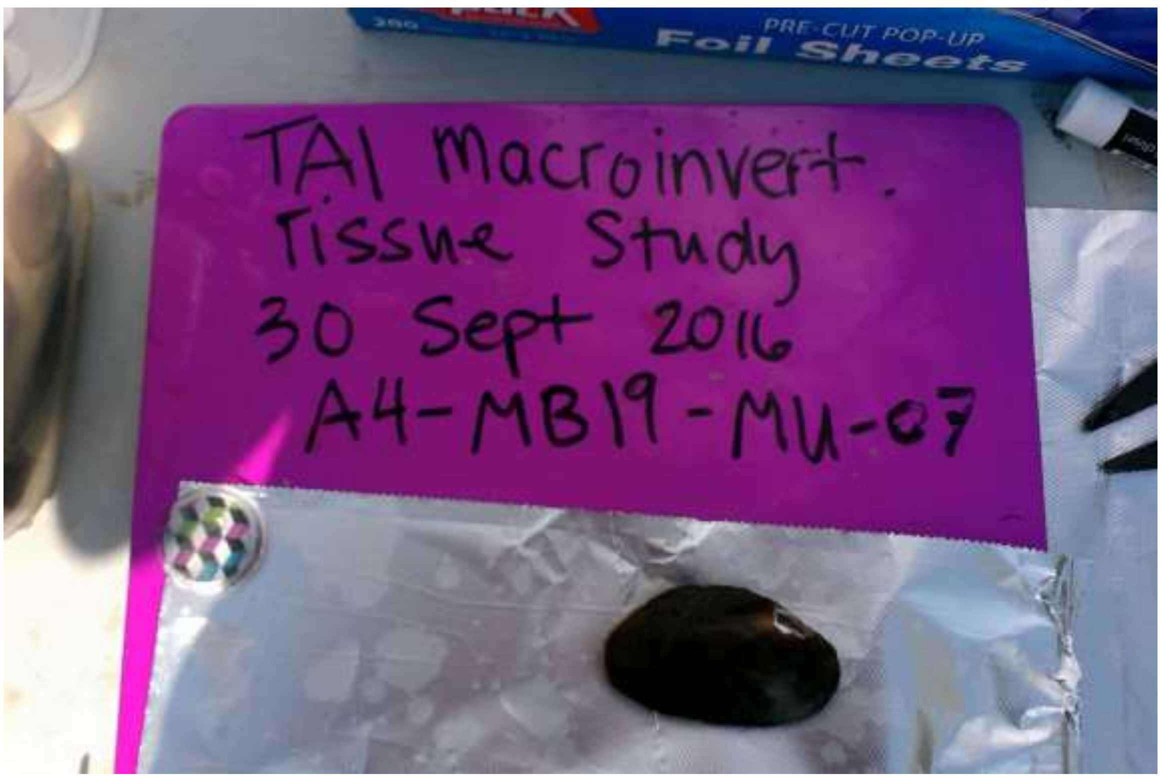
Sample Id: **A4-MB19-MU-07**

Collection Date:	Sep 30, 2016
Collection Time:	12:53
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	70	mm
Width	40	mm
Breadth	23	mm
Weight	35	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-07'

File Name: A4-MB19-MU-07.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

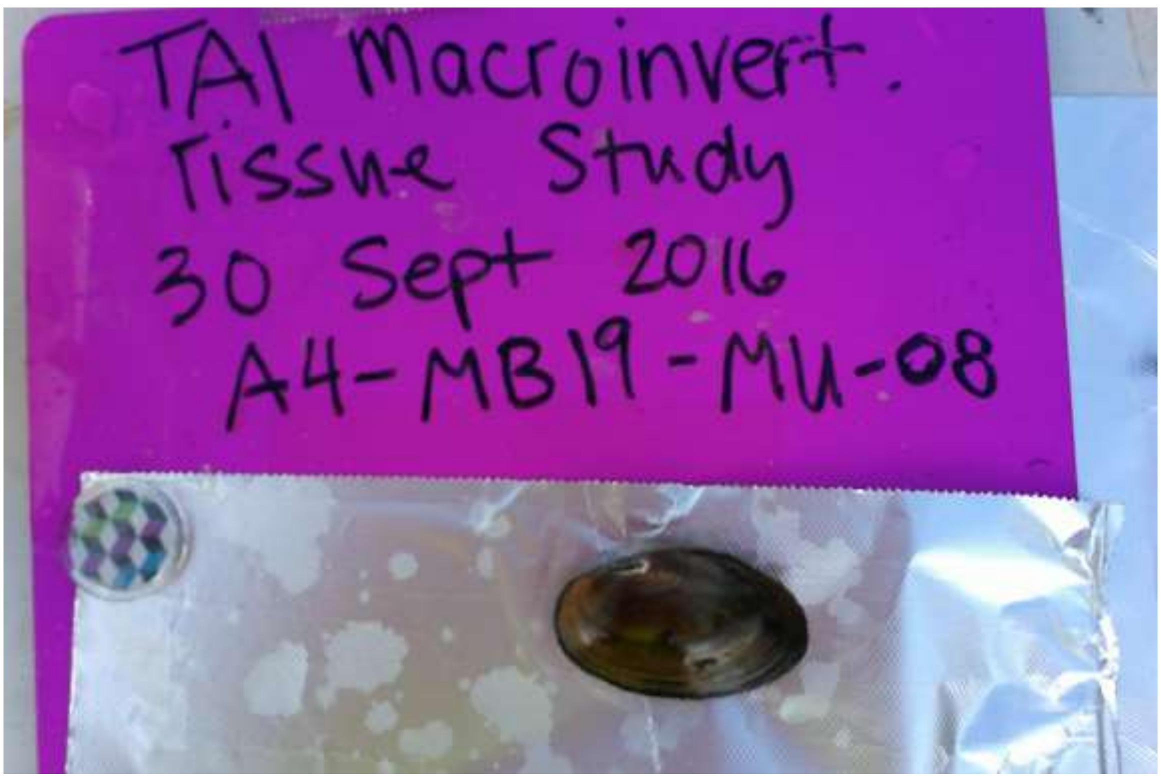
Sample Id: A4-MB19-MU-08

Collection Date:	Sep 30, 2016
Collection Time:	12:56
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	67	mm
Width	42	mm
Breadth	25	mm
Weight	32	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-08'

File Name: A4-MB19-MU-08.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

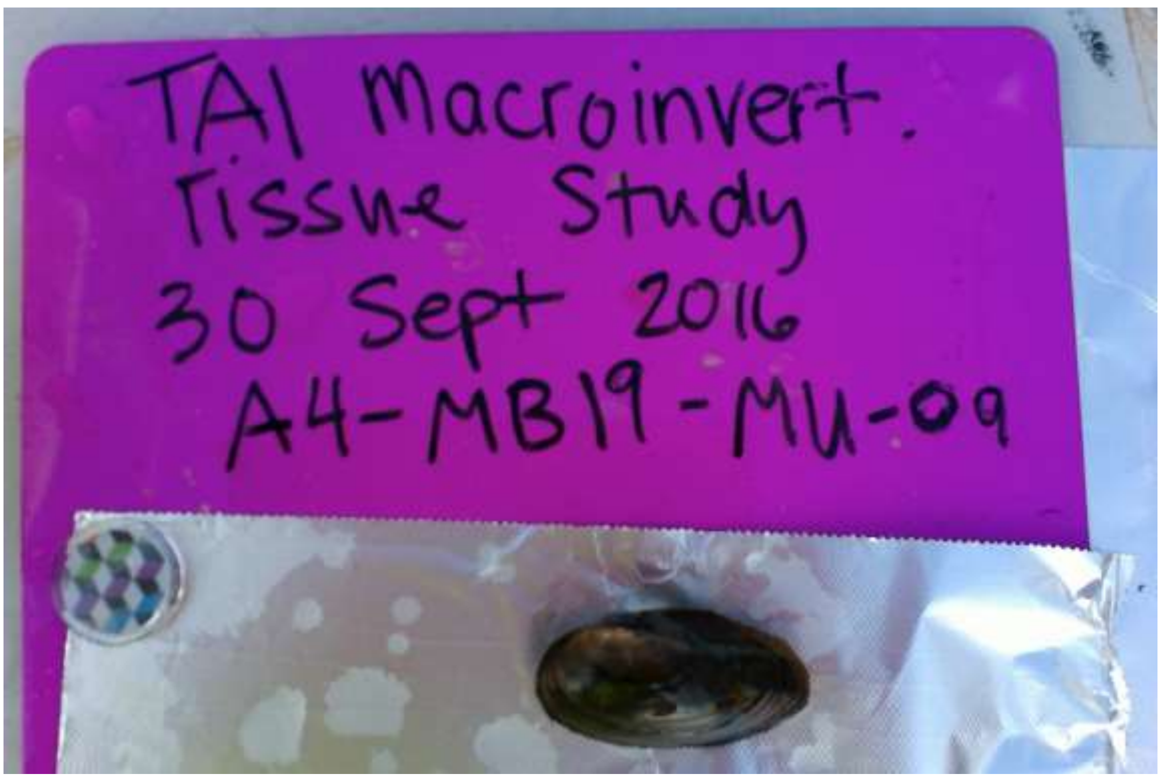
Sample Id: A4-MB19-MU-09

Collection Date:	Sep 30, 2016
Collection Time:	12:59
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	71	mm
Width	38	mm
Breadth	26	mm
Weight	34	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-09'

File Name: A4-MB19-MU-09.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A4-MB19-MU-10

Collection Date:	Sep 30, 2016
Collection Time:	13:02
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	69	mm
Width	42	mm
Breadth	26	mm
Weight	36	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-10'

File Name: A4-MB19-MU-10.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

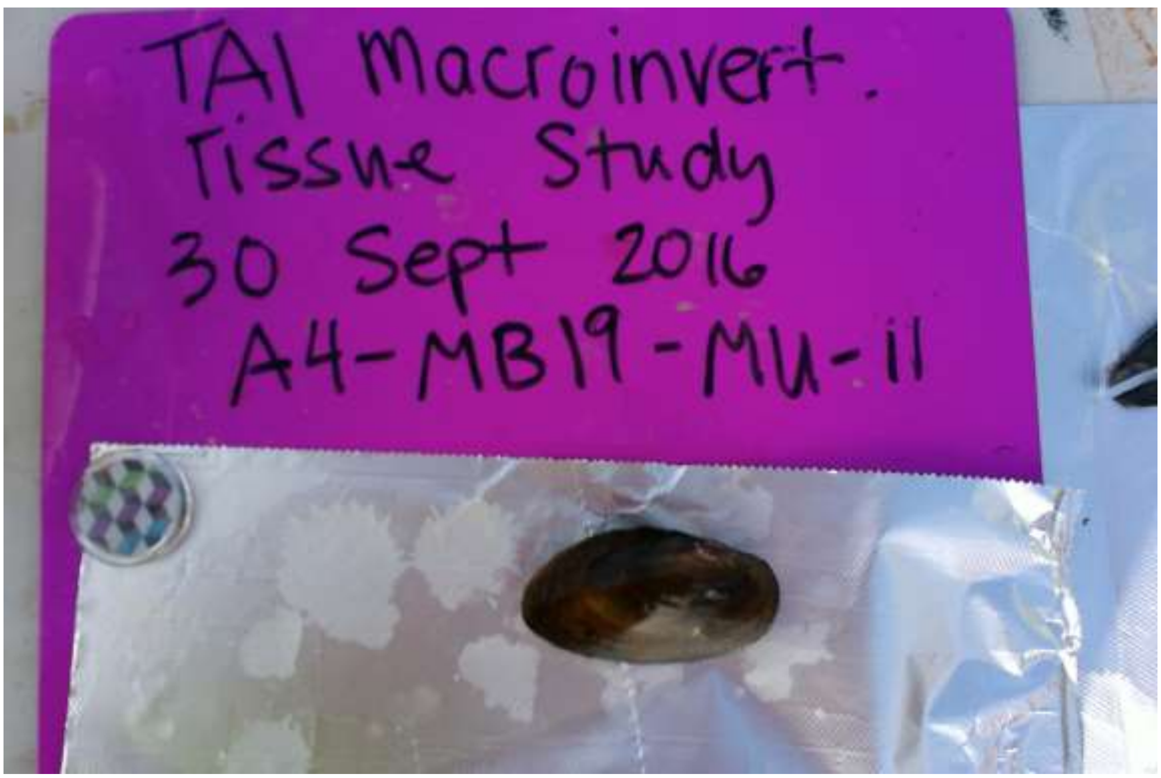
Sample Id: A4-MB19-MU-11

Collection Date:	Sep 30, 2016
Collection Time:	13:05
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	70	mm
Width	42	mm
Breadth	23	mm
Weight	32	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-11'

File Name: A4-MB19-MU-11.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

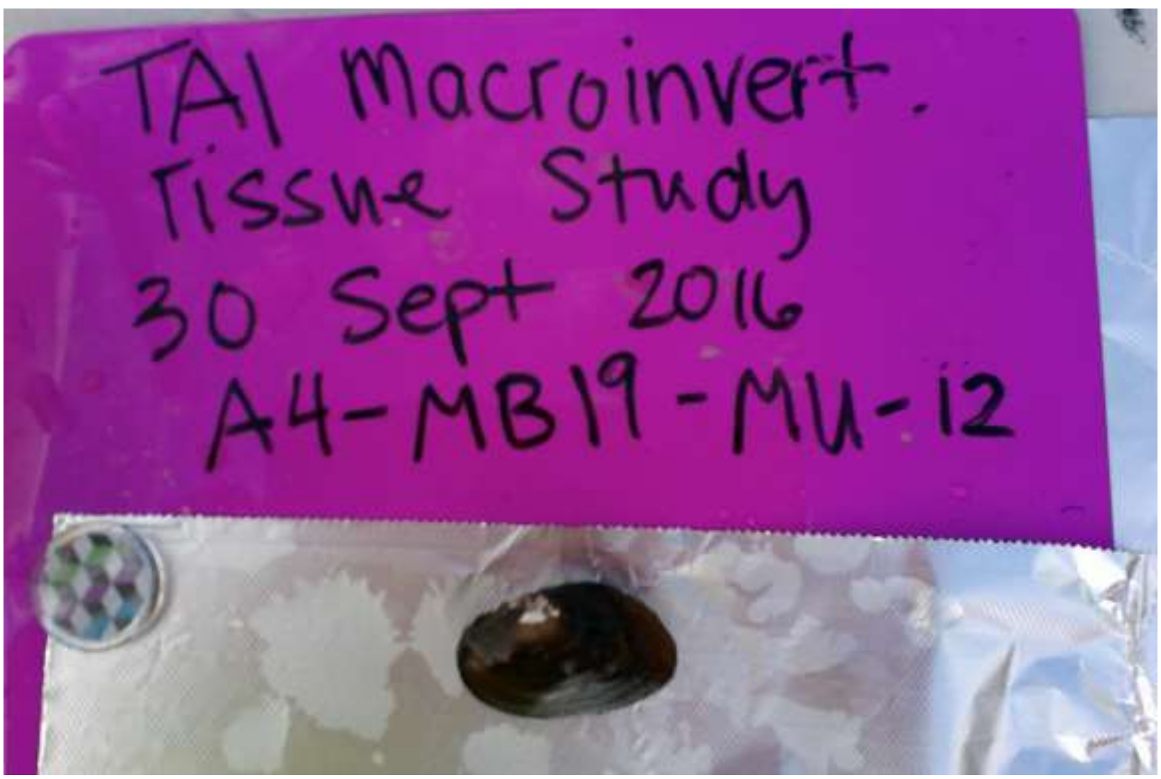
Sample Id: A4-MB19-MU-12

Collection Date:	Sep 30, 2016
Collection Time:	13:08
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	55	mm
Width	34	mm
Breadth	22	mm
Weight	23	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-12'

File Name: A4-MB19-MU-12.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

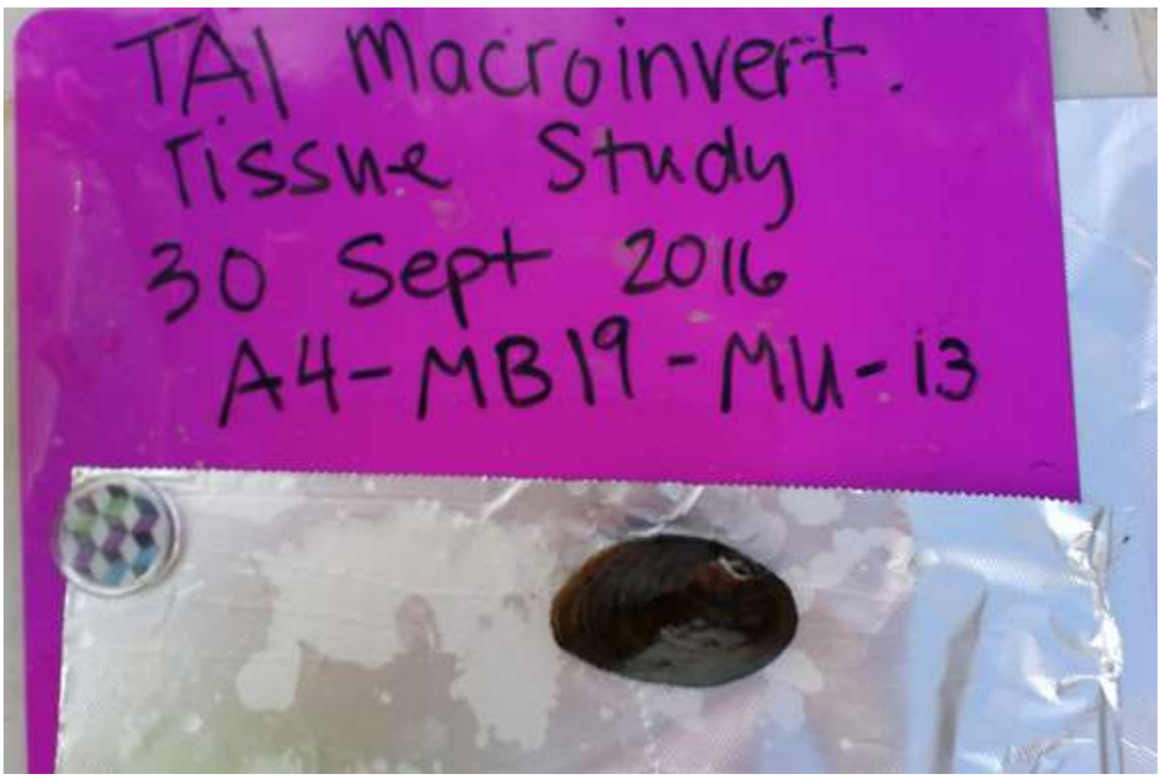
Sample Id: A4-MB19-MU-13

Collection Date:	Sep 30, 2016
Collection Time:	13:12
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	65	mm
Width	41	mm
Breadth	23	mm
Weight	33	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-13'

File Name: A4-MB19-MU-13.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

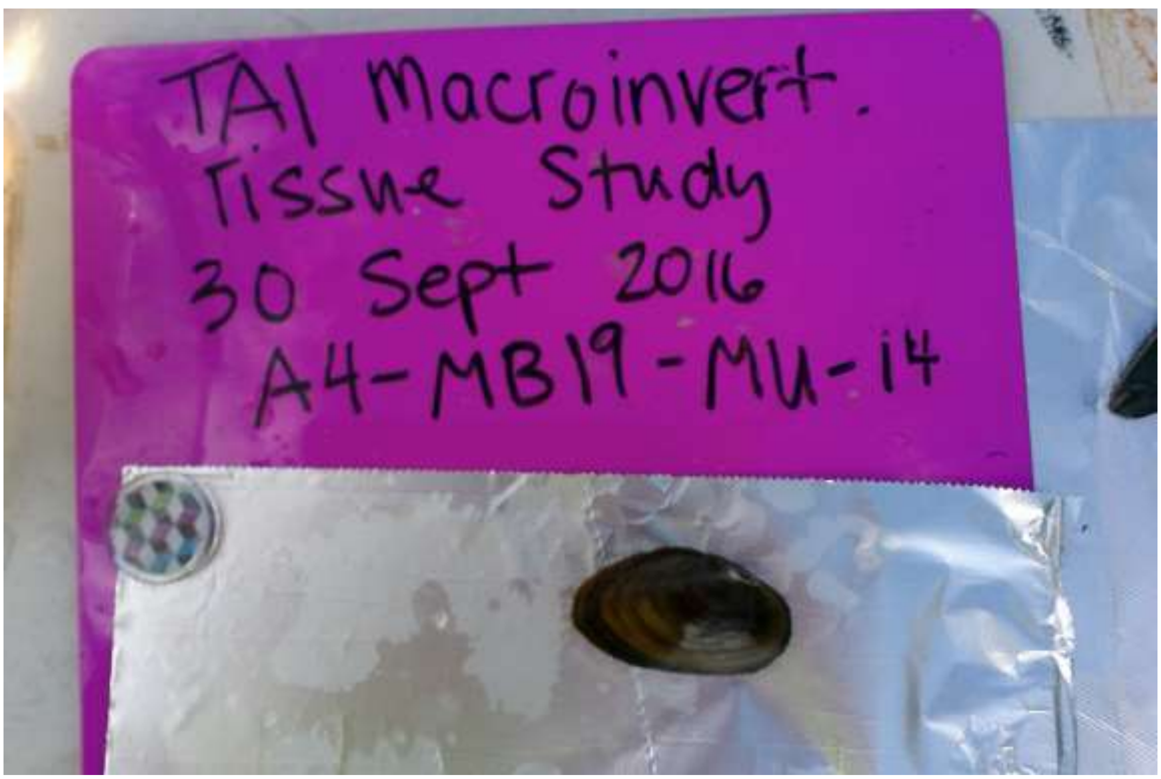
Sample Id: A4-MB19-MU-14

Collection Date:	Sep 30, 2016
Collection Time:	13:14
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	61	mm
Width	38	mm
Breadth	23	mm
Weight	29	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-14'

File Name: A4-MB19-MU-14.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A4-MB19-MU-15**

Collection Date:	Sep 30, 2016
Collection Time:	13:17
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	62	mm
Width	38	mm
Breadth	22	mm
Weight	27	g
Health	Live	none

Photos for Sample Id 'A4-MB19-MU-15'

File Name: A4-MB19-MU-15.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **A5-MB21**

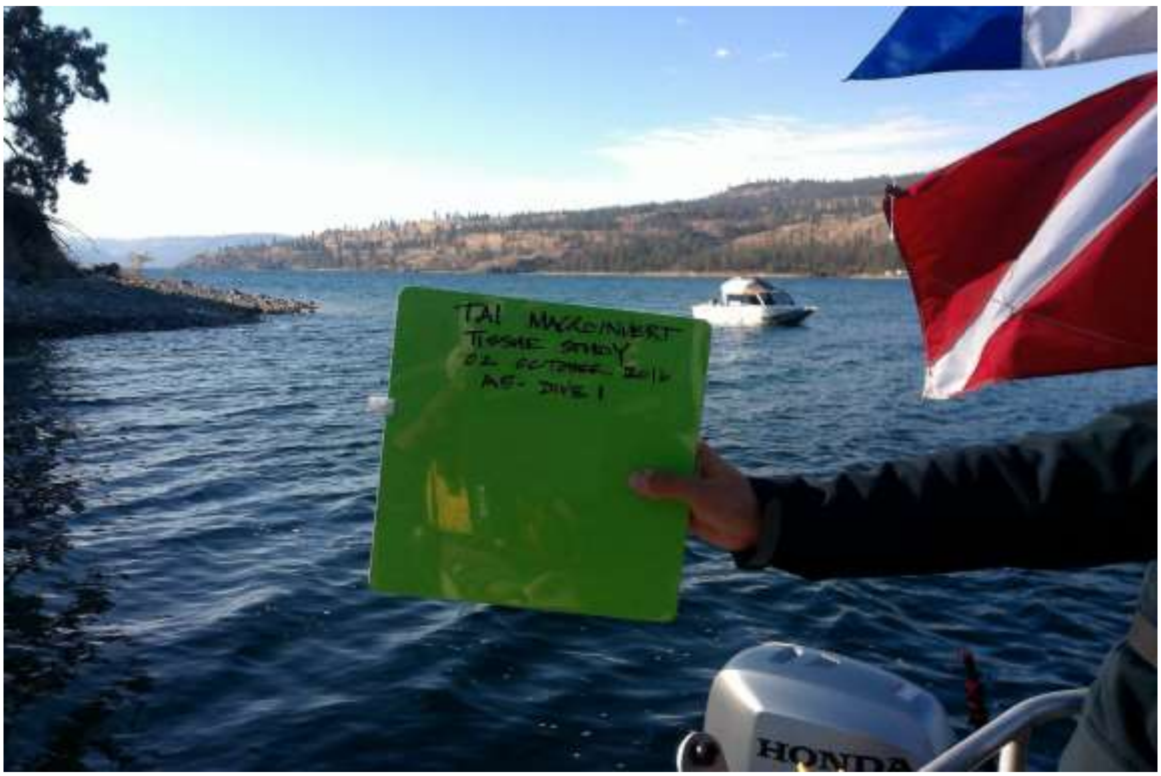
Location Type: Mussel beach (MB)

Location Coordinates:

A5-MB21	-118.345863, 47.917452

Photos for Location Id 'A5-MB21'

File Name: A5-MB21.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

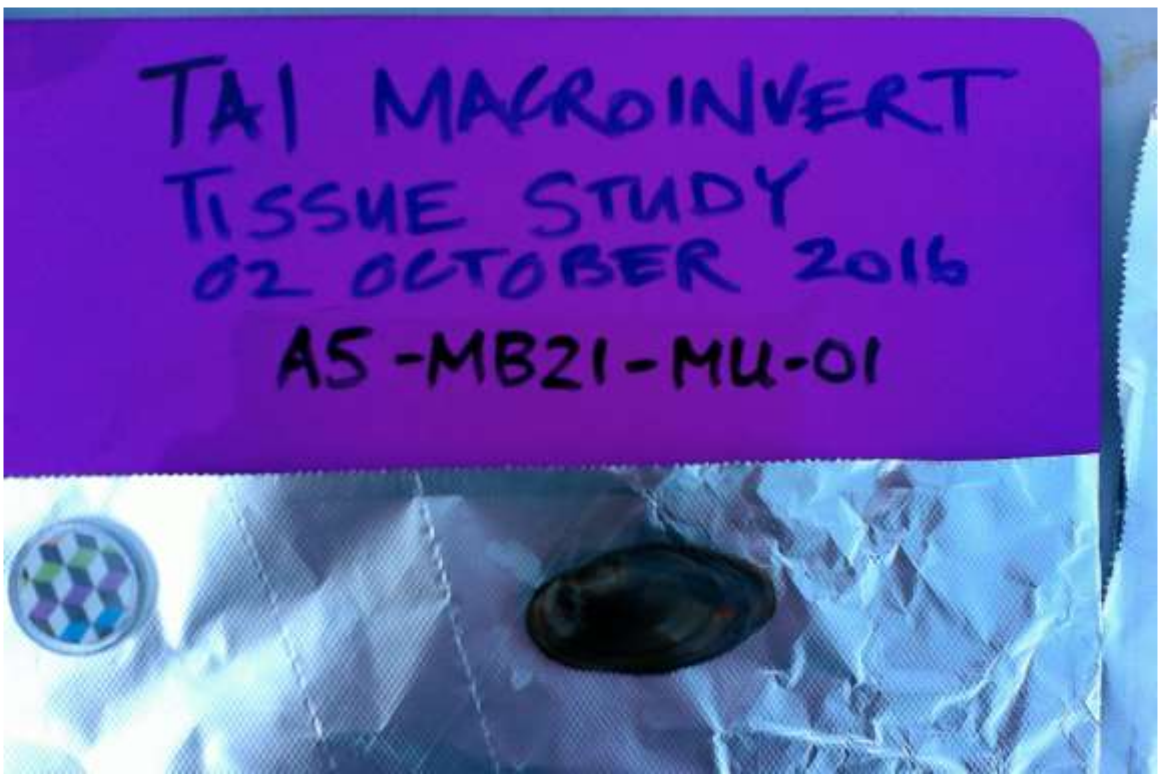
Sample Id: A5-MB21-MU-01

Collection Date:	Oct 02, 2016
Collection Time:	11:03
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	61	mm
Width	35	mm
Breadth	21	mm
Weight	22	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-01'

File Name: A5-MB21-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

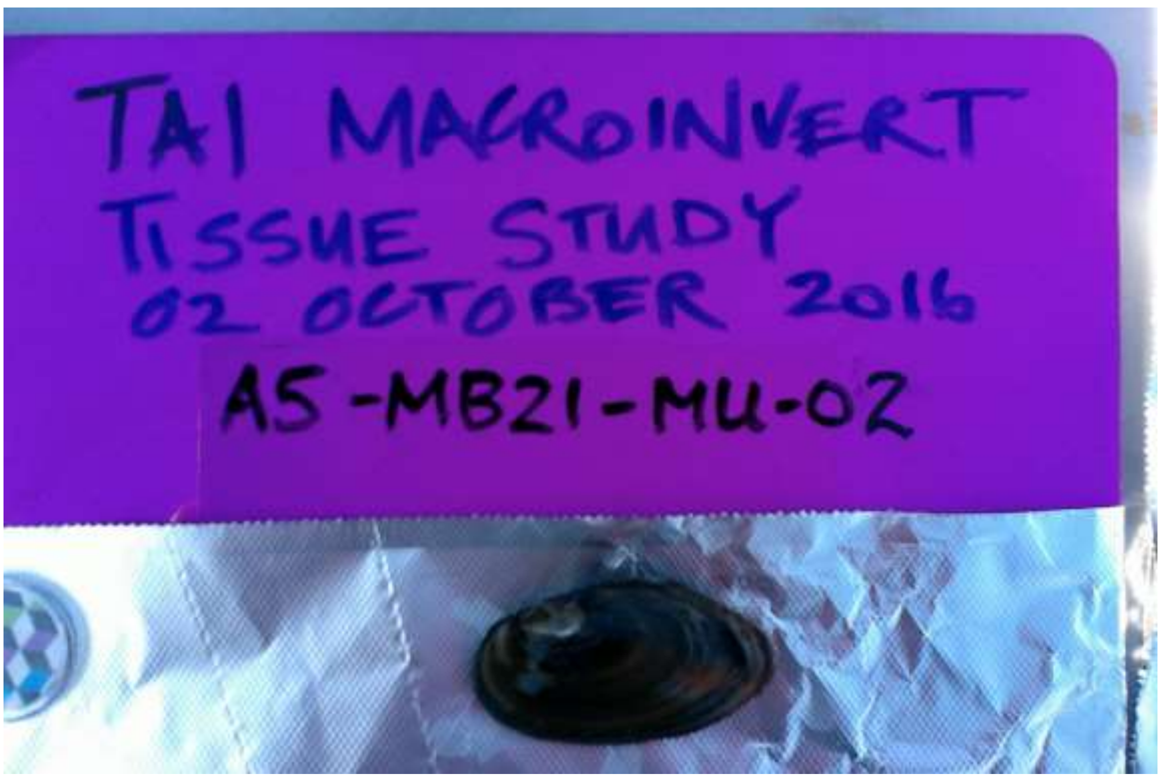
Sample Id: A5-MB21-MU-02

Collection Date:	Oct 02, 2016
Collection Time:	11:07
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	66	mm
Width	38	mm
Breadth	20	mm
Weight	25	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-02'

File Name: A5-MB21-MU-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

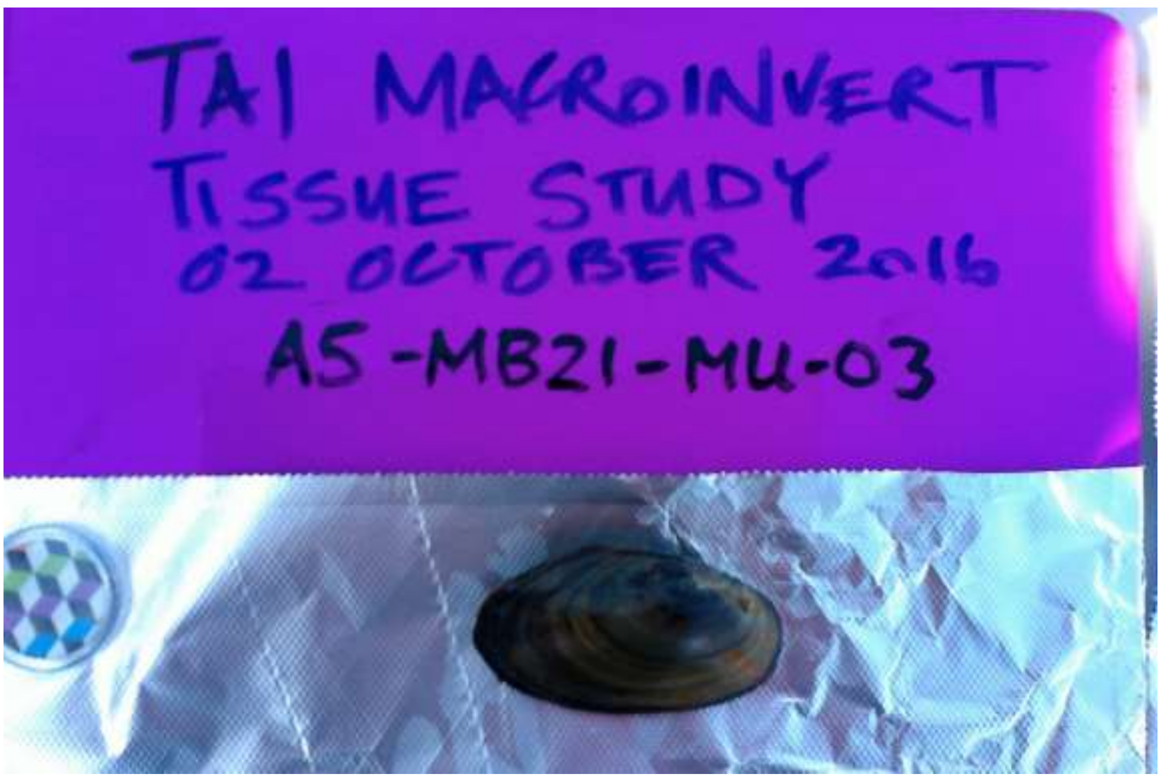
Sample Id: A5-MB21-MU-03

Collection Date:	Oct 02, 2016
Collection Time:	11:10
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	69	mm
Width	40	mm
Breadth	25	mm
Weight	33	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-03'

File Name: A5-MB21-MU-03.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

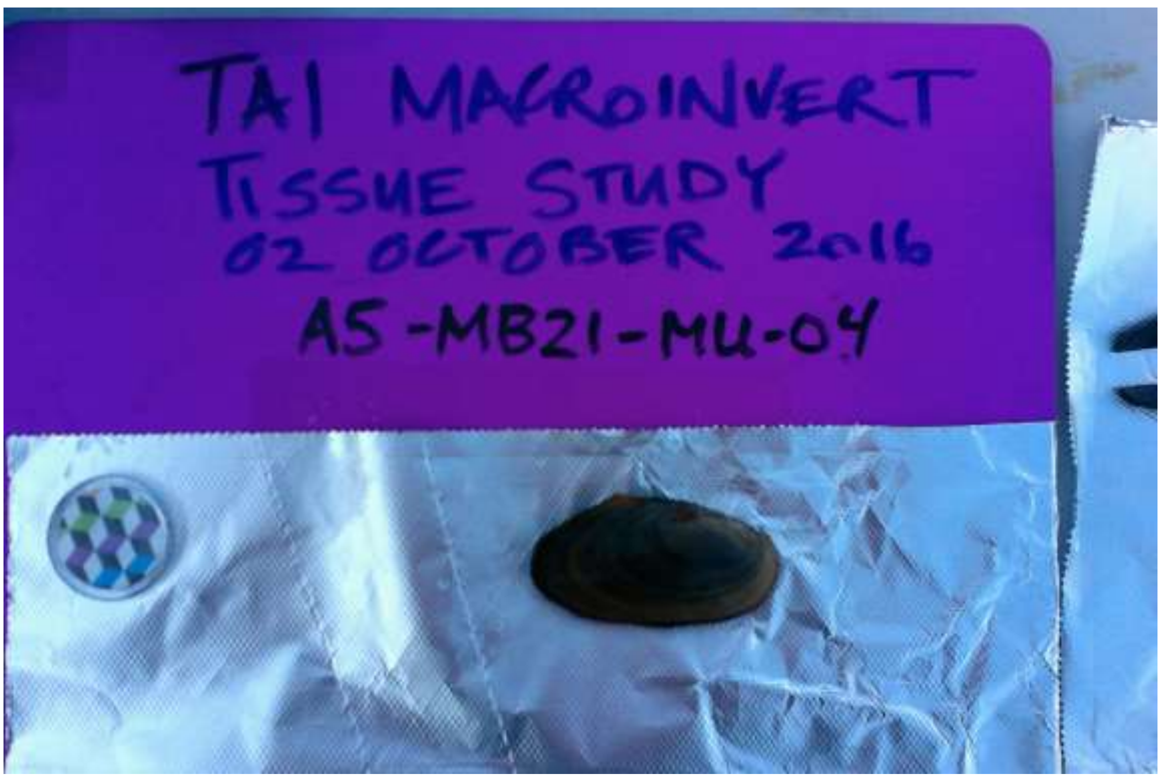
Sample Id: A5-MB21-MU-04

Collection Date:	Oct 02, 2016
Collection Time:	11:12
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	64	mm
Width	35	mm
Breadth	22	mm
Weight	25	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-04'

File Name: A5-MB21-MU-04.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

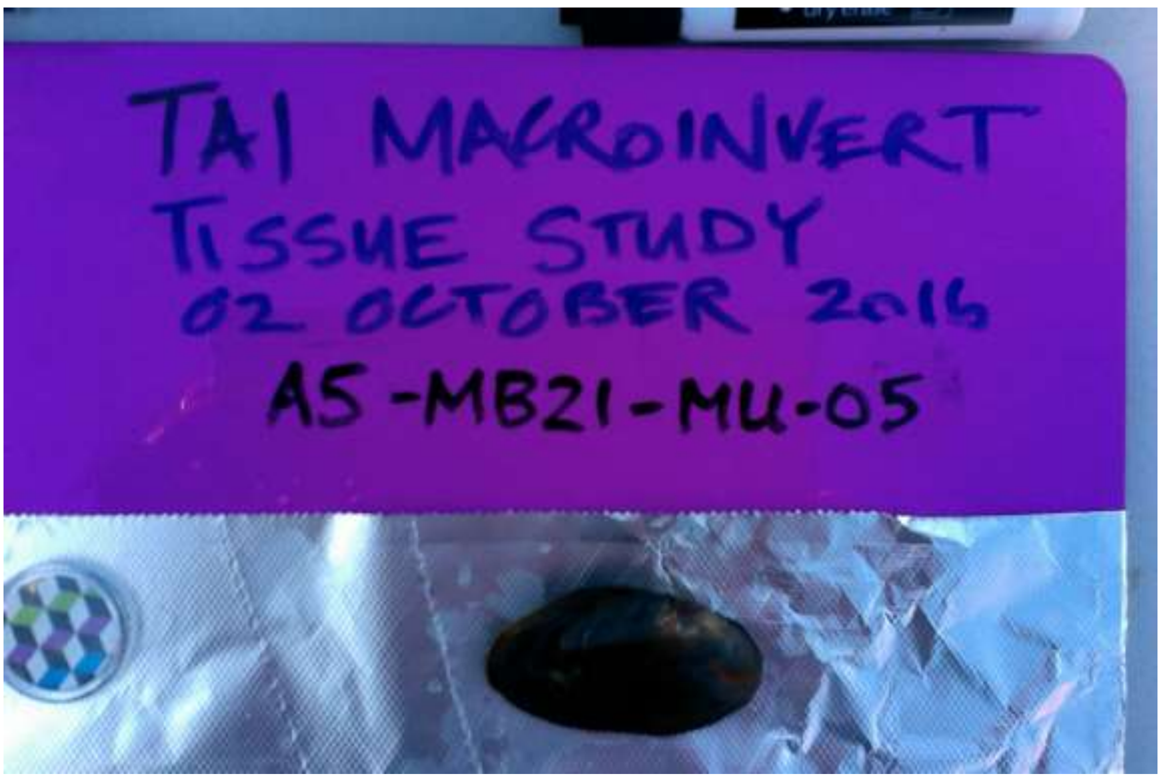
Sample Id: A5-MB21-MU-05

Collection Date:	Oct 02, 2016
Collection Time:	11:15
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	63	mm
Width	37	mm
Breadth	21	mm
Weight	22	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-05'

File Name: A5-MB21-MU-05.JPG



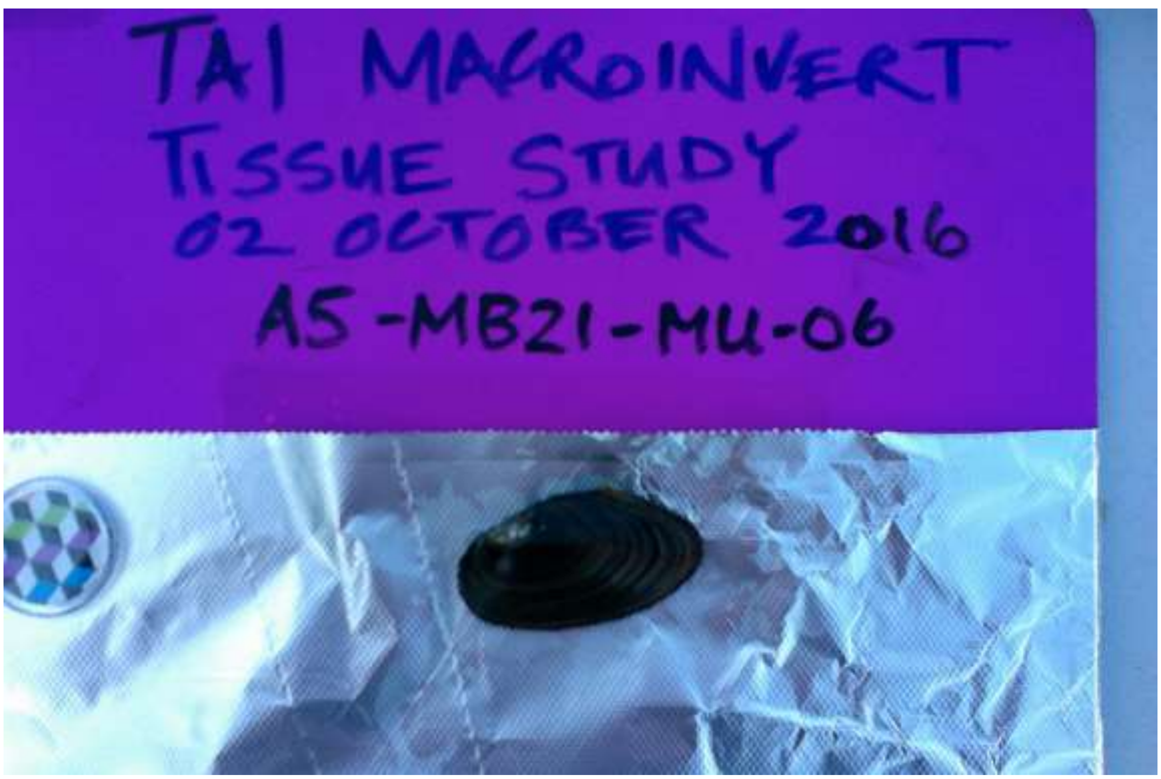
Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB21-MU-06

Collection Date:	Oct 02, 2016	
Collection Time:	11:19	
Species Type:	MU	
Species Name:	Anodonta sp.	
Measurement	Value	Unit of Measure
Length (total)	60	mm
Width	35	mm
Breadth	18	mm
Weight	17	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-06'

File Name: A5-MB21-MU-06.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

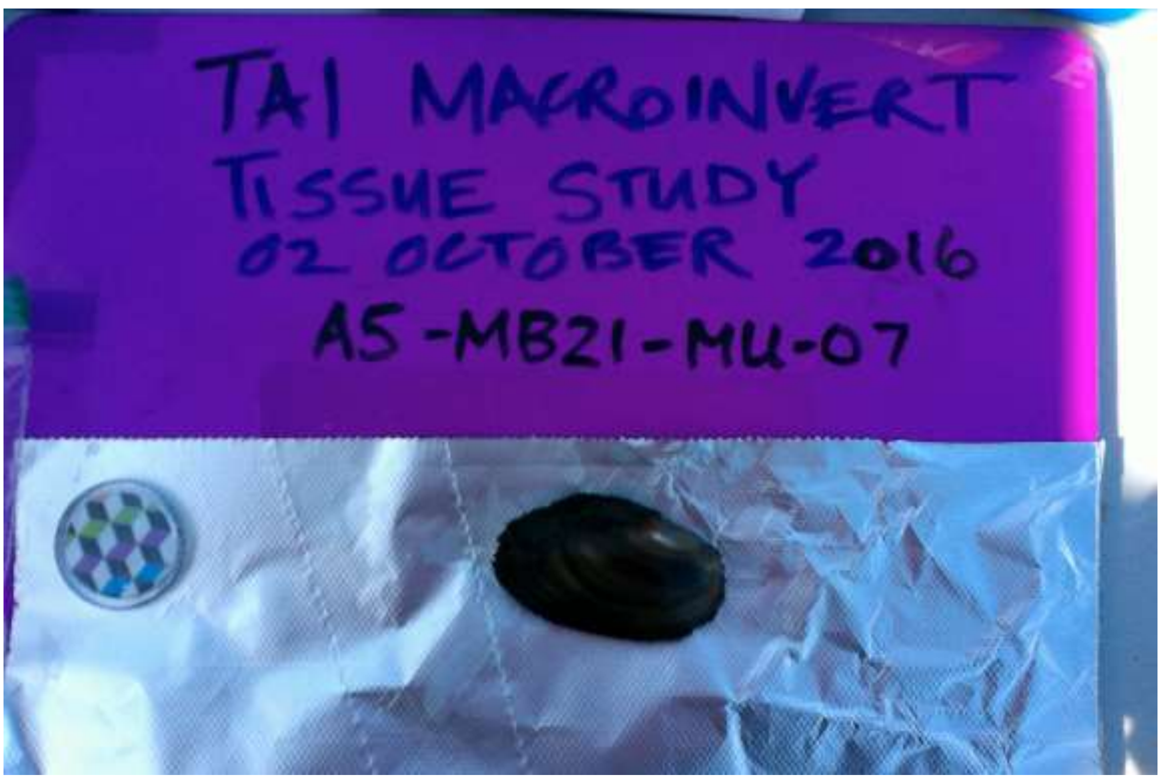
Sample Id: **A5-MB21-MU-07**

Collection Date:	Oct 02, 2016
Collection Time:	11:22
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	59	mm
Width	35	mm
Breadth	20	mm
Weight	20	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-07'

File Name: A5-MB21-MU-07.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

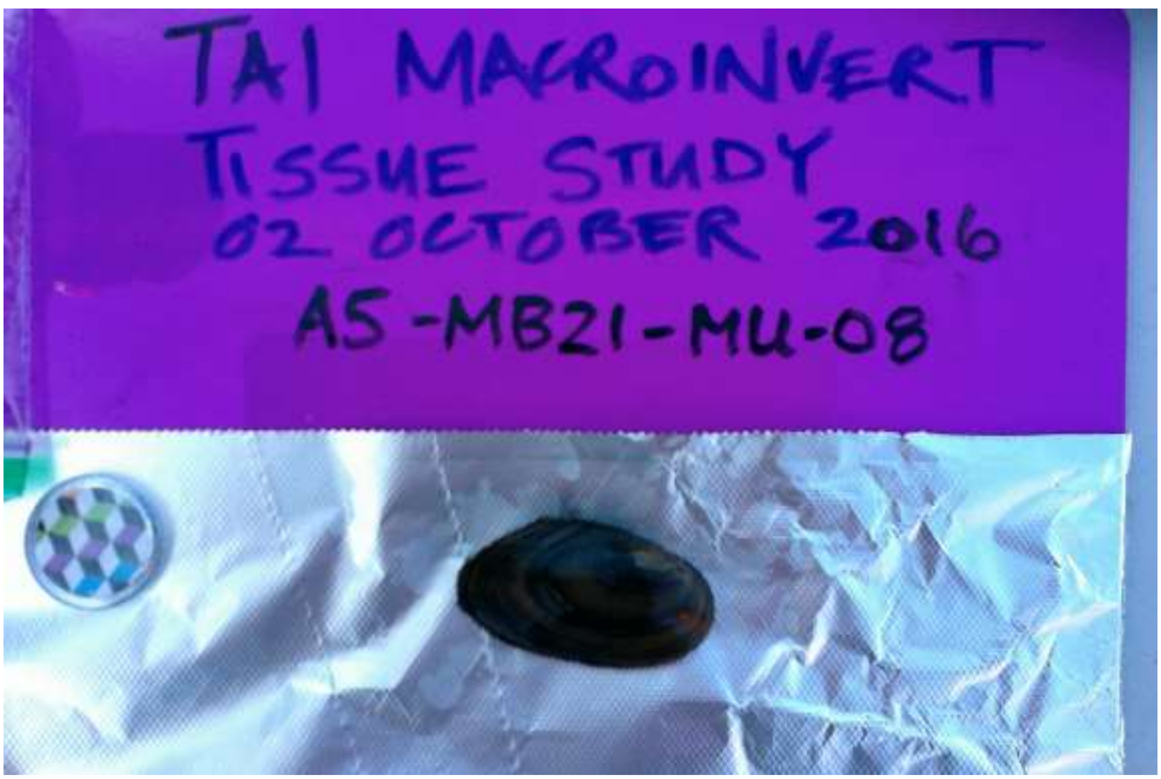
Sample Id: A5-MB21-MU-08

Collection Date:	Oct 02, 2016
Collection Time:	11:26
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	62	mm
Width	36	mm
Breadth	20	mm
Weight	21	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-08'

File Name: A5-MB21-MU-08.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB21-MU-09

Collection Date:	Oct 02, 2016
Collection Time:	11:29
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	62	mm
Width	36	mm
Breadth	20	mm
Weight	22	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-09'

File Name: A5-MB21-MU-09.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB21-MU-10

Collection Date:	Oct 02, 2016
Collection Time:	12:39
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	58	mm
Width	34	mm
Breadth	19	mm
Weight	19	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-10'

File Name: A5-MB21-MU-10.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB21-MU-11

Collection Date:	Oct 02, 2016	
Collection Time:	12:42	
Species Type:	MU	
Species Name:	Anodonta sp.	
Measurement	Value	Unit of Measure
Length (total)	55	mm
Width	32	mm
Breadth	17	mm
Weight	15	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-11'

File Name: A5-MB21-MU-11.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

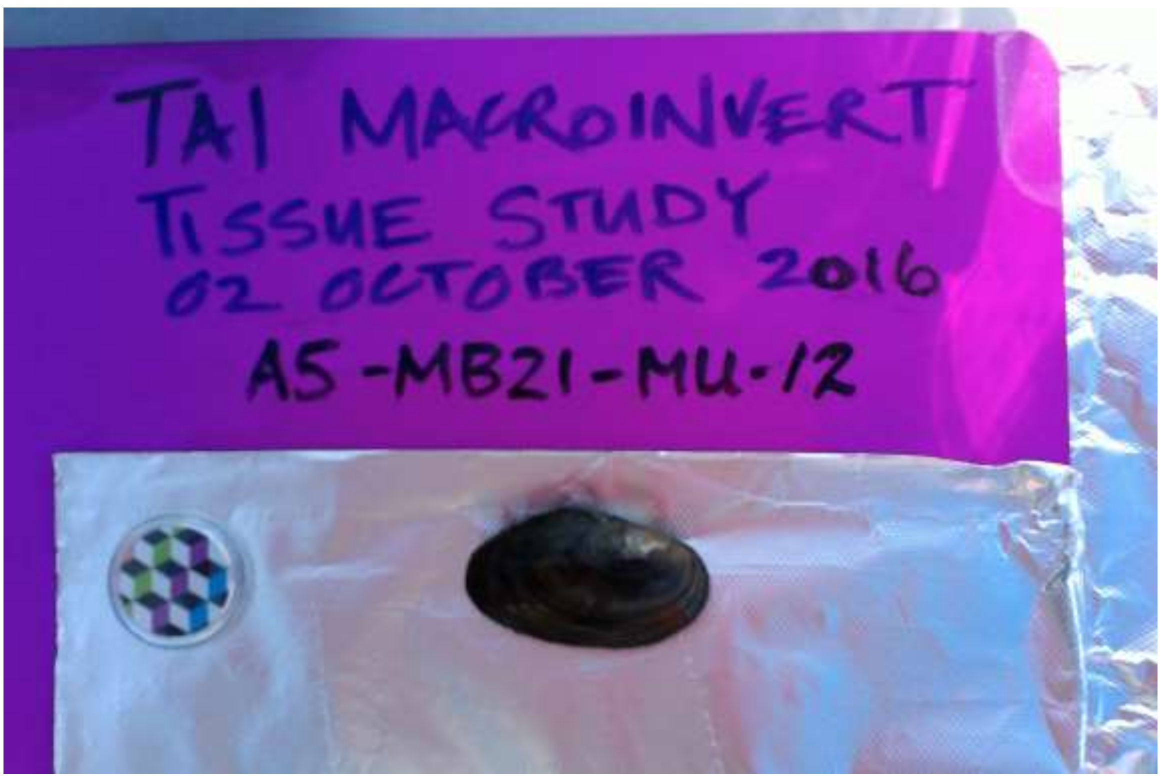
Sample Id: A5-MB21-MU-12

Collection Date:	Oct 02, 2016
Collection Time:	12:44
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	59	mm
Width	34	mm
Breadth	20	mm
Weight	19	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-12'

File Name: A5-MB21-MU-12.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB21-MU-13

Collection Date:	Oct 02, 2016
Collection Time:	12:47
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	54	mm
Width	32	mm
Breadth	17	mm
Weight	15	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-13'

File Name: A5-MB21-MU-13.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB21-MU-14

Collection Date:	Oct 02, 2016
Collection Time:	12:51
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	59	mm
Width	35	mm
Breadth	20	mm
Weight	20	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-14'

File Name: A5-MB21-MU-14.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

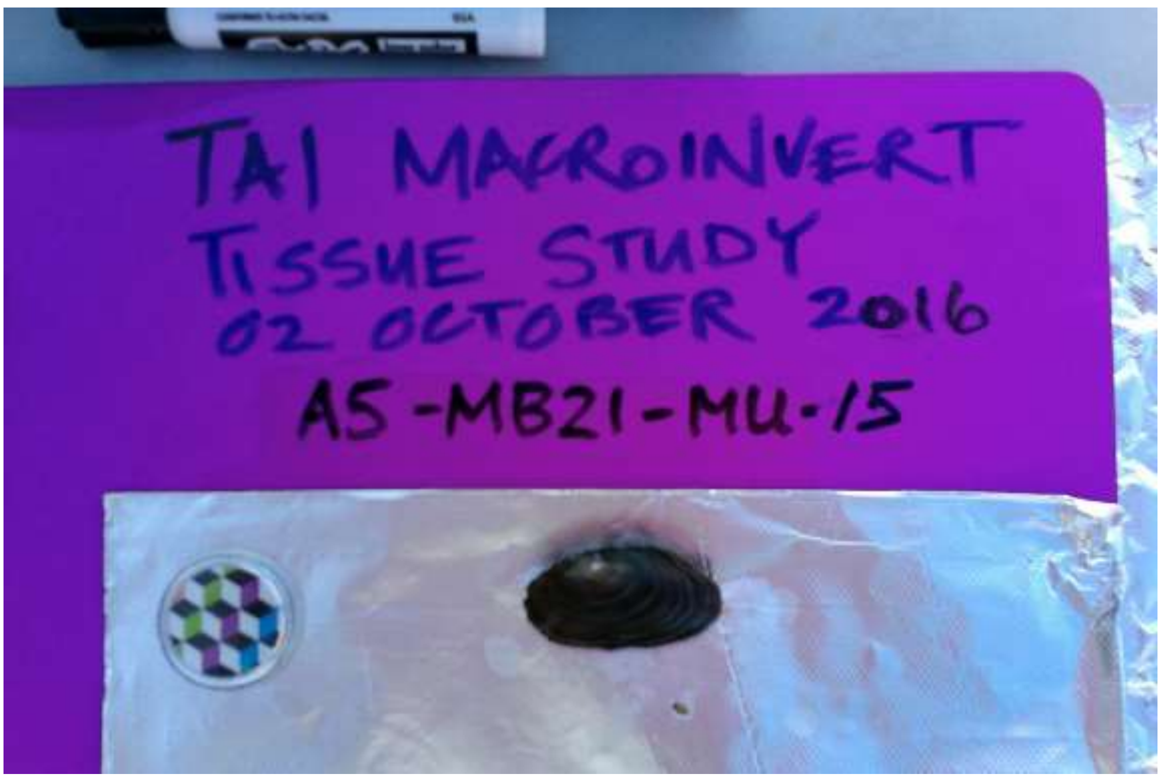
Sample Id: A5-MB21-MU-15

Collection Date:	Oct 02, 2016	
Collection Time:	12:53	
Species Type:	MU	
Species Name:	Anodonta sp.	

Measurement	Value	Unit of Measure
Length (total)	49	mm
Width	27	mm
Breadth	15	mm
Weight	9	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-15'

File Name: A5-MB21-MU-15.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A5-MB21-MU-16**

Collection Date:	Oct 02, 2016
Collection Time:	12:56
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	59	mm
Width	33	mm
Breadth	21	mm
Weight	19	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-16'

File Name: A5-MB21-MU-16.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB21-MU-17

Collection Date:	Oct 02, 2016	
Collection Time:	12:59	
Species Type:	MU	
Species Name:	Anodonta sp.	
Measurement	Value	Unit of Measure
Length (total)	73	mm
Width	38	mm
Breadth	24	mm
Weight	33	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-17'

File Name: A5-MB21-MU-17.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

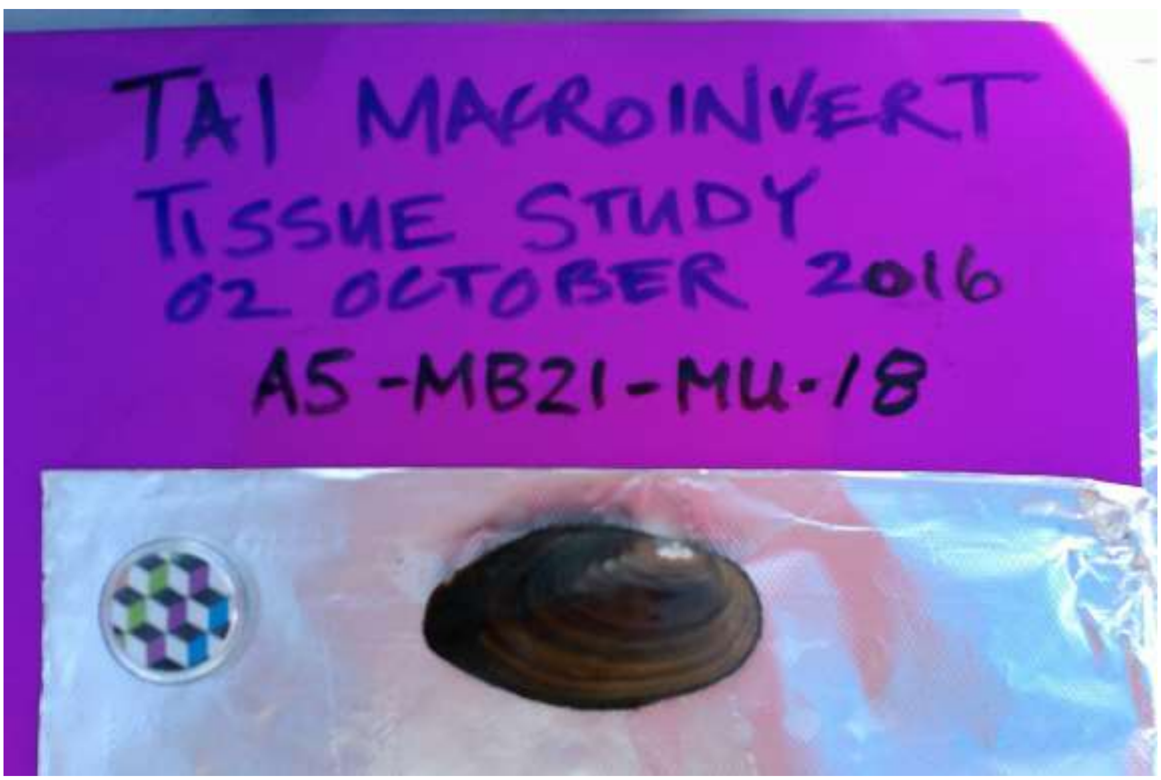
Sample Id: A5-MB21-MU-18

Collection Date:	Oct 02, 2016
Collection Time:	13:01
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	73	mm
Width	39	mm
Breadth	23	mm
Weight	33	g
Health	Live	none

Photos for Sample Id 'A5-MB21-MU-18'

File Name: A5-MB21-MU-18.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A5-MB22

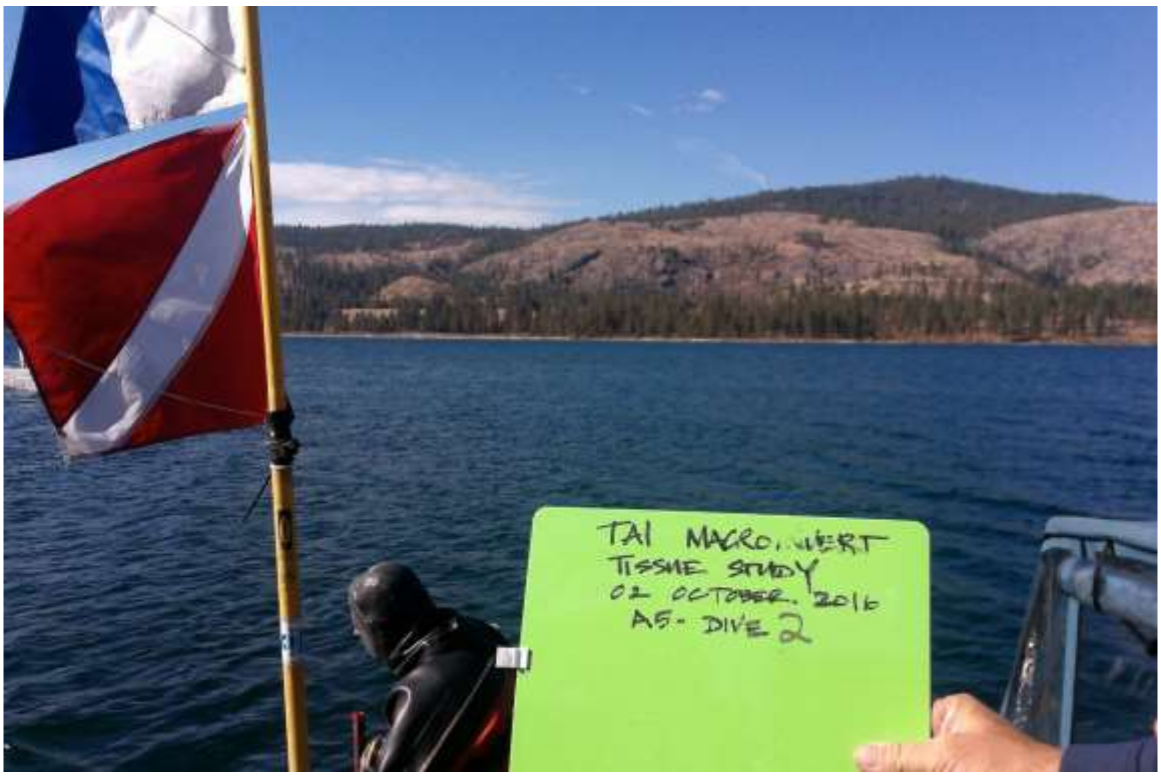
Location Type: Mussel beach (MB)

Location Coordinates:

A5-MB22 -118.345863, 47.917452

Photos for Location Id 'A5-MB22'

File Name: A5-MB22.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

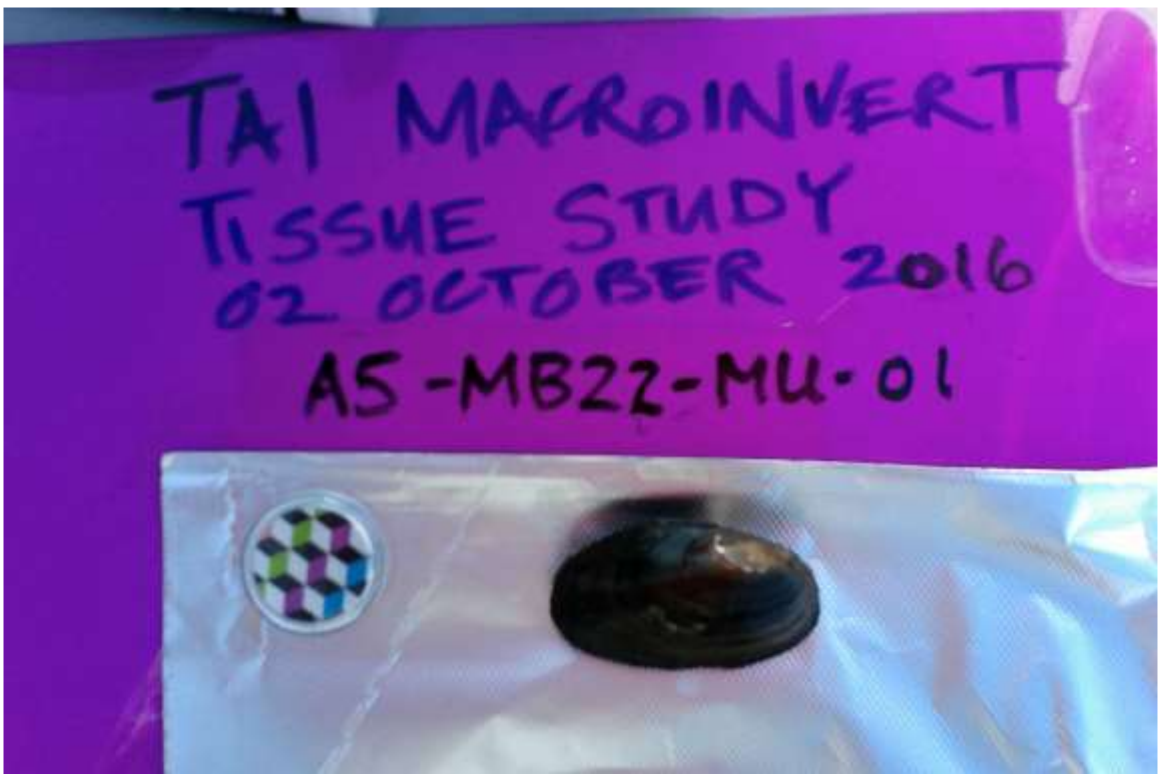
Sample Id: A5-MB22-MU-01

Collection Date:	Oct 02, 2016
Collection Time:	13:08
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	61	mm
Width	35	mm
Breadth	20	mm
Weight	22	g
Health	Live	none

Photos for Sample Id 'A5-MB22-MU-01'

File Name: A5-MB22-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A5-MB22-MU-02**

Collection Date:	Oct 02, 2016
Collection Time:	13:10
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	59	mm
Width	34	mm
Breadth	21	mm
Weight	22	g
Health	Live	none

Photos for Sample Id 'A5-MB22-MU-02'

File Name: A5-MB22-MU-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB22-MU-03

Collection Date:	Oct 02, 2016
Collection Time:	13:13
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	71	mm
Width	38	mm
Breadth	23	mm
Weight	32	g
Health	Live	none

Photos for Sample Id 'A5-MB22-MU-03'

File Name: A5-MB22-MU-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A5-MB22-MU-04**

Collection Date:	Oct 02, 2016
Collection Time:	13:15
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	70	mm
Width	37	mm
Breadth	24	mm
Weight	31	g
Health	Live	none

Photos for Sample Id 'A5-MB22-MU-04'

File Name: A5-MB22-MU-04.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB22-MU-05

Collection Date:	Oct 02, 2016
Collection Time:	13:17
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	80	mm
Width	49	mm
Breadth	26	mm
Weight	45	g
Health	Live	none

Photos for Sample Id 'A5-MB22-MU-05'

File Name: A5-MB22-MU-05.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB22-MU-06

Collection Date:	Oct 02, 2016
Collection Time:	13:20
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	75	mm
Width	40	mm
Breadth	25	mm
Weight	38	g
Health	Live	none

Photos for Sample Id 'A5-MB22-MU-06'

File Name: A5-MB22-MU-06.JPG

Location Id: A5-MB23

Location Type: Mussel beach (MB)

Location Coordinates:

A5-MB23 -118.346542, 47.953271

Photos for Location Id 'A5-MB23'

File Name: A5-MB23.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

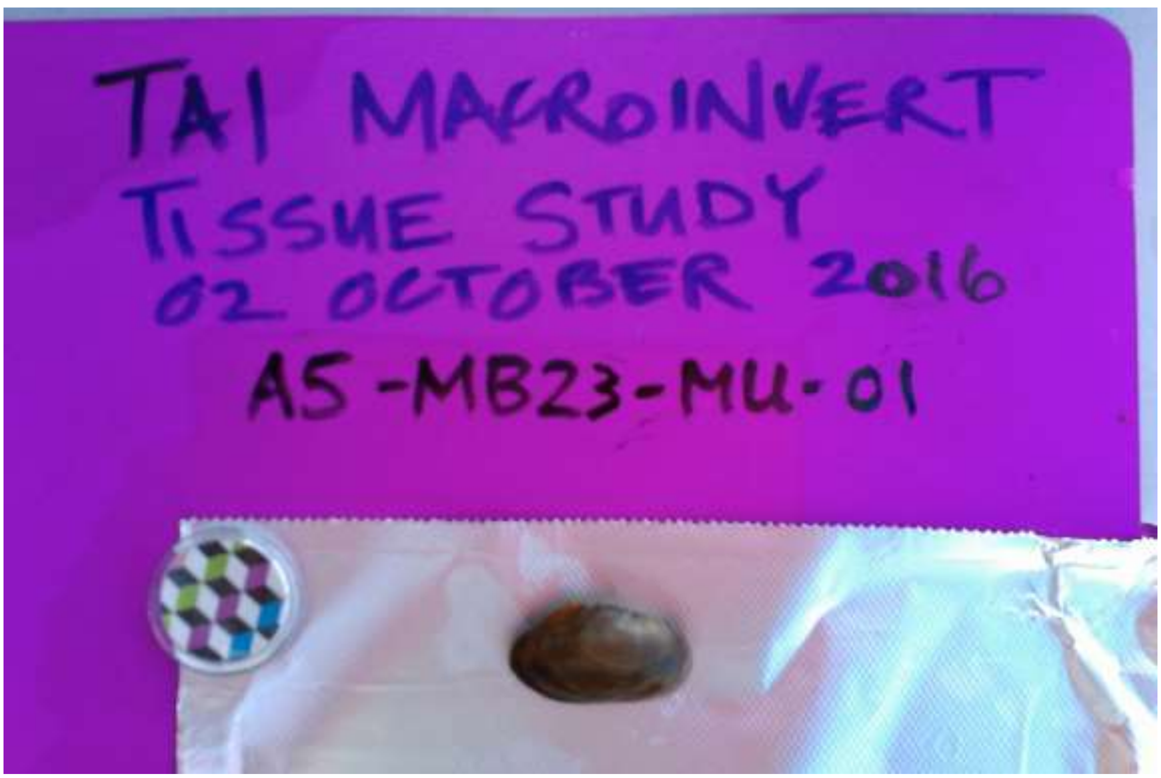
Sample Id: A5-MB23-MU-01

Collection Date:	Oct 02, 2016	
Collection Time:	13:29	
Species Type:	MU	
Species Name:	Anodonta sp.	

Measurement	Value	Unit of Measure
Length (total)	40	mm
Width	24	mm
Breadth	13	mm
Weight	6	g
Health	Live	none

Photos for Sample Id 'A5-MB23-MU-01'

File Name: A5-MB23-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB23-MU-02

Collection Date:	Oct 02, 2016
Collection Time:	13:33
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	54	mm
Width	32	mm
Breadth	20	mm
Weight	5	g
Health	Live	none

Photos for Sample Id 'A5-MB23-MU-02'

File Name: A5-MB23-MU-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A5-MB24

Location Type: Mussel beach (MB)

Location Coordinates:

A5-MB24 -118.345966, 47.918094

Photos for Location Id 'A5-MB24'

File Name: A5-MB24.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB24-MU-01

Collection Date:	Oct 02, 2016
Collection Time:	15:40
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	57	mm
Width	32	mm
Breadth	18	mm
Weight	15	g
Health	Live	none

Photos for Sample Id 'A5-MB24-MU-01'

File Name: A5-MB24-MU-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB24-MU-02

Collection Date:	Oct 02, 2016
Collection Time:	15:42
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	53	mm
Width	30	mm
Breadth	18	mm
Weight	15	g
Health	Live	none

Photos for Sample Id 'A5-MB24-MU-02'

File Name: A5-MB24-MU-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB24-MU-03

Collection Date:	Oct 02, 2016
Collection Time:	15:45
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	58	mm
Width	32	mm
Breadth	20	mm
Weight	22	g
Health	Live	none

Photos for Sample Id 'A5-MB24-MU-03'

File Name: A5-MB24-MU-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

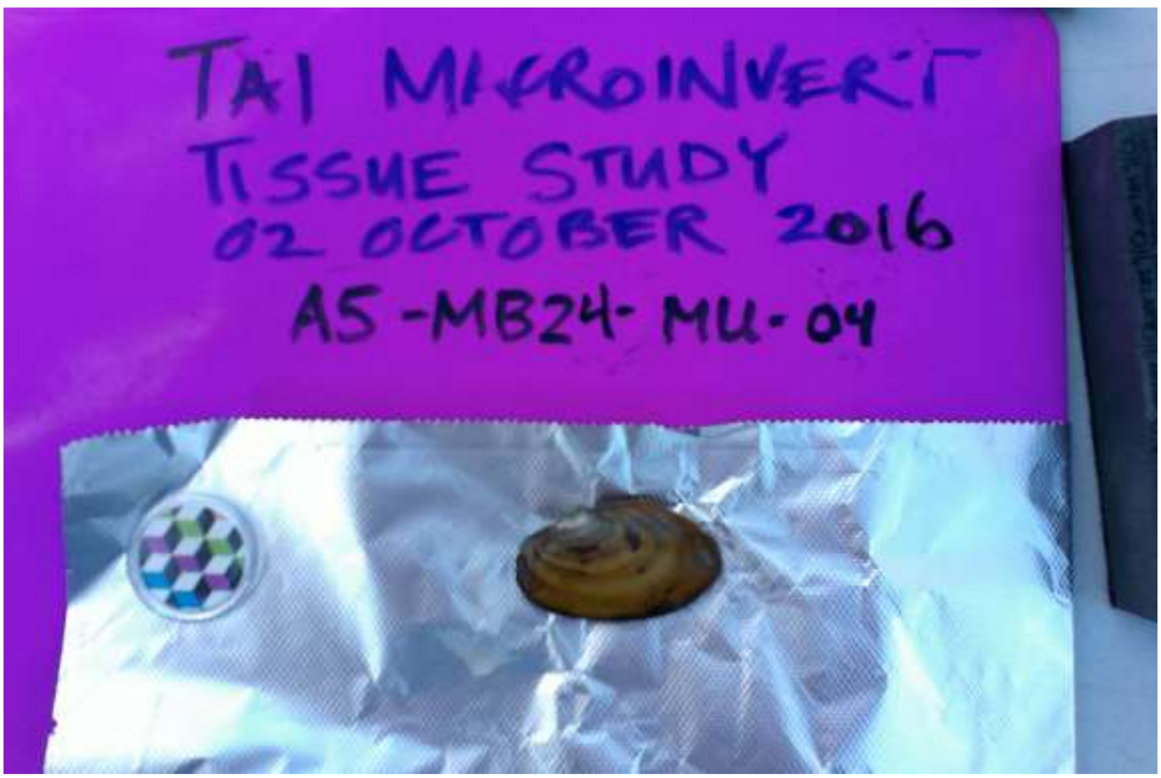
Sample Id: A5-MB24-MU-04

Collection Date:	Oct 02, 2016
Collection Time:	15:48
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	52	mm
Width	31	mm
Breadth	17	mm
Weight	15	g
Health	Live	none

Photos for Sample Id 'A5-MB24-MU-04'

File Name: A5-MB24-MU-04.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

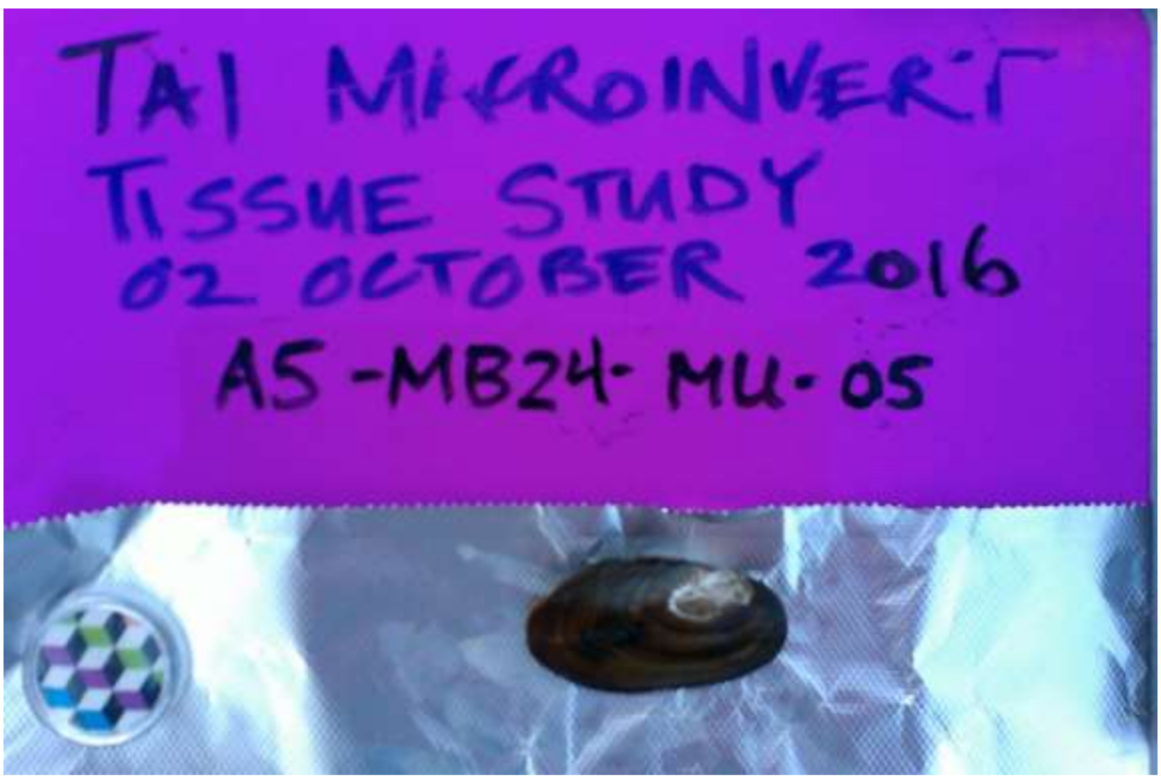
Sample Id: A5-MB24-MU-05

Collection Date:	Oct 02, 2016
Collection Time:	15:51
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	55	mm
Width	32	mm
Breadth	17	mm
Weight	16	g
Health	Live	none

Photos for Sample Id 'A5-MB24-MU-05'

File Name: A5-MB24-MU-05.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

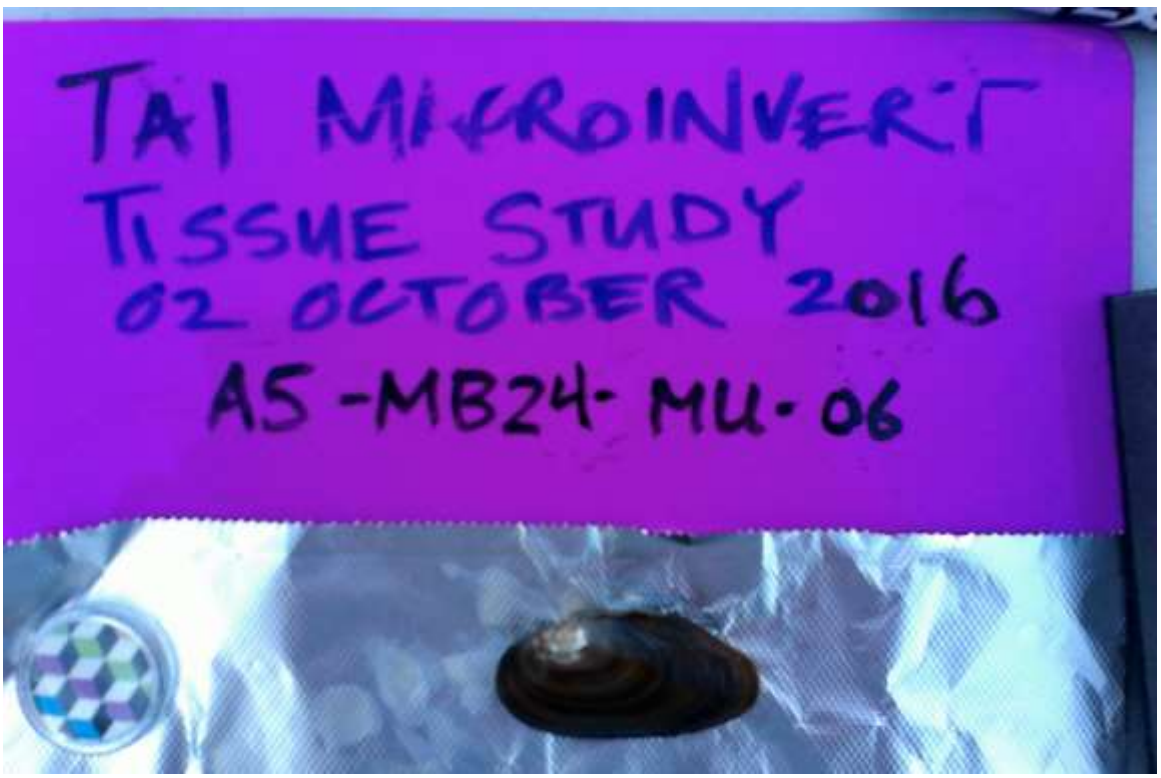
Sample Id: A5-MB24-MU-06

Collection Date:	Oct 02, 2016
Collection Time:	15:53
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	57	mm
Width	32	mm
Breadth	18	mm
Weight	18	g
Health	Live	none

Photos for Sample Id 'A5-MB24-MU-06'

File Name: A5-MB24-MU-06.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB24-MU-07

Collection Date:	Oct 02, 2016
Collection Time:	15:55
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	53	mm
Width	31	mm
Breadth	16	mm
Weight	14	g
Health	Live	none

Photos for Sample Id 'A5-MB24-MU-07'

File Name: A5-MB24-MU-07.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

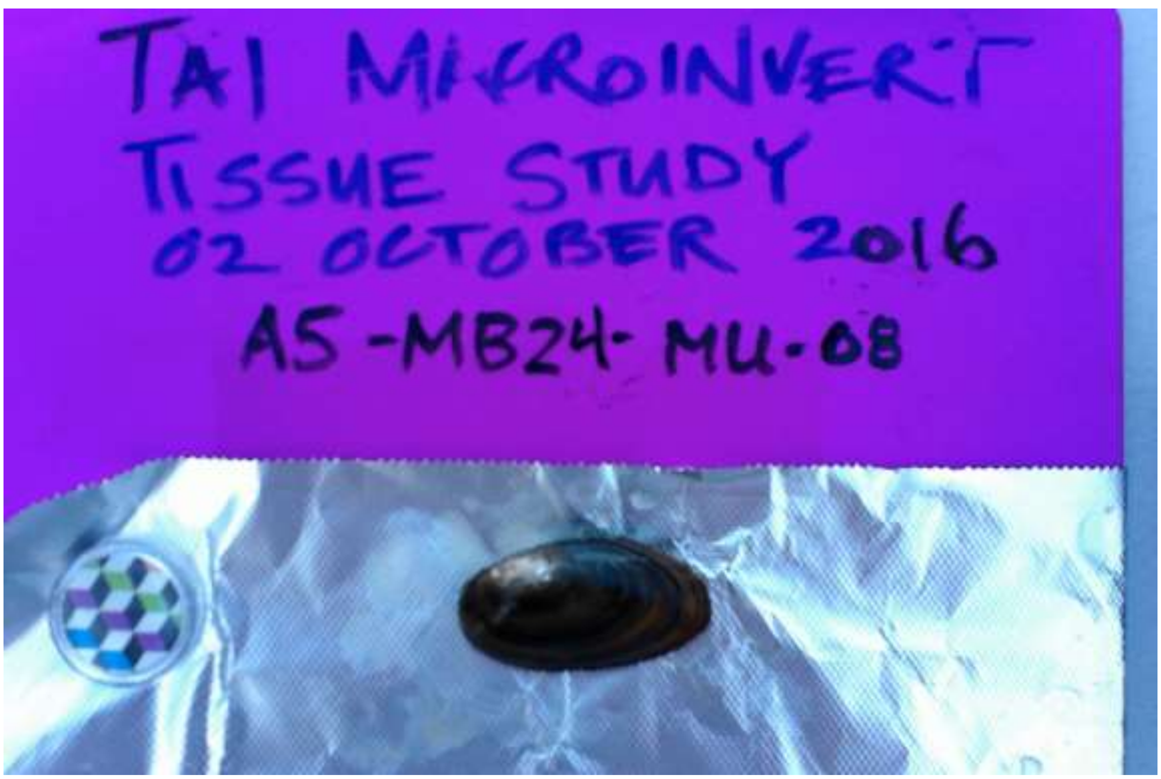
Sample Id: **A5-MB24-MU-08**

Collection Date:	Oct 02, 2016
Collection Time:	15:58
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	55	mm
Width	31	mm
Breadth	18	mm
Weight	17	g
Health	Live	none

Photos for Sample Id 'A5-MB24-MU-08'

File Name: A5-MB24-MU-08.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

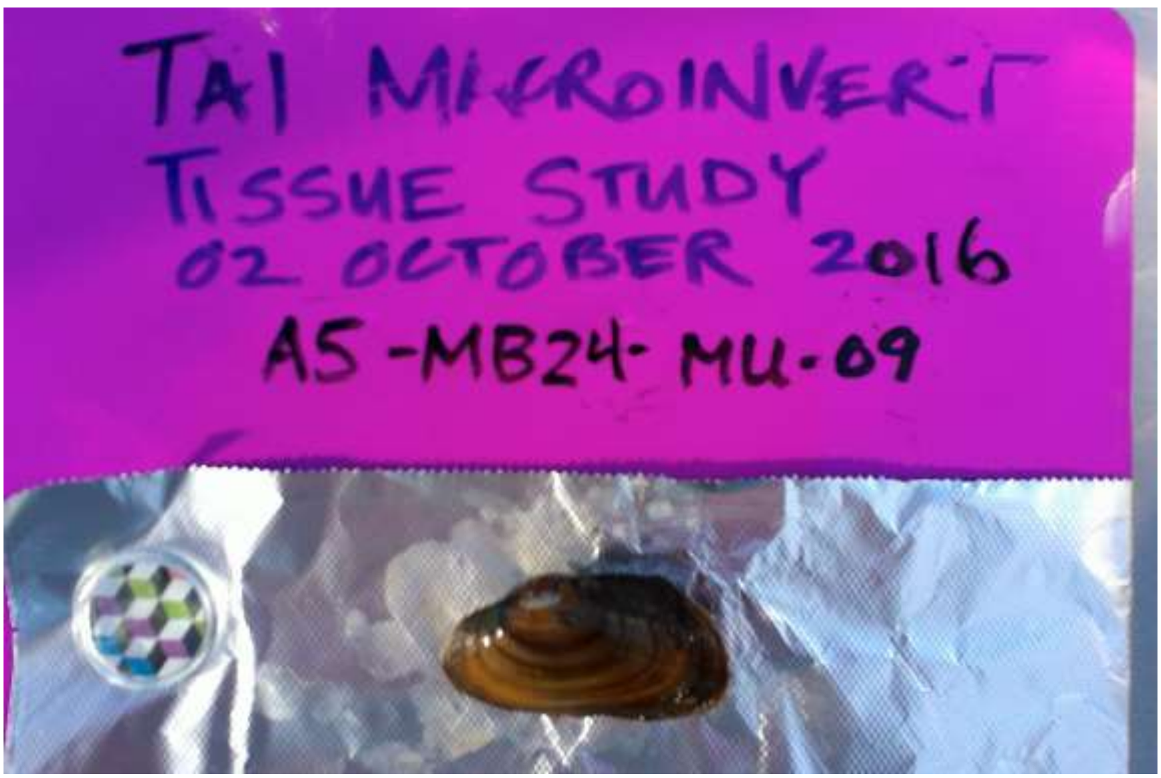
Sample Id: A5-MB24-MU-09

Collection Date:	Oct 02, 2016
Collection Time:	16:02
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	63	mm
Width	36	mm
Breadth	24	mm
Weight	27	g
Health	Live	none

Photos for Sample Id 'A5-MB24-MU-09'

File Name: A5-MB24-MU-09.JPG



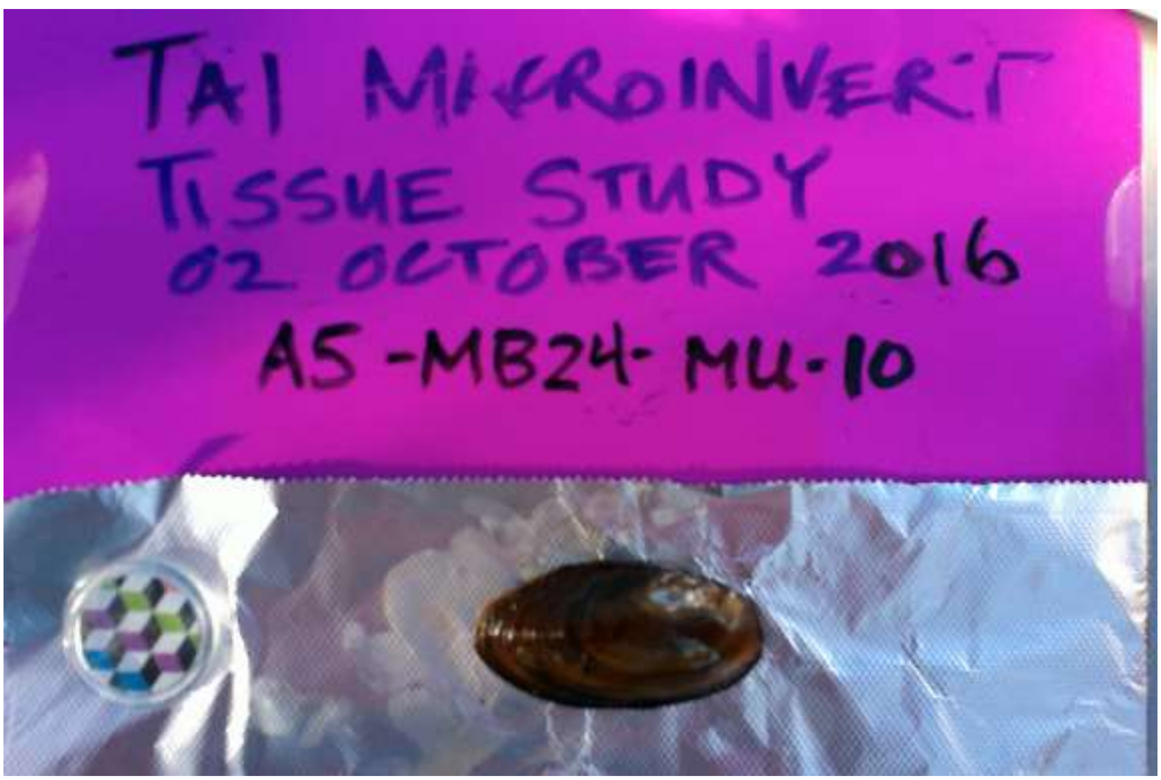
Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A5-MB24-MU-10

Collection Date:	Oct 02, 2016	
Collection Time:	16:07	
Species Type:	MU	
Species Name:	Anodonta sp.	
Measurement	Value	Unit of Measure
Length (total)	63	mm
Width	35	mm
Breadth	23	mm
Weight	25	g
Health	Live	none

Photos for Sample Id 'A5-MB24-MU-10'

File Name: A5-MB24-MU-10.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A6-MB11

Location Type: Mussel beach (MB)

Location Coordinates:

A6-MB11 -118.642992, 47.938172

Photos for Location Id 'A6-MB11'

File Name: A6-MB11.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

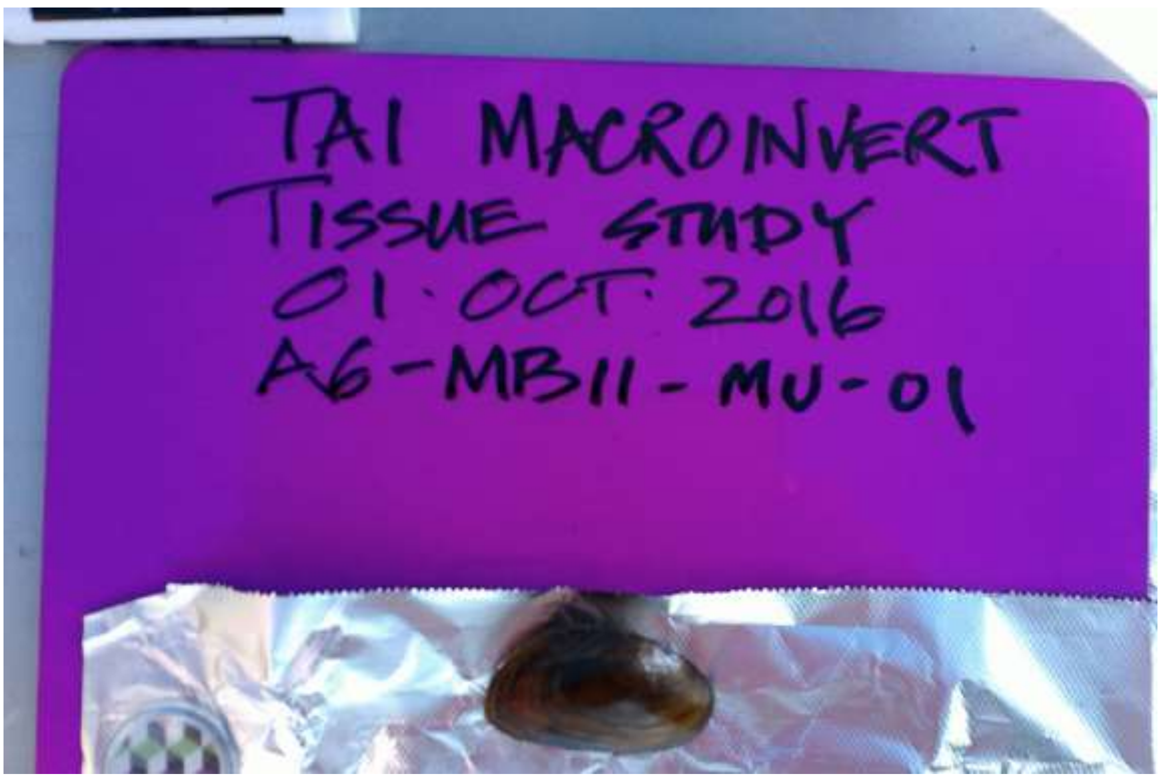
Sample Id: A6-MB11-MU-01

Collection Date:	Oct 01, 2016
Collection Time:	11:31
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	58	mm
Width	32	mm
Breadth	21	mm
Weight	23	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-01'

File Name: A6-MB11-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A6-MB11-MU-02**

Collection Date:	Oct 01, 2016
Collection Time:	11:34
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	57	mm
Width	33	mm
Breadth	20	mm
Weight	20	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-02'

File Name: A6-MB11-MU-02.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-03

Collection Date:	Oct 01, 2016
Collection Time:	11:38
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	54	mm
Width	29	mm
Breadth	19	mm
Weight	19	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-03'

File Name: A6-MB11-MU-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-04

Collection Date:	Oct 01, 2016
Collection Time:	11:42
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	50	mm
Width	29	mm
Breadth	15	mm
Weight	13	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-04'

File Name: A6-MB11-MU-04.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-05

Collection Date:	Oct 01, 2016
Collection Time:	11:45
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	56	mm
Width	34	mm
Breadth	20	mm
Weight	21	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-05'

File Name: A6-MB11-MU-05.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A6-MB11-MU-06**

Collection Date:	Oct 01, 2016
Collection Time:	11:48
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	55	mm
Width	30	mm
Breadth	18	mm
Weight	17	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-06'

File Name: A6-MB11-MU-06.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-07

Collection Date:	Oct 01, 2016
Collection Time:	11:51
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	41	mm
Width	24	mm
Breadth	12	mm
Weight	7	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-07'

File Name: A6-MB11-MU-07.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **A6-MB11-MU-08**

Collection Date:	Oct 01, 2016
Collection Time:	12:04
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	52	mm
Width	29	mm
Breadth	19	mm
Weight	17	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-08'

File Name: A6-MB11-MU-08.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-09

Collection Date:	Oct 01, 2016
Collection Time:	12:08
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	53	mm
Width	30	mm
Breadth	18	mm
Weight	16	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-09'

File Name: A6-MB11-MU-09.JPG

Sample Id: **A6-MB11-MU-10**

Collection Date:	Oct 01, 2016
Collection Time:	12:12
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	52	mm
Width	28	mm
Breadth	18	mm
Weight	15	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-10'

File Name: A6-MB11-MU-10.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-11

Collection Date:	Oct 01, 2016
Collection Time:	12:15
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	51	mm
Width	27	mm
Breadth	15	mm
Weight	13	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-11'

File Name: A6-MB11-MU-11.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-12

Collection Date:	Oct 01, 2016
Collection Time:	12:19
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	50	mm
Width	29	mm
Breadth	17	mm
Weight	14	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-12'

File Name: A6-MB11-MU-12.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-13

Collection Date: Oct 01, 2016

Collection Time: 12:22

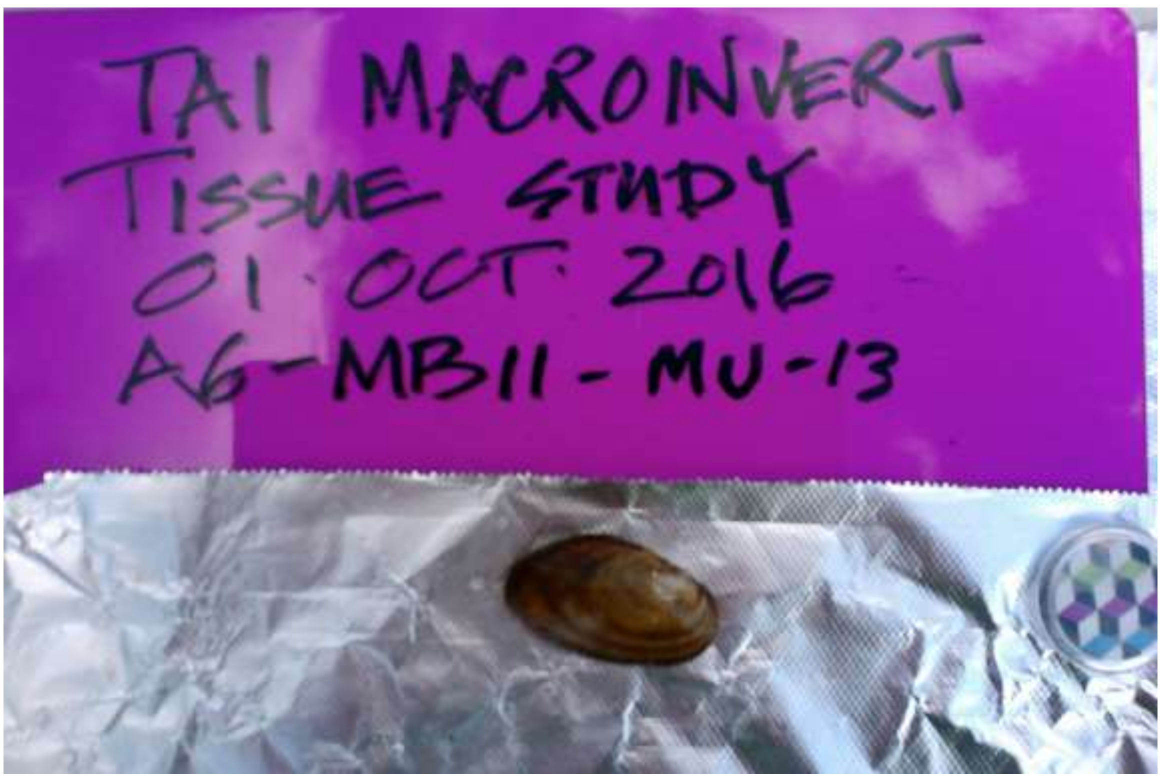
Species Type: MU

Species Name: Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	48	mm
Width	29	mm
Breadth	16	mm
Weight	12	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-13'

File Name: A6-MB11-MU-13.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-14

Collection Date:	Oct 01, 2016
Collection Time:	12:24
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	52	mm
Width	30	mm
Breadth	17	mm
Weight	13	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-14'

File Name: A6-MB11-MU-14.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-15

Collection Date:	Oct 01, 2016	
Collection Time:	12:29	
Species Type:	MU	
Species Name:	Anodonta sp.	
Measurement	**Value**	**Unit of Measure**
Length (total)	50	mm
Width	27	mm
Breadth	17	mm
Weight	13	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-15'

File Name: A6-MB11-MU-15.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-16

Collection Date:	Oct 01, 2016
Collection Time:	12:32
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	58	mm
Width	31	mm
Breadth	20	mm
Weight	20	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-16'

File Name: A6-MB11-MU-16.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-17

Collection Date:	Oct 01, 2016
Collection Time:	12:34
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	46	mm
Width	26	mm
Breadth	16	mm
Weight	11	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-17'

File Name: A6-MB11-MU-17.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

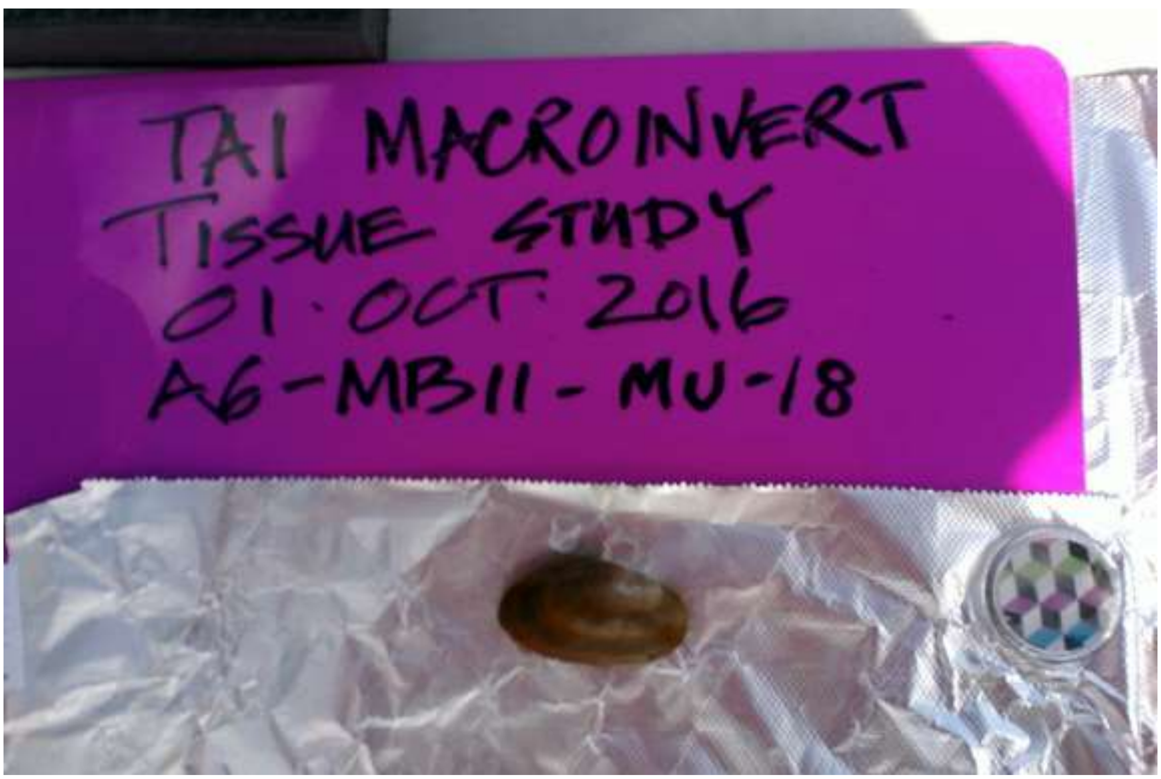
Sample Id: A6-MB11-MU-18

Collection Date:	Oct 01, 2016
Collection Time:	12:38
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	46	mm
Width	26	mm
Breadth	16	mm
Weight	11	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-18'

File Name: A6-MB11-MU-18.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

AECOM

Sample Id: A6-MB11-MU-19

Collection Date:	Oct 01, 2016
Collection Time:	12:41
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	49	mm
Width	32	mm
Breadth	18	mm
Weight	17	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-19'

File Name: A6-MB11-MU-19.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-20

Collection Date:	Oct 01, 2016
Collection Time:	12:44
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	46	mm
Width	27	mm
Breadth	14	mm
Weight	9	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-20'

File Name: A6-MB11-MU-20.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB11-MU-21

Collection Date:	Oct 01, 2016
Collection Time:	12:48
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	45	mm
Width	26	mm
Breadth	13	mm
Weight	9	g
Health	Live	none

Photos for Sample Id 'A6-MB11-MU-21'

File Name: A6-MB11-MU-21.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: A6-MB12

Location Type: Mussel beach (MB)

Location Coordinates:

A6-MB12 -118.642992, 47.938172

Photos for Location Id 'A6-MB12'

File Name: A6-MB12.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

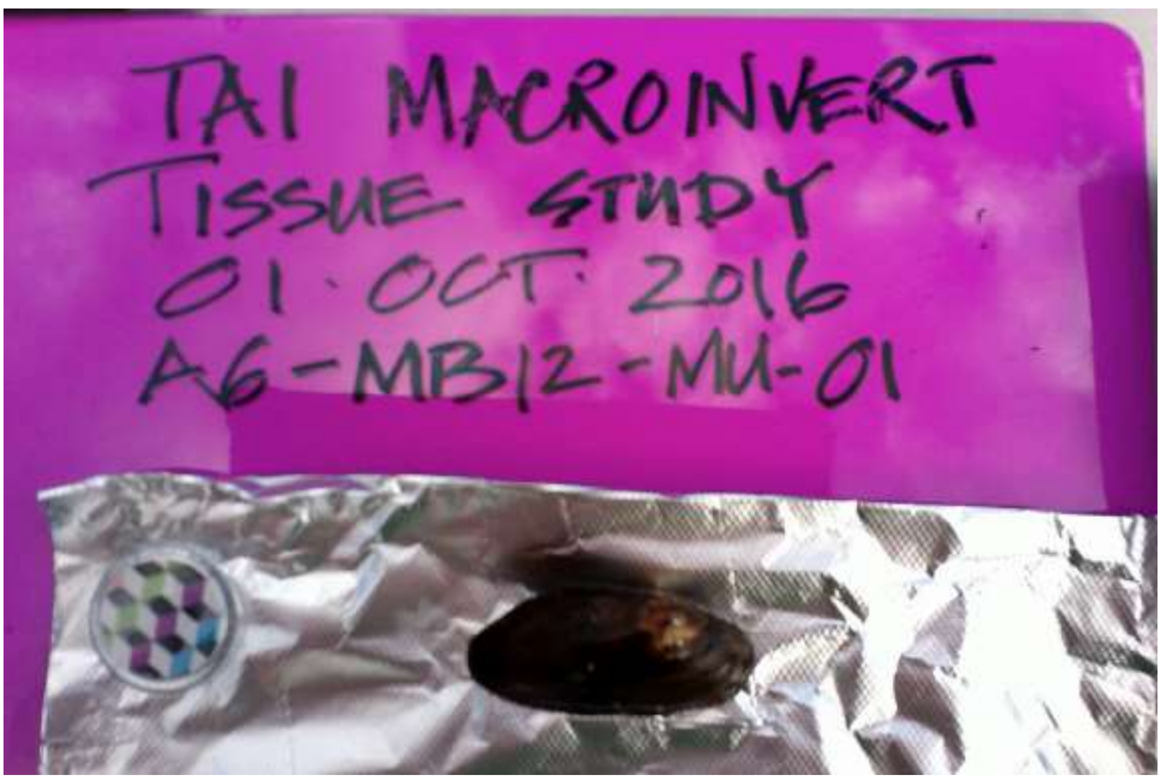
Sample Id: **A6-MB12-MU-01**

Collection Date:	Oct 01, 2016
Collection Time:	12:58
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	64	mm
Width	33	mm
Breadth	21	mm
Weight	22	g
Health	Live	none

Photos for Sample Id 'A6-MB12-MU-01'

File Name: A6-MB12-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: A6-MB12-MU-02

Collection Date:	Oct 01, 2016
Collection Time:	13:01
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	62	mm
Width	33	mm
Breadth	21	mm
Weight	22	g
Health	Live	none

Photos for Sample Id 'A6-MB12-MU-02'

File Name: A6-MB12-MU-02.JPG

Sample Id: **A6-MB12-MU-03**

Collection Date:	Oct 01, 2016
Collection Time:	13:04
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	59	mm
Width	31	mm
Breadth	22	mm
Weight	21	g
Health	Live	none

Photos for Sample Id 'A6-MB12-MU-03'

File Name: A6-MB12-MU-03.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

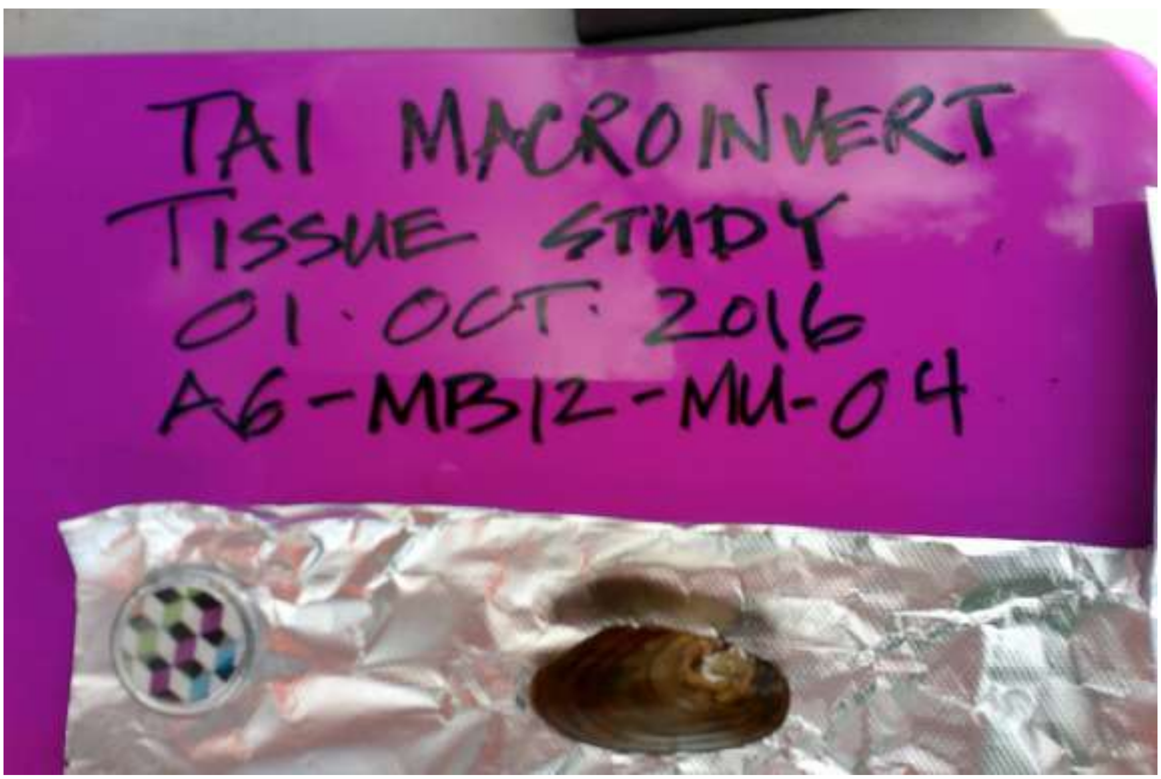
Sample Id: A6-MB12-MU-04

Collection Date:	Oct 01, 2016
Collection Time:	13:07
Species Type:	MU
Species Name:	Anodonta sp.

Measurement	Value	Unit of Measure
Length (total)	57	mm
Width	32	mm
Breadth	18	mm
Weight	16	g
Health	Live	none

Photos for Sample Id 'A6-MB12-MU-04'

File Name: A6-MB12-MU-04.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT31

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT31 -118.671481, 48.063428

Photos for Location Id 'SR-CT31'

File Name: SR-CT31.JPG

No samples were taken at Location Id 'SR-CT31'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT32

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT32 -118.671497, 48.063447

Photos for Location Id 'SR-CT32'

File Name: SR-CT32.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

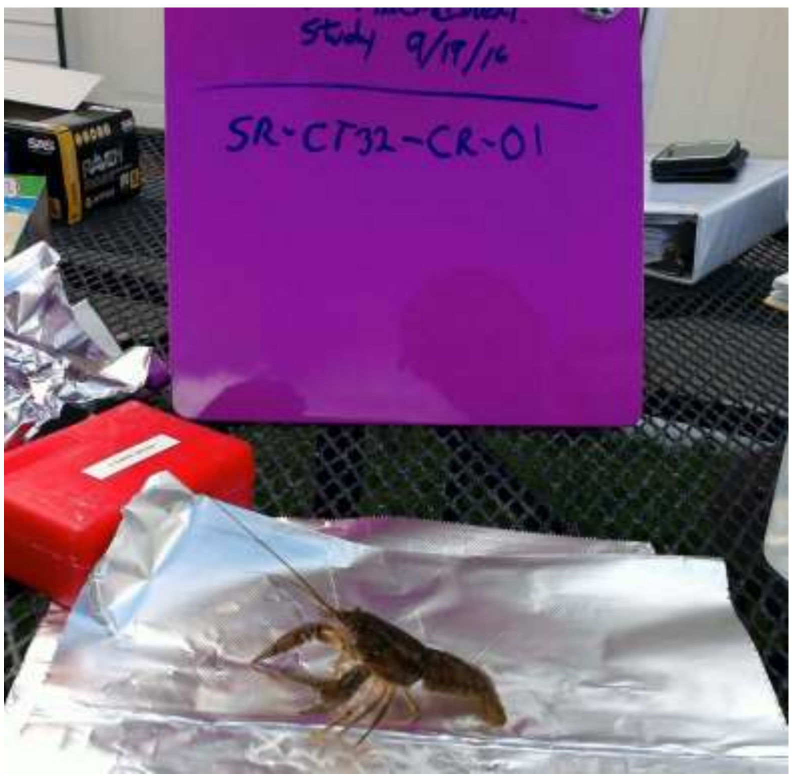
Sample Id: SR-CT32-CR-01

Collection Date:	Sep 19, 2016
Collection Time:	9:43
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	43	mm
Length (total)	85	mm
Weight	23	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'SR-CT32-CR-01'

File Name: SR-CT32-CR-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT33

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT33 -118.67073, 48.063831

Photos for Location Id 'SR-CT33'

File Name: SR-CT33.JPG

No samples were taken at Location Id 'SR-CT33'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT34

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT34 -118.670126, 48.064023

Photos for Location Id 'SR-CT34'

File Name: SR-CT34.JPG

No samples were taken at Location Id 'SR-CT34'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT35

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT35 -118.669632, 48.065

Photos for Location Id 'SR-CT35'

File Name: SR-CT35.JPG

No samples were taken at Location Id 'SR-CT35'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT36

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT36	-118.669476, 48.064791

Photos for Location Id 'SR-CT36'

File Name: SR-CT36.JPG

No samples were taken at Location Id 'SR-CT36'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT37

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT37 -118.669921, 48.06501

Photos for Location Id 'SR-CT37'

File Name: SR-CT37.JPG

No samples were taken at Location Id 'SR-CT37'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT38

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT38	-118.670315, 48.065234

Photos for Location Id 'SR-CT38'

File Name: SR-CT38.JPG

No samples were taken at Location Id 'SR-CT38'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT39

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT39 -118.670557, 48.065178

Photos for Location Id 'SR-CT39'

File Name: SR-CT39.JPG

No samples were taken at Location Id 'SR-CT39'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT40

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT40 -118.670683, 48.065337

Photos for Location Id 'SR-CT40'

File Name: SR-CT40.JPG

No samples were taken at Location Id 'SR-CT40'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT41

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT41 -118.669775, 48.066991

Photos for Location Id 'SR-CT41'

File Name: SR-CT41.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **SR-CT41-CR-01**

Collection Date:	Sep 19, 2016
Collection Time:	10:16
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	54	mm
Length (total)	110	mm
Weight	42	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'SR-CT41-CR-01'

File Name: SR-CT41-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

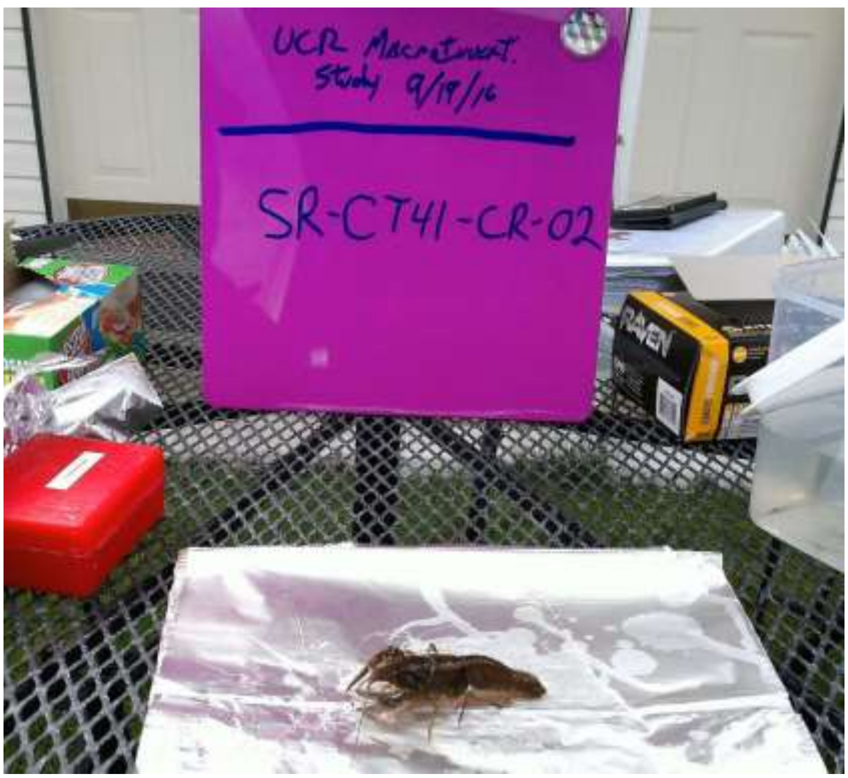
Sample Id: SR-CT41-CR-02

Collection Date:	Sep 19, 2016
Collection Time:	10:16
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	43	mm
Length (total)	90	mm
Weight	22	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'SR-CT41-CR-02'

File Name: SR-CT41-CR-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

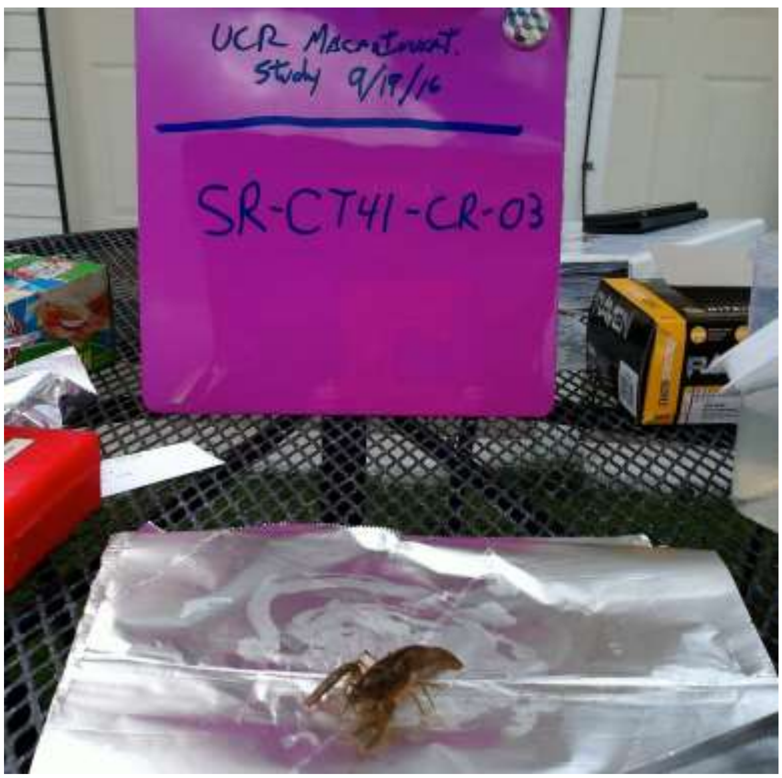
Sample Id: **SR-CT41-CR-03**

Collection Date:	Sep 19, 2016
Collection Time:	10:16
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	33	mm
Length (total)	72	mm
Weight	10	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'SR-CT41-CR-03'

File Name: SR-CT41-CR-03.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT42

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT42 -118.669697, 48.067059

Photos for Location Id 'SR-CT42'

File Name: SR-CT42.JPG

No samples were taken at Location Id 'SR-CT42'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **SR-CT43**

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT43 -118.667357, 48.068637

Photos for Location Id 'SR-CT43'

File Name: SR-CT43.JPG

No samples were taken at Location Id 'SR-CT43'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT44

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT44 -118.667277, 48.06898

Photos for Location Id 'SR-CT44'

File Name: SR-CT44.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **SR-CT44-CR-01**

Collection Date:	Sep 19, 2016
Collection Time:	10:32
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	54	mm
Length (total)	114	mm
Weight	53	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'SR-CT44-CR-01'

File Name: SR-CT44-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT45

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT45 -118.668444, 48.069719

Photos for Location Id 'SR-CT45'

File Name: SR-CT45.JPG

No samples were taken at Location Id 'SR-CT45'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT46

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT46 -118.666313, 48.073233

Photos for Location Id 'SR-CT46'

File Name: SR-CT46.JPG

No samples were taken at Location Id 'SR-CT46'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT47

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT47 -118.666445, 48.073361

Photos for Location Id 'SR-CT47'

File Name: SR-CT47.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: SR-CT47-CR-01

Collection Date:	Sep 19, 2016	
Collection Time:	10:52	
Species Type:	CR	
Species Name:	Orconectes virilis	

Measurement	Value	Unit of Measure
Length (carapace)	53	mm
Length (total)	102	mm
Weight	46	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'SR-CT47-CR-01'

File Name: SR-CT47-CR-01.JPG

Location Id: SR-CT48

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT48 -118.667229, 48.073683

Photos for Location Id 'SR-CT48'

File Name: SR-CT48.JPG

No samples were taken at Location Id 'SR-CT48'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT49

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT49 -118.667833, 48.074015

Photos for Location Id 'SR-CT49'

File Name: SR-CT49.JPG

No samples were taken at Location Id 'SR-CT49'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT50

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT50 -118.667967, 48.075833

Photos for Location Id 'SR-CT50'

File Name: SR-CT50.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: SR-CT50-CR-01

Collection Date:	Sep 19, 2016
Collection Time:	11:13
Species Type:	CR
Species Name:	Pacifastacus leniusculus

Measurement	Value	Unit of Measure
Length (carapace)	35	mm
Length (total)	71	mm
Weight	18	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'SR-CT50-CR-01'

File Name: SR-CT50-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT51

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT51 -118.66818, 48.075986

Photos for Location Id 'SR-CT51'

File Name: SR-CT51.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **SR-CT51-CR-01**

Collection Date:	Sep 19, 2016
Collection Time:	11:14
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	56	mm
Length (total)	110	mm
Weight	56	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'SR-CT51-CR-01'

File Name: SR-CT51-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

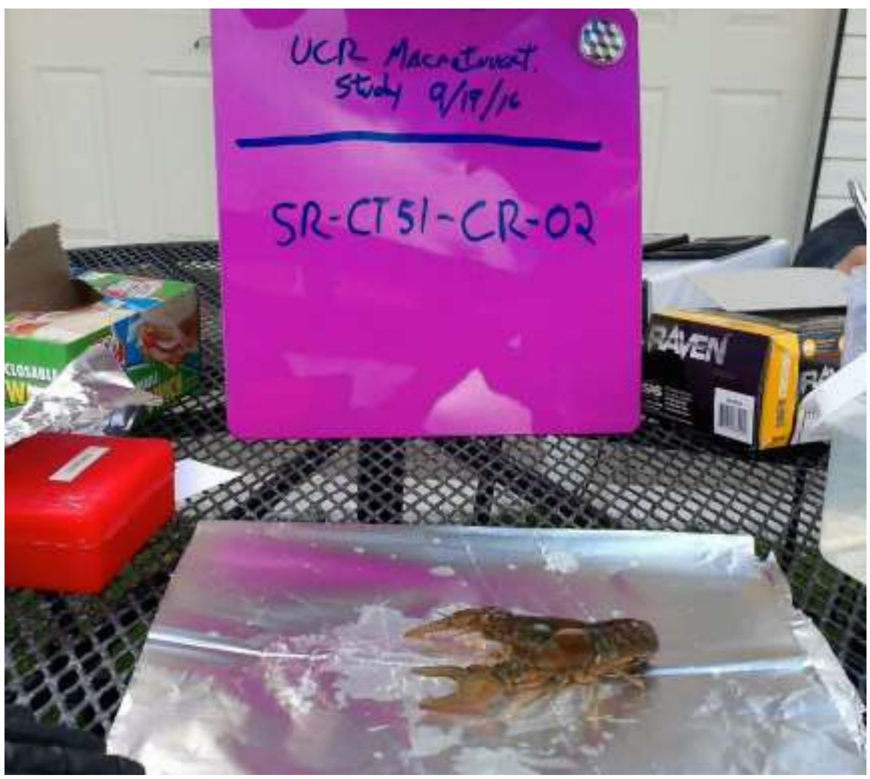
Sample Id: **SR-CT51-CR-02**

Collection Date:	Sep 19, 2016
Collection Time:	11:14
Species Type:	CR
Species Name:	Orconectes virilis

Measurement	Value	Unit of Measure
Length (carapace)	51	mm
Length (total)	104	mm
Weight	40	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'SR-CT51-CR-02'

File Name: SR-CT51-CR-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT52

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT52 -118.679586, 48.079091

Photos for Location Id 'SR-CT52'

File Name: SR-CT52.JPG

No samples were taken at Location Id 'SR-CT52'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT53

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT53 -118.679544, 48.079176

Photos for Location Id 'SR-CT53'

File Name: SR-CT53.JPG

AECOM

No samples were taken at Location Id 'SR-CT53'

Location Id: **SR-CT54**

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT54	-118.680118, 48.07949

Photos for Location Id 'SR-CT54'

File Name: SR-CT54.JPG

No samples were taken at Location Id 'SR-CT54'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT55

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT55 -118.683158, 48.080749

Photos for Location Id 'SR-CT55'

File Name: SR-CT55.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **SR-CT55-CR-01**

Collection Date:	Sep 20, 2016
Collection Time:	11:27
Species Type:	CR
Species Name:	Pacifastacus leniusculus

Measurement	Value	Unit of Measure
Length (carapace)	34	mm
Length (total)	73	mm
Weight	18	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'SR-CT55-CR-01'

File Name: SR-CT55-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT56

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT56 -118.68369, 48.080991

Photos for Location Id 'SR-CT56'

File Name: SR-CT56.JPG

No samples were taken at Location Id 'SR-CT56'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT57

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT57 -118.687569, 48.082072

Photos for Location Id 'SR-CT57'

File Name: SR-CT57.JPG

No samples were taken at Location Id 'SR-CT57'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT58

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT58 -118.687425, 48.082007

Photos for Location Id 'SR-CT58'

File Name: SR-CT58.JPG

No samples were taken at Location Id 'SR-CT58'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **SR-CT59**

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT59 -118.689876, 48.082992

Photos for Location Id 'SR-CT59'

File Name: SR-CT59.JPG

No samples were taken at Location Id 'SR-CT59'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT60

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT60 -118.690339, 48.083354

Photos for Location Id 'SR-CT60'

File Name: SR-CT60.JPG

No samples were taken at Location Id 'SR-CT60'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT61

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT61 -118.691643, 48.085212

Photos for Location Id 'SR-CT61'

File Name: SR-CT61.JPG

No samples were taken at Location Id 'SR-CT61'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **SR-CT62**

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT62	-118.69302, 48.08605

Photos for Location Id 'SR-CT62'

File Name: SR-CT62.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: SR-CT62-CR-01

Collection Date: Sep 19, 2016

Collection Time: 12:35

Species Type: CR

Species Name: Pacifastacus leniusculus

Measurement	Value	Unit of Measure
Length (carapace)	42	mm
Length (total)	83	mm
Weight	29	g
Health	Live	none
Bait	Salmon	none

Photos for Sample Id 'SR-CT62-CR-01'

File Name: SR-CT62-CR-01.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-CT63

Location Type: Crayfish trap (CT)

Location Coordinates:

SR-CT63 -118.693091, 48.086283

Photos for Location Id 'SR-CT63'

File Name: SR-CT63.JPG

AECOM

No samples were taken at Location Id 'SR-CT63'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-MB31

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB31 Begin	-118.670207, 48.064166
SR-MB31 End	-118.669724, 48.064682

Photos for Location Id 'SR-MB31'

File Name: SR-MB31.JPG

No samples were taken at Location Id 'SR-MB31'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-MB32

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB32 Begin	-118.669779, 48.064966
SR-MB32 End	-118.670806, 48.065437

Photos for Location Id 'SR-MB32'

File Name: SR-MB32.JPG

No samples were taken at Location Id 'SR-MB32'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-MB33

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB33 Begin	-118.669633, 48.067055
SR-MB33 End	-118.668722, 48.067379

Photos for Location Id 'SR-MB33'

File Name: SR-MB33.JPG

No samples were taken at Location Id 'SR-MB33'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **SR-MB34**

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB34 Begin	-118.690048, 48.083094
SR-MB34 End	-118.689211, 48.082692

Photos for Location Id 'SR-MB34'

File Name: SR-MB34.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

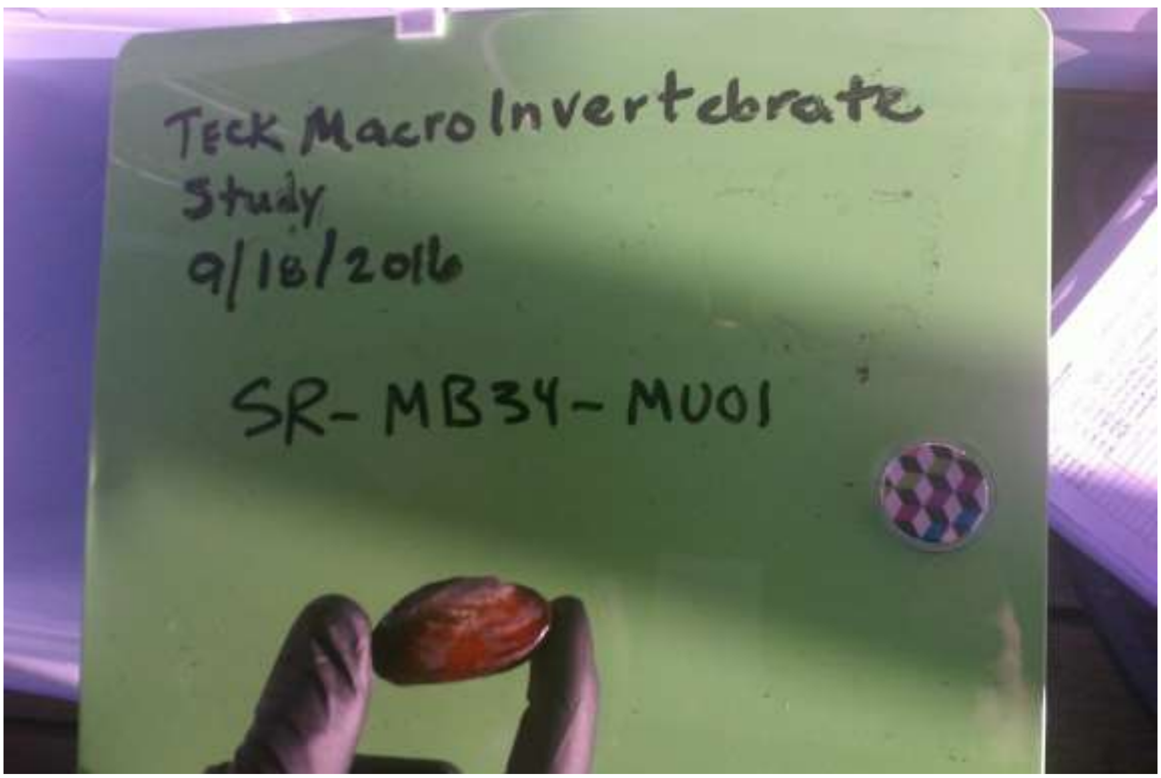
Sample Id: SR-MB34-MU-01

Collection Date:	Sep 18, 2016
Collection Time:	13:50
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	48.3	mm
Width	26.2	mm
Breadth	15.7	mm
Weight	14	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-01'

File Name: SR-MB34-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

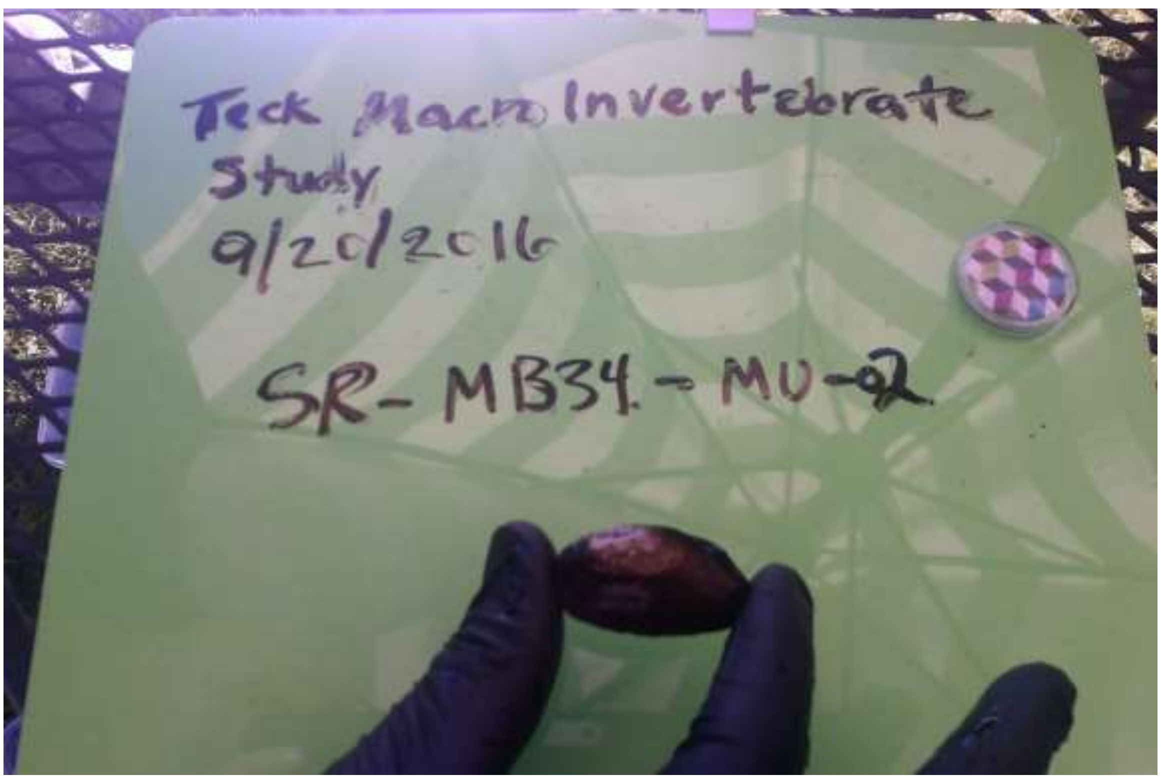
Sample Id: **SR-MB34-MU-02**

Collection Date:	Sep 20, 2016
Collection Time:	9:15
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	44	mm
Width	23.7	mm
Breadth	13.9	mm
Weight	8.5	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-02'

File Name: SR-MB34-MU-02.JPG



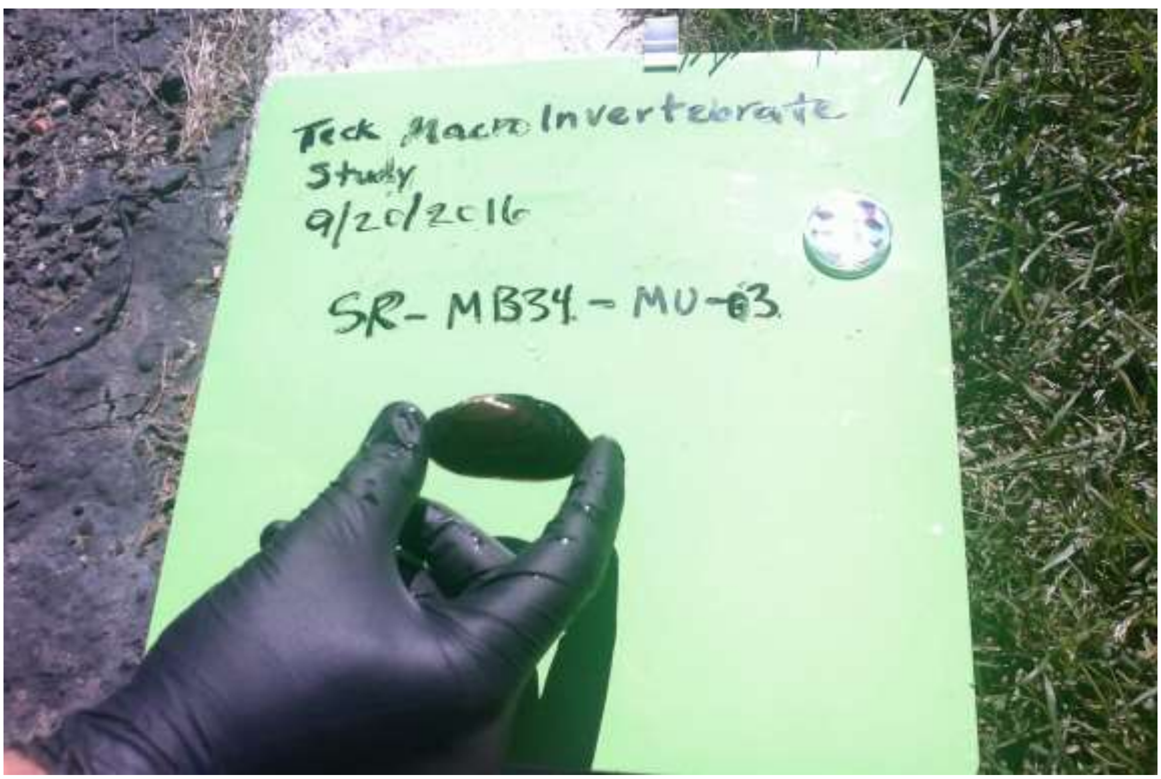
Sample Id: SR-MB34-MU-03

Collection Date:	Sep 20, 2016
Collection Time:	9:20
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	57.5	mm
Width	29.4	mm
Breadth	16.7	mm
Weight	16	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-03'

File Name: SR-MB34-MU-03.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

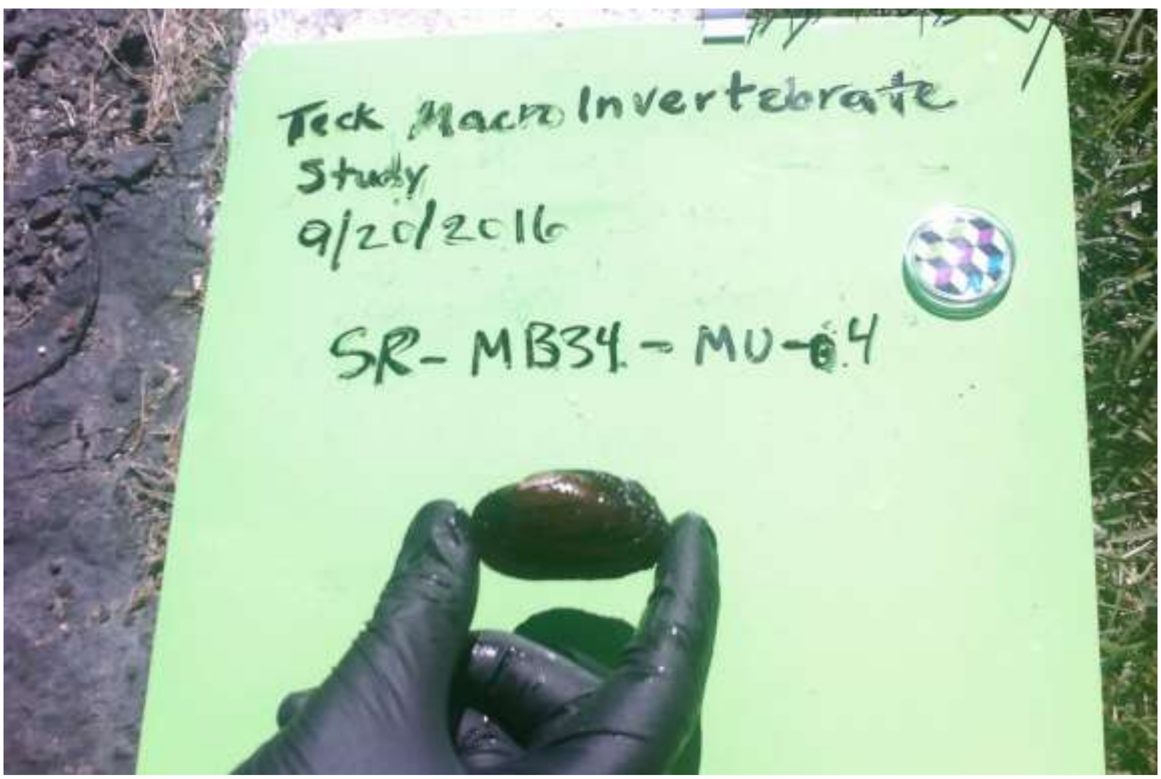
Sample Id: SR-MB34-MU-04

Collection Date:	Sep 20, 2016
Collection Time:	9:21
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	56.6	mm
Width	31.5	mm
Breadth	17.7	mm
Weight	22	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-04'

File Name: SR-MB34-MU-04.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

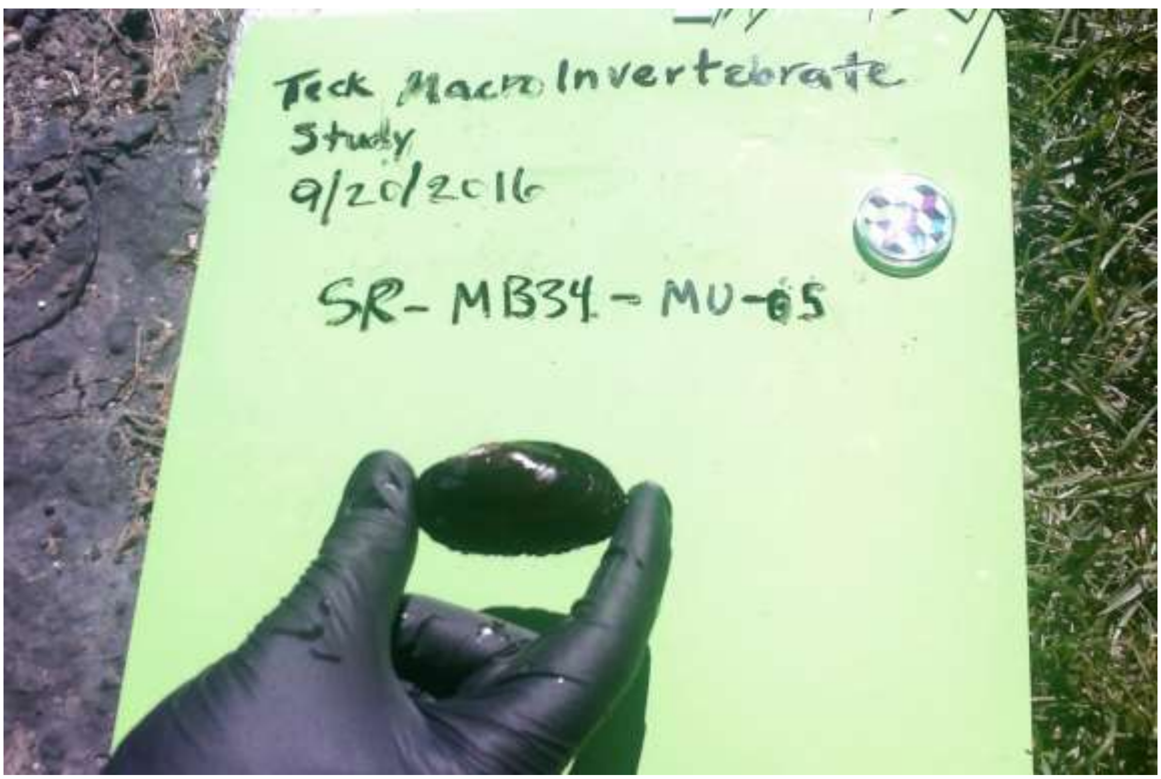
Sample Id: **SR-MB34-MU-05**

Collection Date:	Sep 20, 2016
Collection Time:	9:22
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	63.7	mm
Width	34.3	mm
Breadth	18.6	mm
Weight	28	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-05'

File Name: SR-MB34-MU-05.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

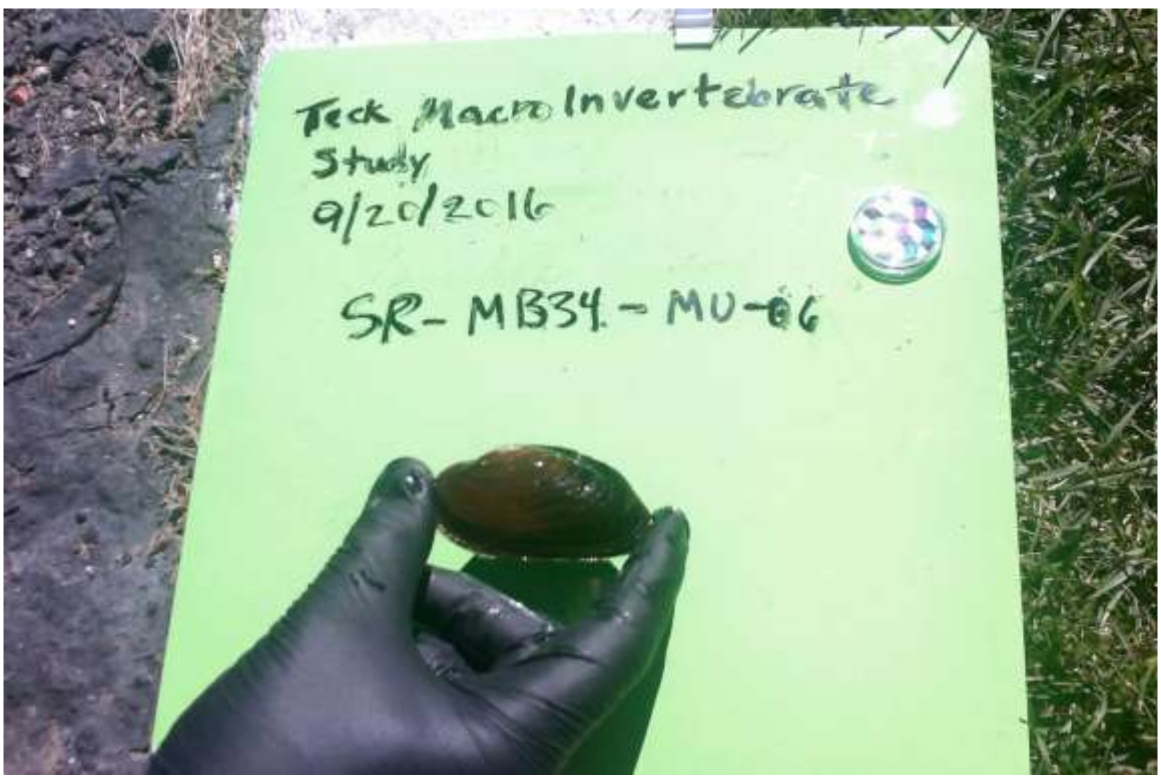
Sample Id: SR-MB34-MU-06

Collection Date:	Sep 20, 2016
Collection Time:	9:26
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	73.5	mm
Width	37.8	mm
Breadth	22.3	mm
Weight	40	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-06'

File Name: SR-MB34-MU-06.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

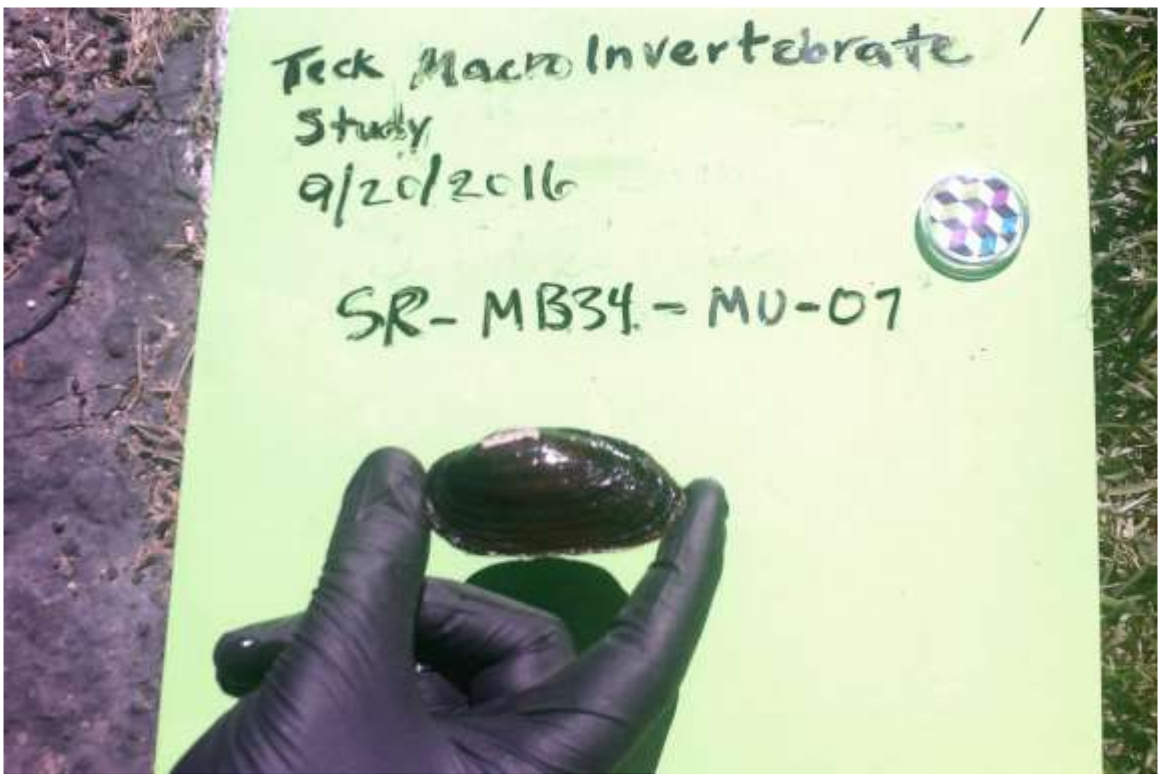
Sample Id: SR-MB34-MU-07

Collection Date:	Sep 20, 2016
Collection Time:	9:27
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	74.6	mm
Width	37.9	mm
Breadth	21.9	mm
Weight	39	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-07'

File Name: SR-MB34-MU-07.JPG



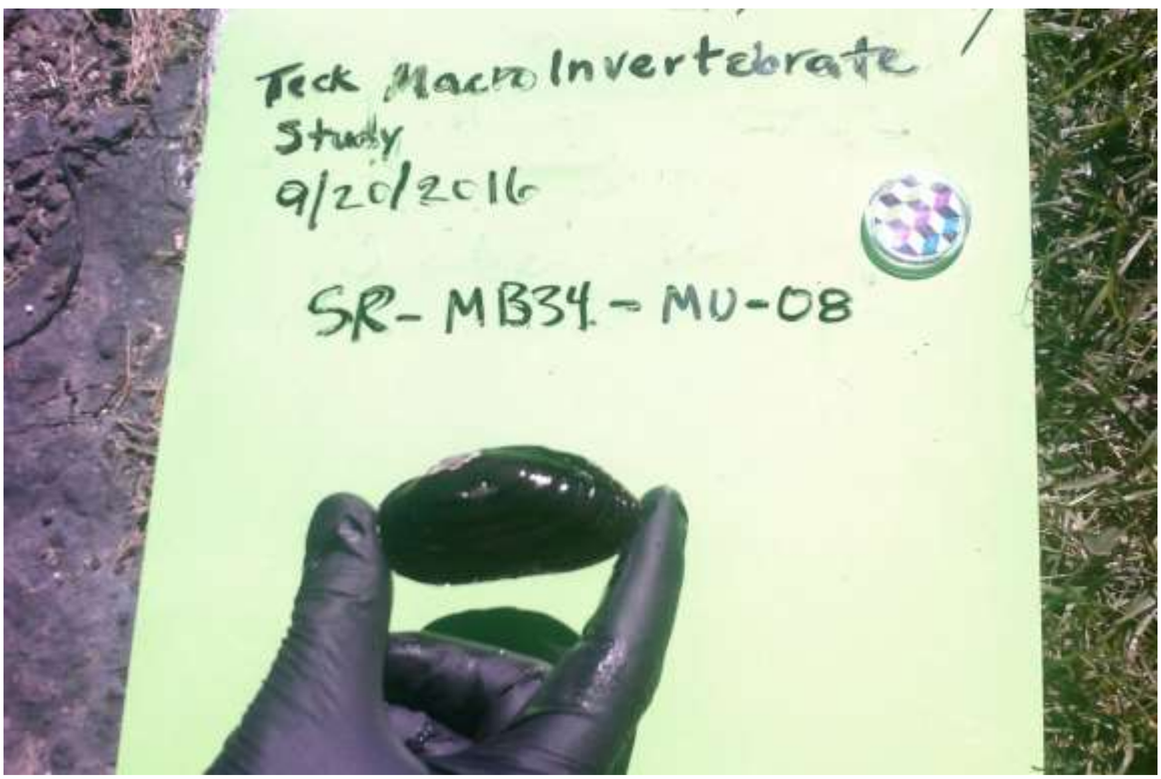
Sample Id: **SR-MB34-MU-08**

Collection Date:	Sep 20, 2016
Collection Time:	9:29
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	75.5	mm
Width	37	mm
Breadth	21.6	mm
Weight	39	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-08'

File Name: SR-MB34-MU-08.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: **SR-MB34-MU-09**

Collection Date: Sep 20, 2016

Collection Time: 9:33

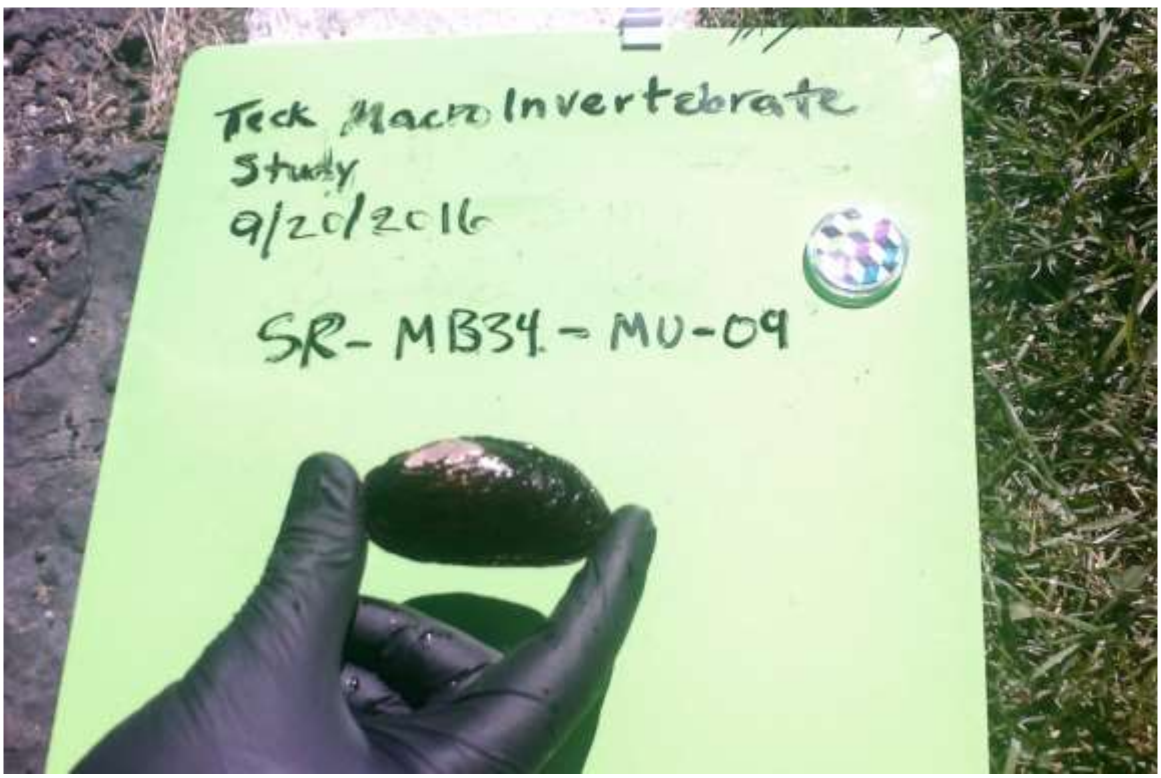
Species Type: MU

Species Name: Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	73.3	mm
Width	37.3	mm
Breadth	22.5	mm
Weight	40	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-09'

File Name: SR-MB34-MU-09.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

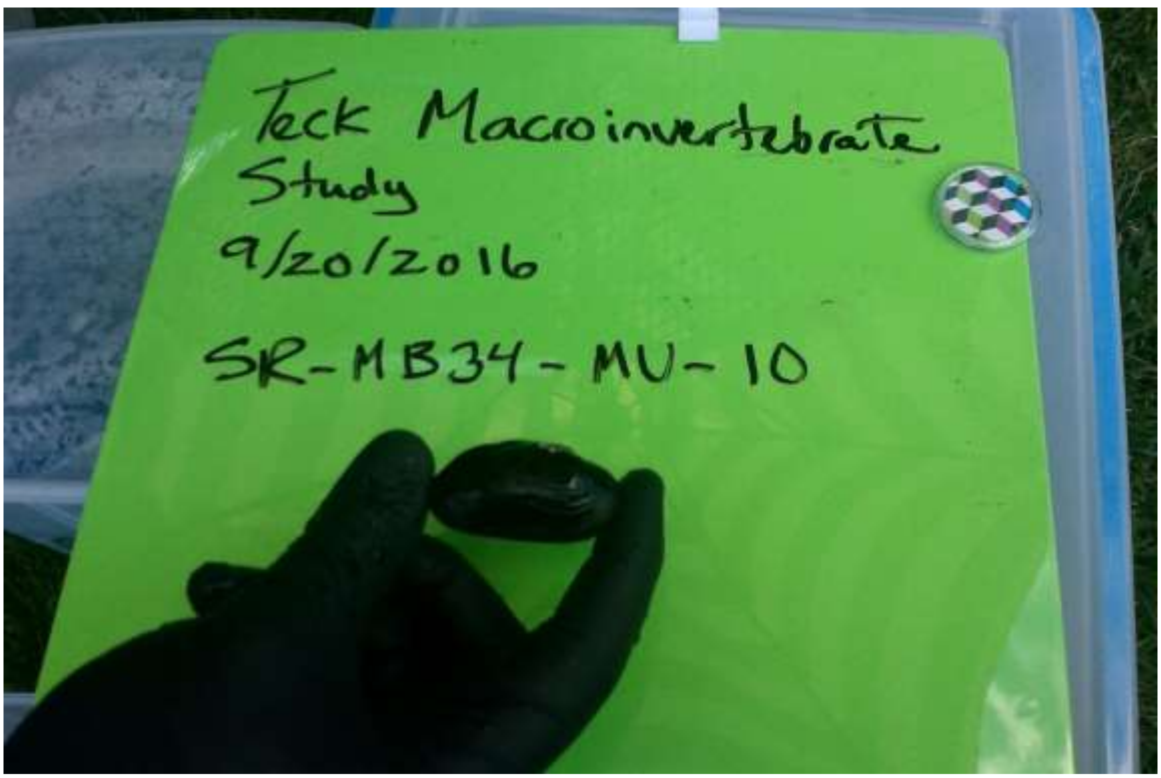
Sample Id: SR-MB34-MU-10

Collection Date:	Sep 20, 2016
Collection Time:	15:30
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	51.5	mm
Width	27.4	mm
Breadth	14.6	mm
Weight	13	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-10'

File Name: SR-MB34-MU-10.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

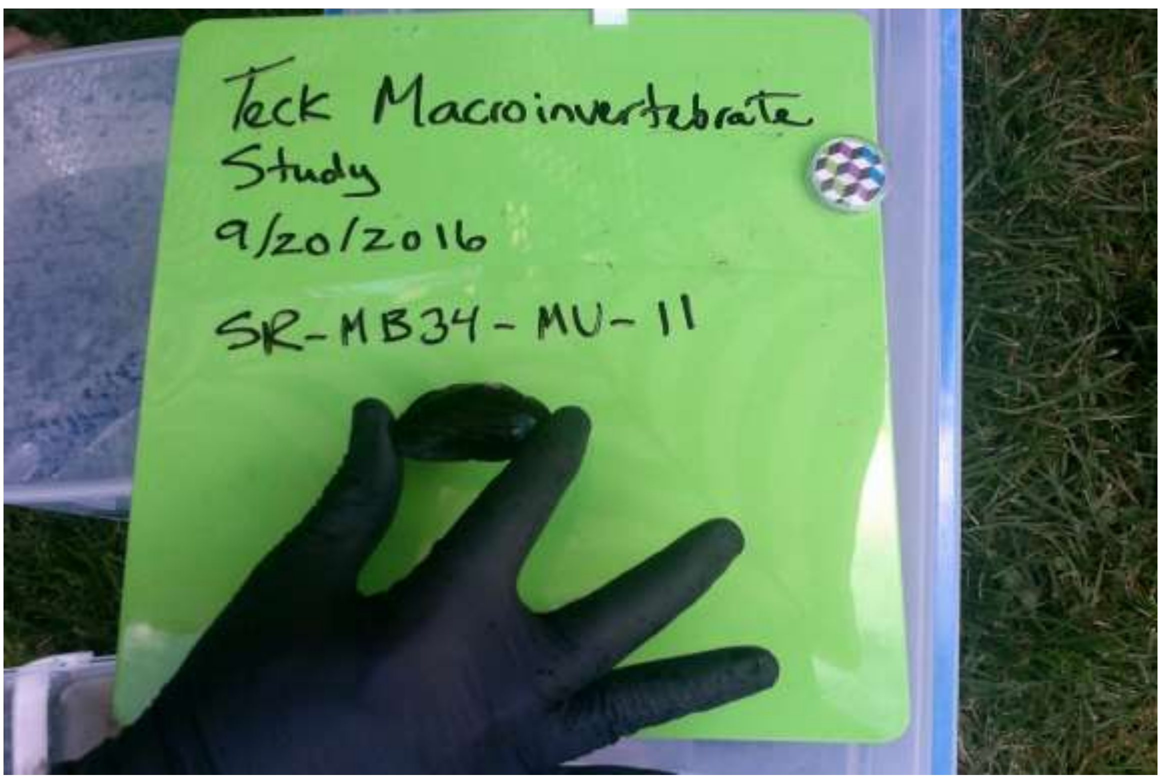
Sample Id: **SR-MB34-MU-11**

Collection Date:	Sep 20, 2016
Collection Time:	15:32
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	58.5	mm
Width	31	mm
Breadth	17	mm
Weight	20	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-11'

File Name: SR-MB34-MU-11.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

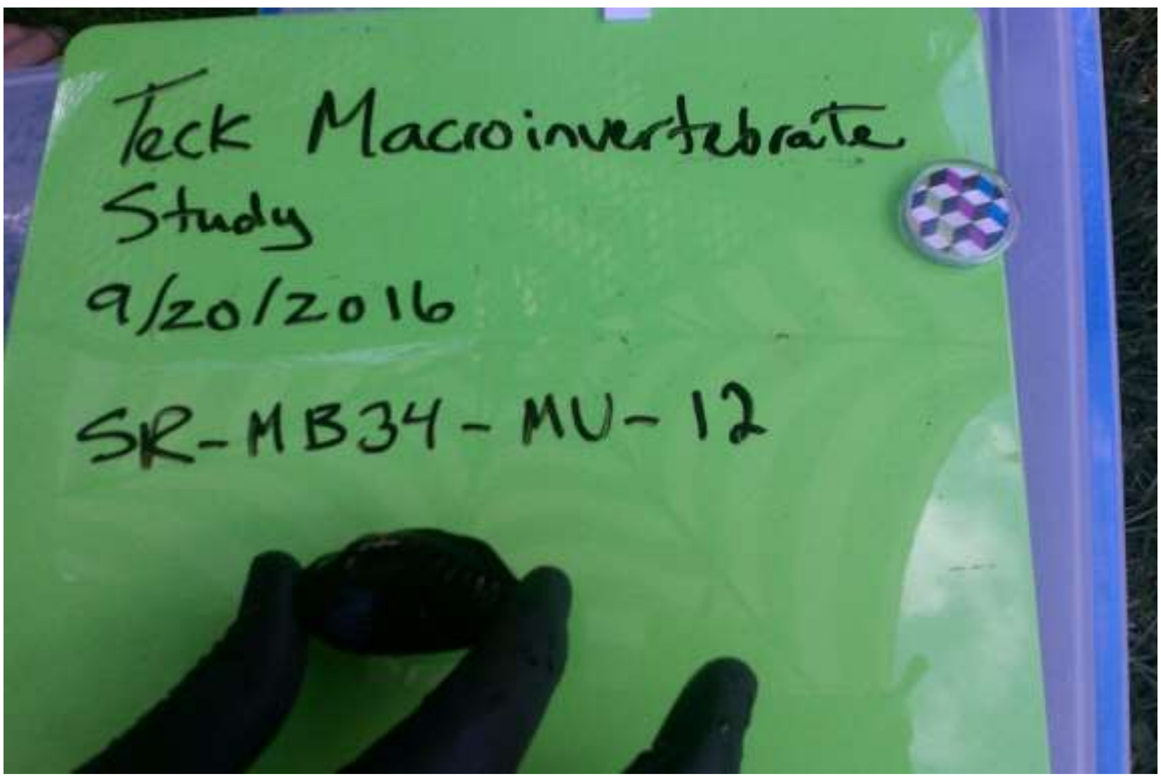
Sample Id: SR-MB34-MU-12

Collection Date:	Sep 20, 2016
Collection Time:	15:32
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	57.6	mm
Width	29.2	mm
Breadth	17.4	mm
Weight	20	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-12'

File Name: SR-MB34-MU-12.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

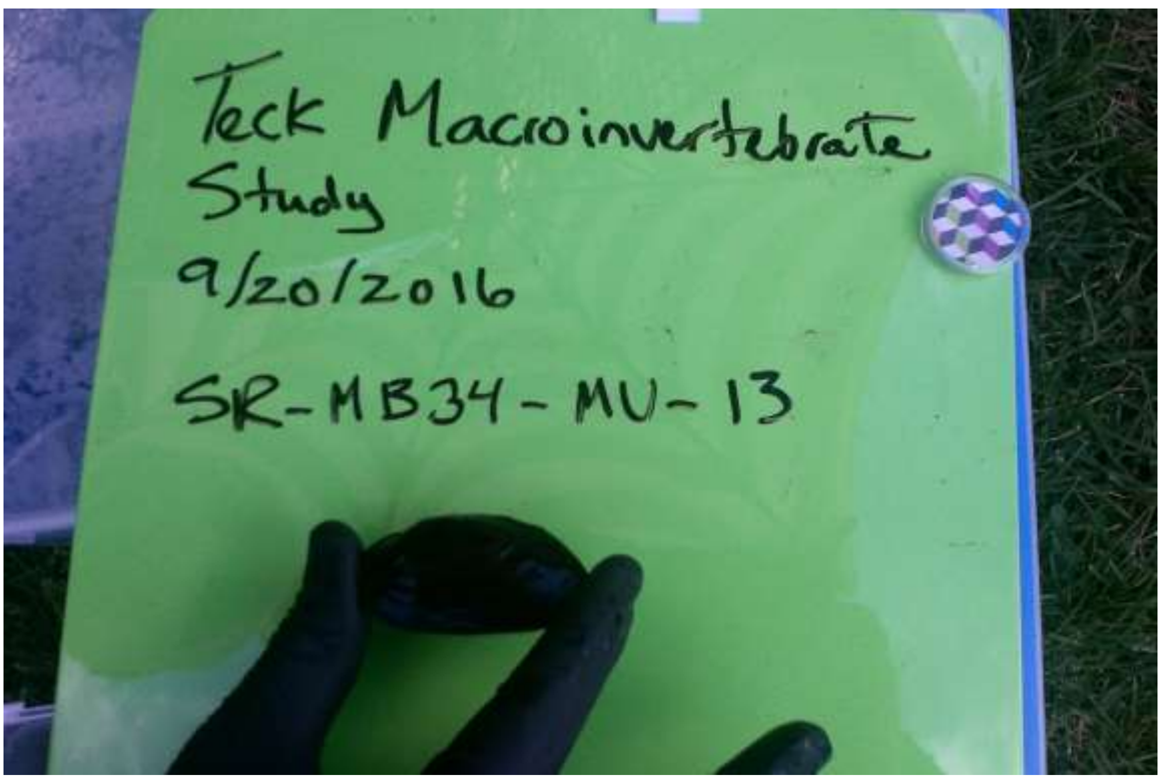
Sample Id: SR-MB34-MU-13

Collection Date:	Sep 20, 2016
Collection Time:	15:32
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	66.5	mm
Width	35.1	mm
Breadth	18.5	mm
Weight	27	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-13'

File Name: SR-MB34-MU-13.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

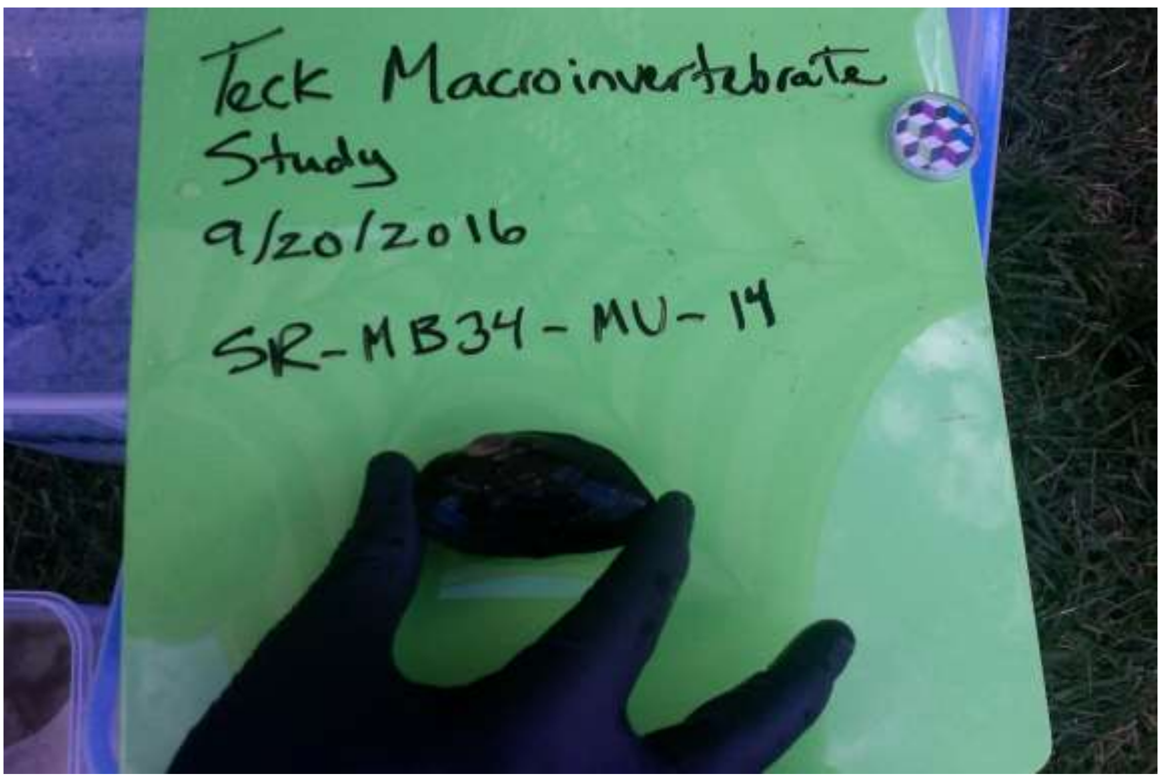
Sample Id: SR-MB34-MU-14

Collection Date:	Sep 20, 2016
Collection Time:	15:33
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	74	mm
Width	38.5	mm
Breadth	22.1	mm
Weight	42	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-14'

File Name: SR-MB34-MU-14.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

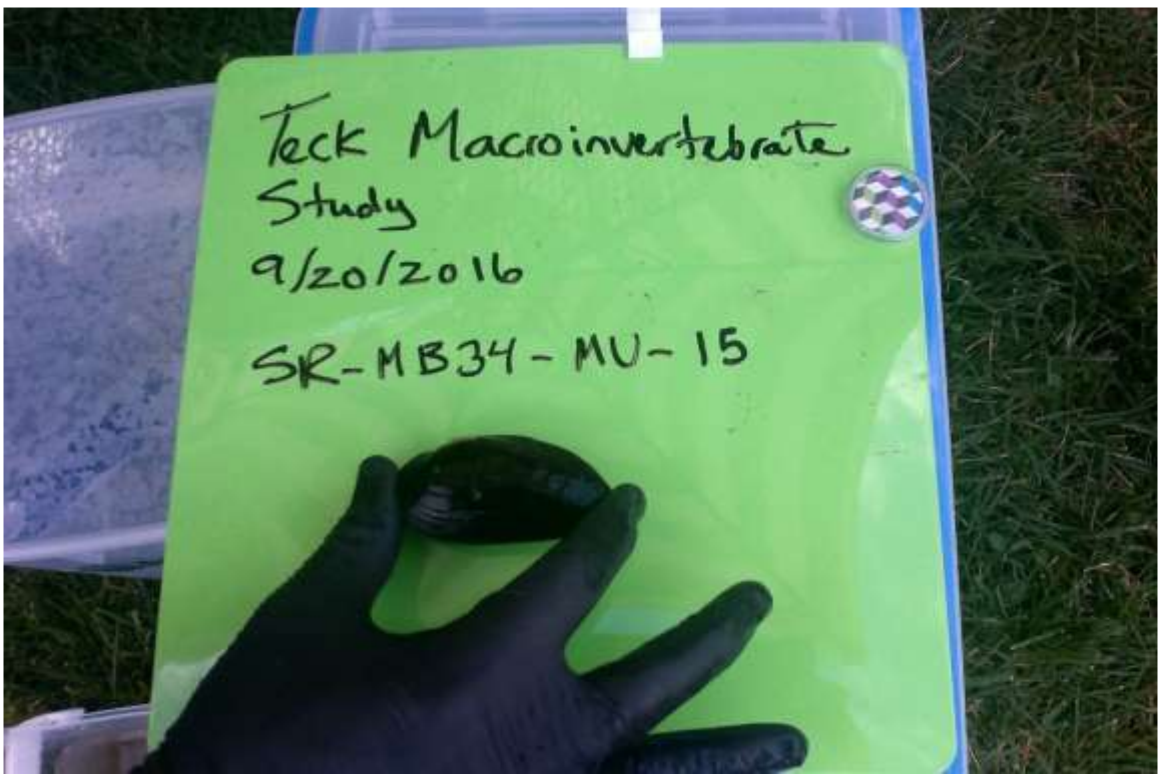
Sample Id: SR-MB34-MU-15

Collection Date:	Sep 20, 2016
Collection Time:	15:33
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	79.1	mm
Width	40	mm
Breadth	22.5	mm
Weight	44	g
Health	Live	none

Photos for Sample Id 'SR-MB34-MU-15'

File Name: SR-MB34-MU-15.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-MB35

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB35 Begin	-118.690437, 48.083376
SR-MB35 End	-118.691136, 48.083688

Photos for Location Id 'SR-MB35'

File Name: SR-MB35.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

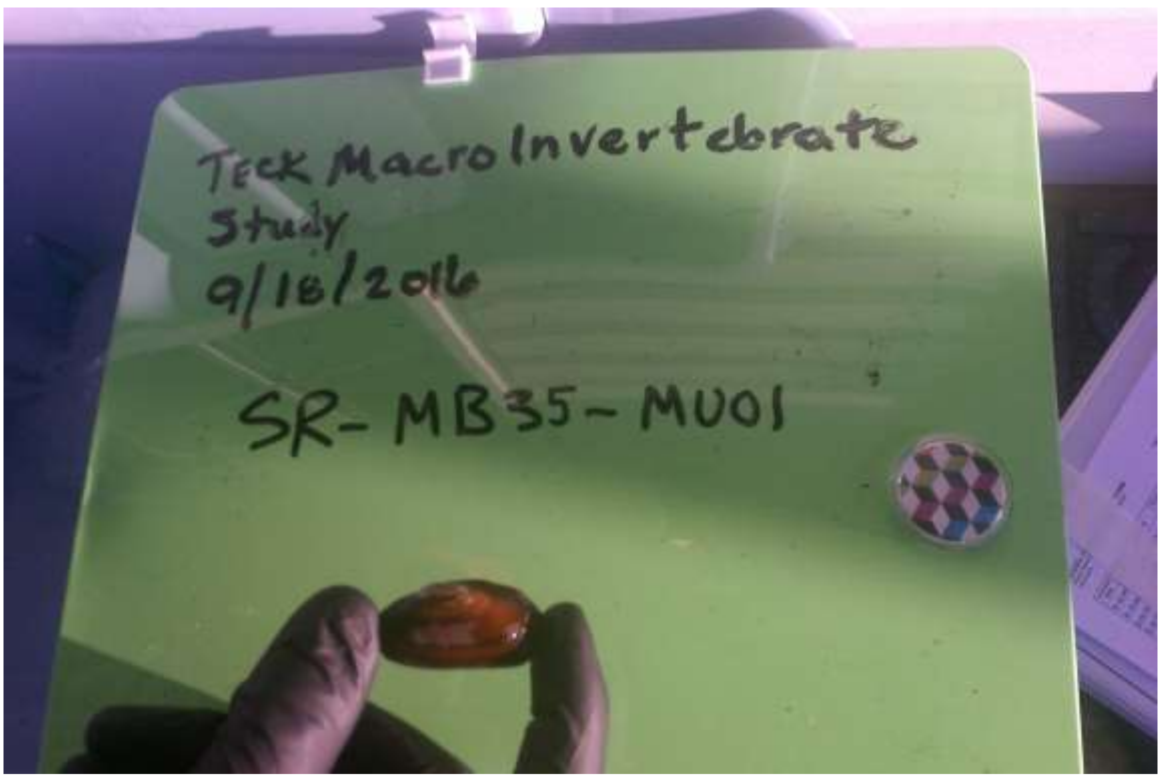
Sample Id: SR-MB35-MU-01

Collection Date:	Sep 18, 2016
Collection Time:	14:25
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	42.6	mm
Width	21.8	mm
Breadth	13.3	mm
Weight	8	g
Health	Live	none

Photos for Sample Id 'SR-MB35-MU-01'

File Name: SR-MB35-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

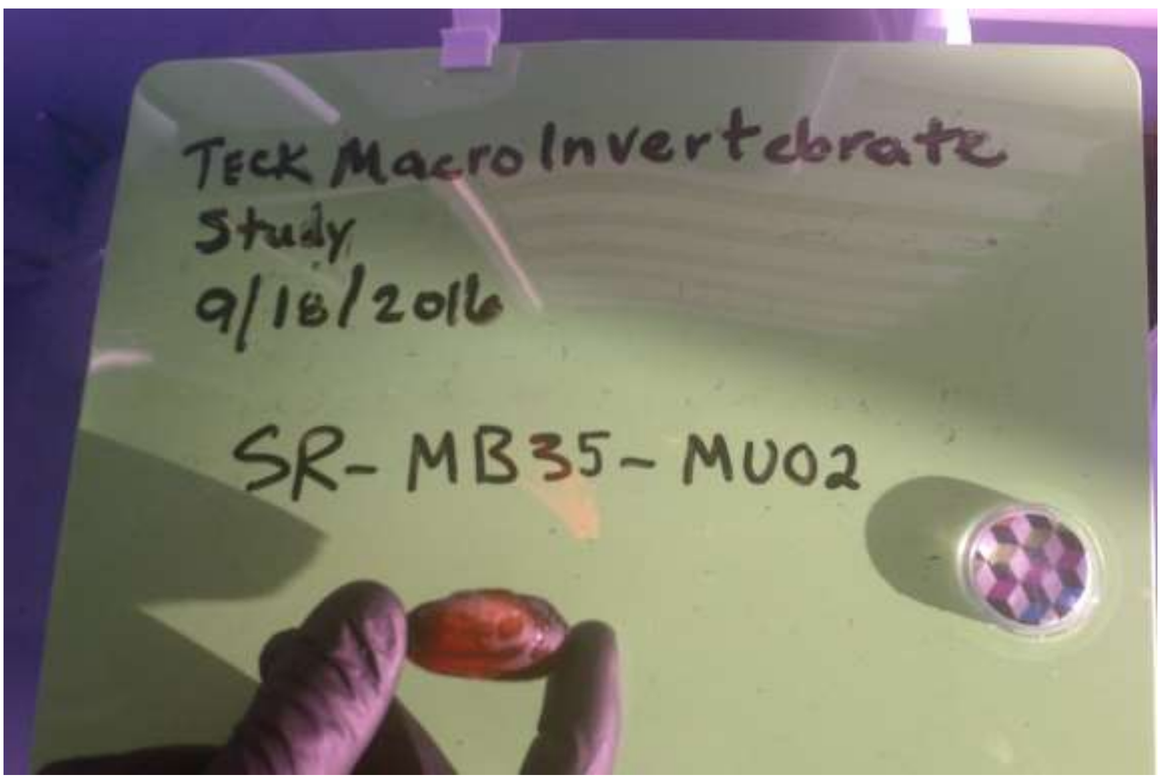
Sample Id: SR-MB35-MU-02

Collection Date:	Sep 18, 2016
Collection Time:	14:28
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	40.9	mm
Width	20.6	mm
Breadth	11.7	mm
Weight	6	g
Health	Live	none

Photos for Sample Id 'SR-MB35-MU-02'

File Name: SR-MB35-MU-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-MB36

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB36 Begin	-118.689135, 48.082714
SR-MB36 End	-118.688358, 48.082486

Photos for Location Id 'SR-MB36'

File Name: SR-MB36.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

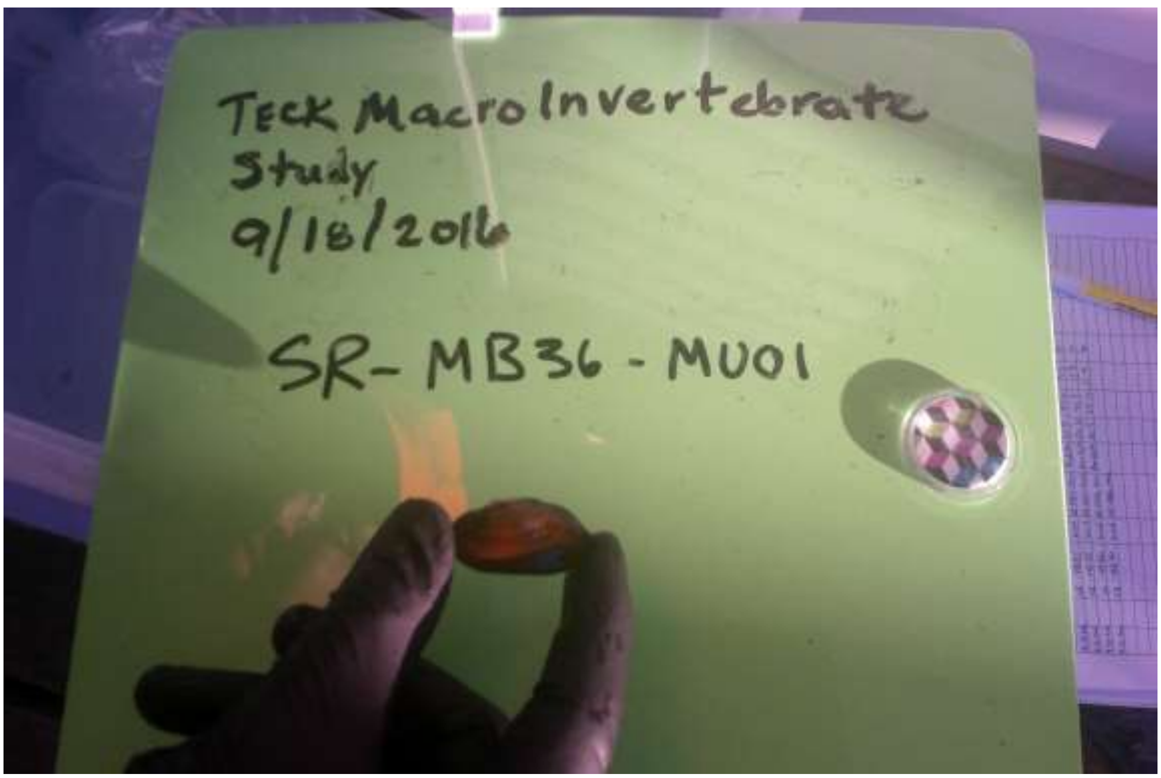
Sample Id: SR-MB36-MU-01

Collection Date:	Sep 18, 2016	
Collection Time:	15:05	
Species Type:	MU	
Species Name:	Margaritifera falcata	

Measurement	Value	Unit of Measure
Length (total)	37.6	mm
Width	20.5	mm
Breadth	11.4	mm
Weight	6	g
Health	Live	none

Photos for Sample Id 'SR-MB36-MU-01'

File Name: SR-MB36-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

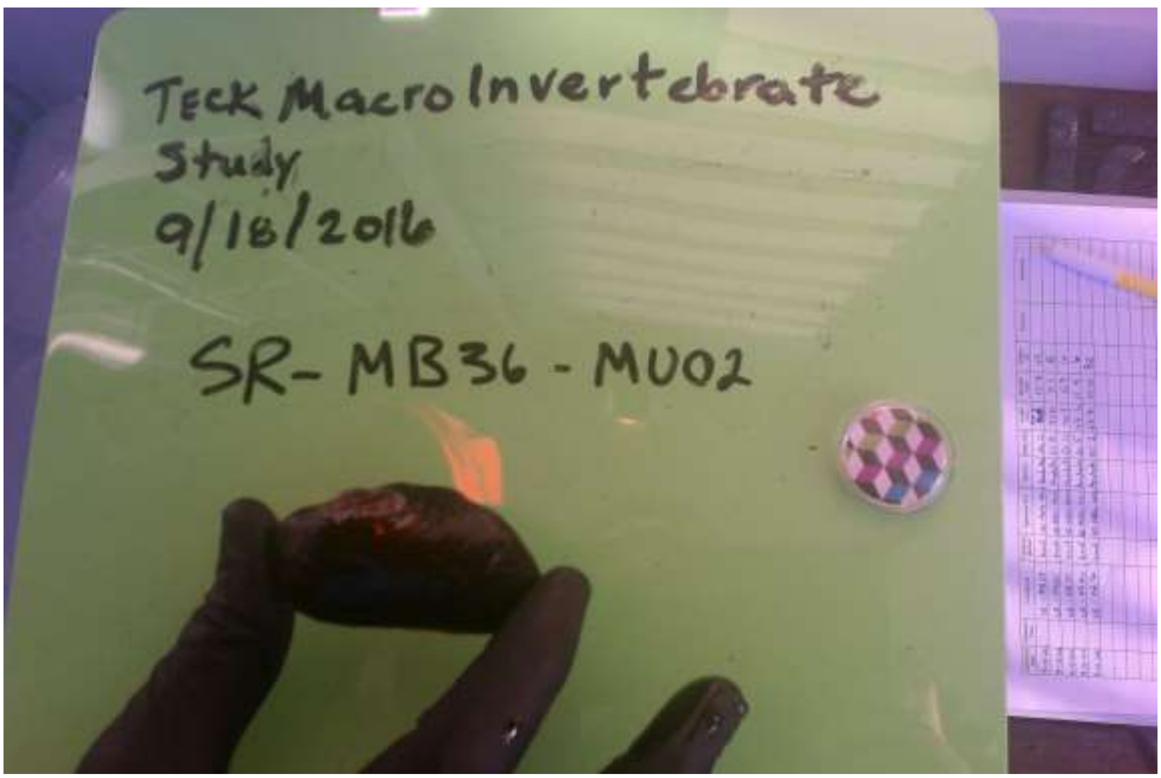
Sample Id: SR-MB36-MU-02

Collection Date:	Sep 18, 2016
Collection Time:	15:07
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	68.7	mm
Width	35.2	mm
Breadth	20.6	mm
Weight	32	g
Health	Live	none

Photos for Sample Id 'SR-MB36-MU-02'

File Name: SR-MB36-MU-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-MB37

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB37 Begin	-118.691512, 48.085076
SR-MB37 End	-118.691262, 48.08467

Photos for Location Id 'SR-MB37'

File Name: SR-MB37.JPG

No samples were taken at Location Id 'SR-MB37'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-MB38

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB38 Begin	-118.691505, 48.085111
SR-MB38 End	-118.692598, 48.085726

Photos for Location Id 'SR-MB38'

File Name: SR-MB38.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

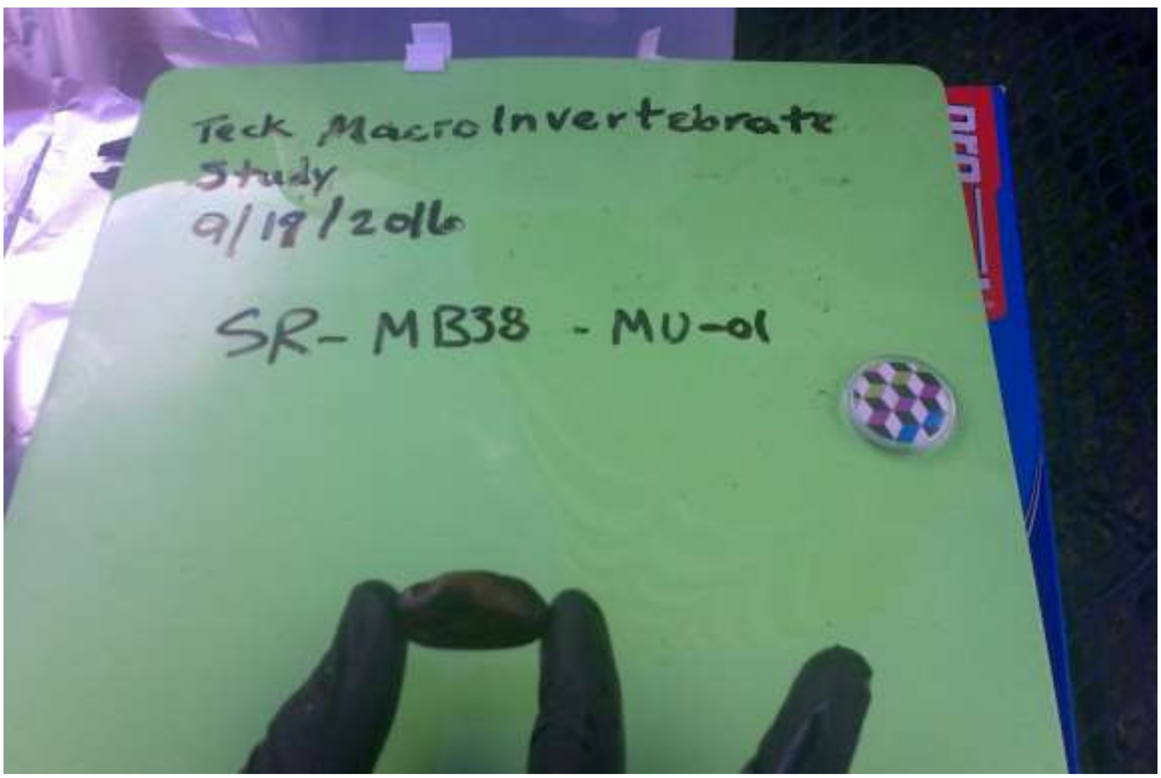
Sample Id: SR-MB38-MU-01

Collection Date:	Sep 19, 2016
Collection Time:	10:10
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	36.9	mm
Width	18.7	mm
Breadth	9.8	mm
Weight	4	g
Health	Live	none

Photos for Sample Id 'SR-MB38-MU-01'

File Name: SR-MB38-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Sample Id: SR-MB38-MU-02

Collection Date: Sep 19, 2016

Collection Time: 10:12

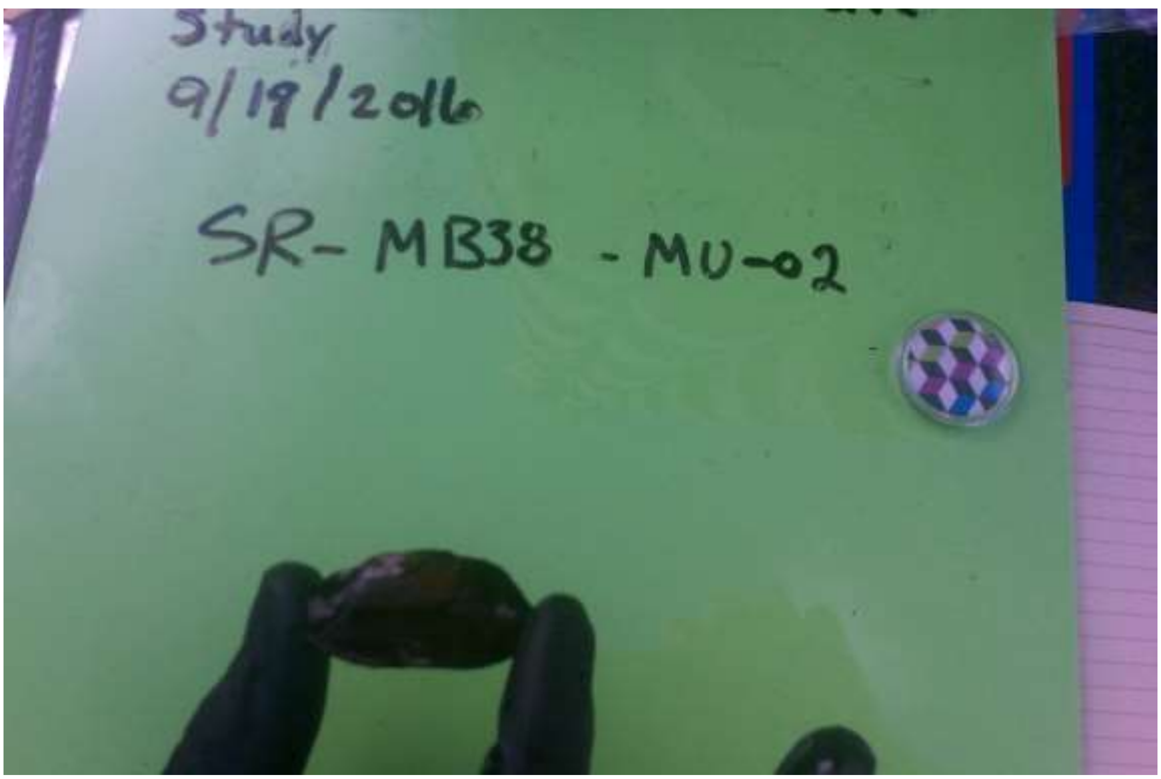
Species Type: MU

Species Name: Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	45.7	mm
Width	23.5	mm
Breadth	14.5	mm
Weight	11	g
Health	Live	none

Photos for Sample Id 'SR-MB38-MU-02'

File Name: SR-MB38-MU-02.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **SR-MB39**

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB39 Begin	-118.666499, 48.073478
SR-MB39 End	-118.667483, 48.073734

Photos for Location Id 'SR-MB39'

File Name: SR-MB39.JPG

No samples were taken at Location Id 'SR-MB39'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: **SR-MB40**

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB40 Begin	-118.667596, 48.073766
SR-MB40 End	-118.667844, 48.074519

Photos for Location Id 'SR-MB40'

File Name: SR-MB40.JPG

No samples were taken at Location Id 'SR-MB40'

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-MB41

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB41 Begin	-118.683824, 48.081011
SR-MB41 End	-118.68462, 48.080855

Photos for Location Id 'SR-MB41'

File Name: SR-MB41.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

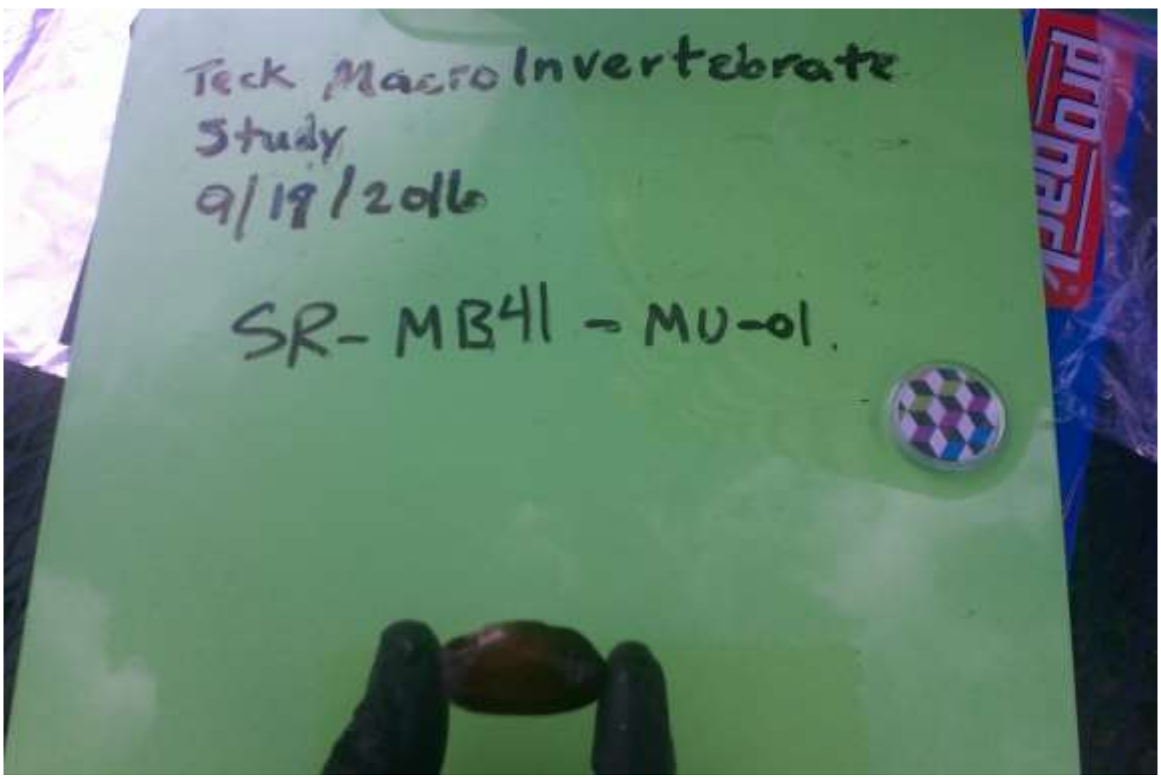
Sample Id: SR-MB41-MU-01

Collection Date:	Sep 19, 2016
Collection Time:	12:48
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	40.5	mm
Width	21.2	mm
Breadth	12.6	mm
Weight	8	g
Health	Live	none

Photos for Sample Id 'SR-MB41-MU-01'

File Name: SR-MB41-MU-01.JPG



Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

Location Id: SR-MB42

Location Type: Mussel beach (MB)

Location Coordinates:

SR-MB42 Begin	-118.683837, 48.080832
SR-MB42 End	-118.683333, 48.080273

Photos for Location Id 'SR-MB42'

File Name: SR-MB42.JPG

Teck American Incorporated
Macroinvertebrate Tissue Study
Field Summary Report

AECOM

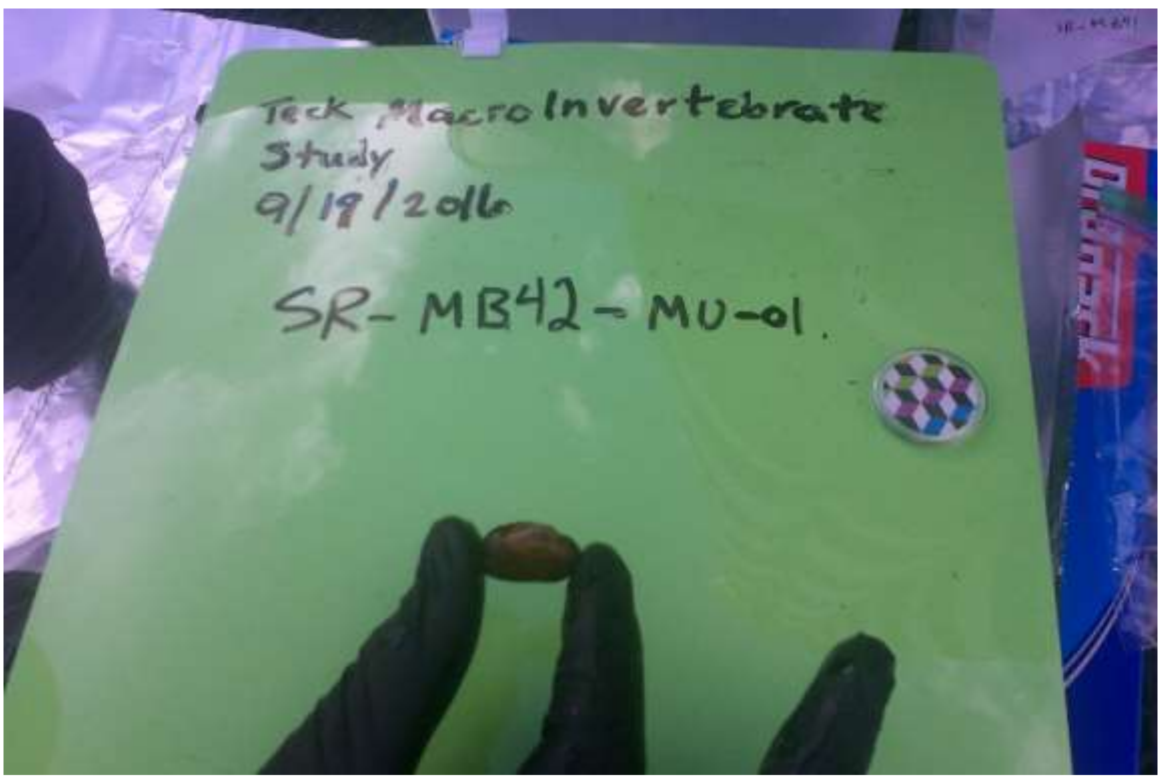
Sample Id: **SR-MB42-MU-01**

Collection Date:	Sep 19, 2016
Collection Time:	13:30
Species Type:	MU
Species Name:	Margaritifera falcata

Measurement	Value	Unit of Measure
Length (total)	26.5	mm
Width	15.1	mm
Breadth	8.3	mm
Weight	2.5	g
Health	Live	none

Photos for Sample Id 'SR-MB42-MU-01'

File Name: SR-MB42-MU-01.JPG



Appendix J

AECOM

TASK HAZARD ASSESSMENT

Customer TAI	**Permit No.** —
Location Gifford Boat launch (A4) — UCR	**Job No.** 60517029
Description of Task Crayfish traps / underwater recon	**Date** 7 Sept. 2016

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Overwater work	slips, trips, falls		PFD		
loading boat	man overboard		3 points of contact		
	fire		stay seated fire extinguisher		
			hand gear over first aid kit		
Crayfish trap setting	pinch points		wear gloves		
	cutting bait		" "		
underwater camera recon					
drive to/from boat launch	Deer strike		Scan for deer		
			wear seat belt		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Jennifer Pretare (Print Name) — [signature] (Signature)

Supervisor Jennifer Pretare (Print Name) — [signature] (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Jennifer Pretare	
Mike Duffield	
Ed Sloan	
Eric Weatherman	CNI
J Weatherman	CNI
	AECOM
	CH2M

Emergency Meeting / Assembly Area.

Colville NH - Carmel Hospital

Emergency Contact #

Emergency Radio Channel

16

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Jennifer Pretare

Signature

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck	Permit No.
Location Gifford Campground Boat Launch	Job No.
Description of Task Crayfish Sampling	Date 9/8/2016

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Crayfish Sampling	Heat Stress	LH	Sunblock, stay hydrated	1	LH
	Slips, Trips, Falls	LH	Be alert, allow workspace	1	LH
			for trap retrieval, deployment		
	Nausea	LH	Break up time spent	1	LH
			watching video of underwater		
			rover		
Rover operation	pinch points & cable		use gloves if assisting	2	LH
			with rover &		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Linda Howard
Print Name
Signature

Supervisor Jennifer Pretare
Print Name
Signature

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Linda Howard	AECOM
Jenny Pretare	AECOM
Matt Mayry	SH2M
Ed Sloan	Ed
J Weatherman	CNI
Eric Weatherman	CNI
Mike Duffin	Granty

Emergency Meeting / Assembly Area

Mt Carmel Hospital

Emergency Contact #

AECOM Incident Reporting Line

Emergency Radio Channel

16

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) ______________________

Signature ______________________

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break — Initial

Lunch Break — Initial

Second Break — Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck America, Inc.	**Permit No.**
Location UCR A4 Sampling Area - Gifford	**Job No.**
Description of Task Crayfish & Mussel Sampling	**Date** 9/9/2016

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Collect crayfish traps	slips, trips, falls	2	Keep workspace clear	1	
			housekeeping		
Operate underwater	pinch points, hand injuries	2	be aware of pinch points,	1	
camera rover			wear gloves		
View underwater	video monitor can move	4	secure monitor	2	
video	in high wind, wave &	4			
	hit someone			2	
	nausea from watching video	2	break up into 30 min segments	1	
	to long				
	high wind/waves	~~2~~ 4		~~1~~ 2	
			will take shelter if high		
	Friday - more boating		wind/waves arise		
	traffic	3	be aware - safe distance	1	
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Linda Howard
Print Name
Signature

Supervisor Jennifer Pretare
Print Name
Signature [signature]

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Mike Duffield	Gravity
Dan Smith	C.W.I.
J Weatherman	C.W.I.
Rae Toller	GRAVITY
Jim	AECOM
	CH2M
Linda M Hamal	AECOM

Emergency Meeting / Assembly Area

Gifford Campground

Emergency Contact #

1-800-348-5046

Emergency Radio Channel

VHF 16

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) ____________________

Signature ____________________

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer	**Permit No.**
Location UCR A-3 Sampling Area	**Job No.**
Description of Task Crayfish Sampling & Mussel Recon	**Date** 9/10/2016

Basic Task Steps (explain how the task will be carried out)	**Hazards** (identify all hazards and potential hazards)	**Risk** (initial)	**Precautions** (describe how that hazard will be controlled)	**Risk** (final)	**Initials**
Deploy Crayfish Traps	Weather - heat stress	4	stay hydrated, sunblock	2	
Mussel Recon with rover	Wind / waves				
Pull Crayfish traps	underwater terrain	4	go slow, maintain 3 points	2	
Process crayfish	risk to camera		of contact in boats		
	risk of catching camera				
	on rocks, stumps				
Tear down	fatigue	4	all pitch in for tear	2	
			down		
Saturday - increased	collision, more waves	4	be aware, 3 points of	2	
recreational boats			contact, respect public		
			use of boat launch		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Linda M. Hayward
Print Name — Signature

Supervisor Jennifer Pretare
Print Name — Signature [signature]

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Linda Howard	AECOM
Mike Duffield	Gravity
Jenny a Pr	AECOM
J Weatherman	CNI
[illegible]	CH2M
[illegible]	GRAVITY
Dan Smith	C.N.

Emergency Meeting / Assembly Area

Mt Carmel Hospital - Colvill

Emergency Contact #

1-800-348-5046

Emergency Radio Channel

VHF 16

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
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	People	Property Damage	Environmental Impact	Public Image/Reputation
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Occasional	May occur during the task/activity	1/100
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Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Jennifer Pretare

Signature Jenny a Pr

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer	Permit No.
Location UCR A3 sample area, Hayes Island	Job No.
Description of Task Crayfish Sampling mussel recon	Date 9/11/2016

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Pull & check Traps, Reset	weather: heat stress	4	stay hydrated, sunblock	2	
Process crayfish	rain, wind		cabin gets hot so may need		
View underwater	underwater terrain	6	to step outside, take breaks	3	
camera	@ Hayes Island, risk	–	boat will go slow, 3 pts		
	of catching camera		of contact, secure items		
	on rocks & stumps		overhead		
Recreational boat	collision, waves		3 pts, stay alert!		
traffic					
Boat work	CO_2 from boat idling		Shut off engine for		
			prolonged periods of idling		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Linda M. Howard

Print Name — Signature

Supervisor Jennifer Pretare — [signature]

Print Name — Signature

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print)	SIGNATURE
Dan Smith	C.W.
Matt Mayry	[illegible]
J Weatherman	CWI
[illegible]	GRAVITY
Mike Duffield	Gravity
[illegible]	AECOM
Jen [illegible]	AECOM

I participated in the development and understand the content of this Task Hazard Assessment.

Emergency Meeting / Assembly Area

Mt. Carmel Hospital

Emergency Contact #

1-800-348-5046

Emergency Radio Channel

VHF 16

Risk Rating Matrix

Probability	Severity				
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5-Frequent	25	20	15	10	5
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	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
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Probable	Likely to occur during task/activity	1/10
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Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Jennifer Pestare

Signature Jen [illegible]

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer	**Permit No.**
Location WCR A-3 Sampling Area / Kettle Falls	**Job No.**
Description of Task Crayfish & mussel collection	**Date** 9/12/2016

Basic Task Steps (explain how the task will be carried out)	**Hazards** (identify all hazards and potential hazards)	**Risk** (initial)	**Precautions** (describe how that hazard will be controlled)	**Risk** (final)	**Initials**
Pull Crayfish Traps	Slips, trips, Falls; hand injuries	2	Be alert, housekeeping - Keep	1	LH
	Weather - heat stress	2	workspace clear	1	LH
Process crayfish	wind, waves		Hydrate, sunblock		
			3 points of contact		
Mussel Recon	Camera catching on rocks,	6	Secure overhead gear	3	LH
	Stumps - Falls, gear		boat will move slow		
	Falling				
	Fatigue after being	4	Take time, be alert & deliberate	2	LH
	out for 6 days				
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Linda Howard (Print Name) [signature] (Signature)

Supervisor Jennifer Preston (Print Name) [signature] (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Ree Lide	GRAVITY
Matt Mayr	CH2M
Mike D...	...
Eric Weatherman	CNI
Dan Smith	CNI
...	AECOM
... M. Howard	AECOM

Emergency Meeting / Assembly Area

Mt. Carmel

Emergency Contact #

1-800-348-5046

Emergency Radio Channel

VHF 16

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
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	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
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Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
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Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Jennifer Pretare

Signature

VISITOR SIGN ON

NAME (Please Print) SIGNATURE TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck	**Permit No.**
Location WCR A-1 Sampling Area - Northport	**Job No.**
Description of Task	**Date** 9/13/2016

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Deploy boats/onboarding	fall hazards, pinch points		heed boat onboarding procedures		
wet dock — load gear	from launch rather than dock		hand gear to boat crew then		
offload mussel beach	fall hazard, pinch points		board as instructed, be deliberate		
sampling team			debark from boat as instructed		
search beach & wadeable	slips, trips, falls, wading		wading up to knees only, walk		
water for mussels	in water, mud		against current, check substrate		
process mussels on			for debris or mud hazards & avoid		
boat			stay within arms reach of		
other team on boat will	wind, waves, traps &		partner while in water, avoid		
set crayfish traps	ropes - trip hazard		steep eroding shoreline, buddy		
~~process cray~~			system - stay within speaking of group		
pickup mussel beach			or visual distance, radio		
team & conduct	motion sickness from		or cell phone check		
underwater camera	watching video on boat		→ take breaks from viewing		
mussel monitoring	camera catching on rocks,		camera, maintain 3 pts		
	wood, gear falling		of contact, secure overhead		
~~weath~~			gear, watch out for each other		
	weather: cold, heat, waves		layers, sunblock	**Highest Risk Index**	

monitor cold or heat stress and get out of weather as needed

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Linda Howard (Print Name) Linda M Howard (Signature)

Supervisor Jennifer Pretare (Print Name) [signature] (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Mike Duffield	M Brouty
Dan Smith	C.N.I.
John Toll	J Toll
Kathryn Cense	Katty Cense
Russ Bevill	Russ Bevill
Jenny Pretak	Jenny
Rene Trudeau	R Trudeau

Emergency Meeting / Assembly Area

mt. Carmel Hospital

Emergency Contact #

1-800-348-5046 AECOM

Emergency Radio Channel

VHF 16

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
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Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
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Probability		
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Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Jennifer Pretak

Signature Jenny

VISITOR SIGN ON

NAME (Please Print) SIGNATURE TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck	Permit No.
Location UCR A-1 Sampling Area – Northport	Job No.
Description of Task	Date 9/14/2016

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Travel from Colville to Northport + return	Other drivers, wildlife, children + School buses		Defensive driving, watch speed, take turns driving, stop for buses.		
Deploy boats – load + unload gear @ dock	Slips, trips, falls. – Fall in water Boat creep / movement.		Three points of contact, exit boat at oblique angle, watch for tripping hazards. Watch boat creep.		
Search beaches/shore for mussels. Process mussels on beach.	Slips, trips, falls. Slippery rocks, loose sand, debris, glass, metal, + other sharp objects. Heat.		Walk slowly, test depth of mud, look for sharp objects, place feet carefully. Take breaks as needed. Drink fluids, use sunscreen.		
Process crayfish on boat. Set + check crayfish traps.	Posture, heat		Take time, avoid too much sun, watch posture		
Underwater camera monitoring + GPS	Motion sickness, fatigue, heat Watch step for gear		Take breaks, share tasks, watch step.		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Russ Bevill (Print Name) Russ Bevill (Signature)

Supervisor Linda Howard (Print Name) Linda M Howard (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print)	SIGNATURE
I participated in the development and understand the content of this Task Hazard Assessment.	
Mike Duffield	Gravity
Dan Smith	C.W.I.
Eric Weatherman	CNI
Rene Fall	GRAVITY
Linda Howard	AECOM
Katlyn Cerise	ERA

Emergency Meeting / Assembly Area

Mt. Carmel Hospital

Emergency Contact #

1-800-348-5046 AECOM

Emergency Radio Channel

VHF 16

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Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Linda Howard

Signature Linda M. Howard

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME
John Toll	J. Toll	8:00

Task Hazard Assessment Follow-Up/Review.

First Break — Initial

Lunch Break — Initial

Second Break — Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck	Permit No.
Location UCR A1 Sampling Area Northport	Job No.
Description of Task Cray Fish + Mussel Collection	Date 9/15/16

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Pull Cray Fish Traps	Slips Trips + Falls		Step Carefully 3 point Contact		
	Lots of small Boats on the water		Be Aware		
	Bow Creep		Step Away from the Boat		
Beach Surveys	Rock are wet + slimy		~~Bere~~ Be Careful of Rocks		
	Communications		+ Metal / Radio Checks every		
			30 minutes		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Originator ______________ Print Name ______________ Signature

Supervisor ______________ Print Name ______________ Signature

Risk Matrix on Reverse

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print)	SIGNATURE
David Hosz/AECOM	David R. Hosz
Mike Duffield Gravity	[illegible]
René Trudeau GRAVITY	[illegible]
Dan Smith	C.N.I.
Rachel Zajac-Fay	R Zajac-Fay
Eric Weatherman	CNI
Russ Bevill	Russ Bevill AECOM
Jeff Walker	[illegible]

I participated in the development and understand the content of this Task Hazard Assessment.

Risk Rating Matrix

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Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) ______________________

Signature ______________________

Emergency Meeting / Assembly Area

Emergency Contact #

Emergency Radio Channel

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck	Permit No.
Location VCR MIS Area A1	Job No.
Description of Task Pull Cray Fish Traps + Conduct Beach Surveys	Date 9/16/16

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Pull Fish Traps	Pinch Points, Unstable Boat		Don't Inhale when you Hit The Water		
	deck, Traveling on The water				
	Human Overboard				
Beach Surveys	Traversing wet Slippery				
	Rocks				
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator David Hoske (Print Name) David Ri[illegible] (Signature)

Supervisor ____________ (Print Name) ____________ (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print)	SIGNATURE
David R. Host	[signature]
Rachel Zajac-Fay	[signature]
Dan Smith	C, N. I
Russ Bevill	[signature] AECOM
John Schaefer	[signature]
Greg Weatherman	CNI
Jeff Walker	[signature]
Mike Duffield	Gravity

I participated in the development and understand the content of this Task Hazard Assessment.

Emergency Meeting / Assembly Area

Boat Dock

Emergency Contact #

Emergency Radio Channel

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences

	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability

Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name)

Signature

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer TeckTAL	**Permit No.**
Location Lake Roosevelt	**Job No.**
Description of Task Camera Surveys at A6	**Date** 9/17/16

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
On water Bottom Camera Surveys	All Boat Related Issues		Be Aware of your Team Mates		
			Three Point Contact at All Times		
	Carbon Monoxide exposure if traveling with wind		Don't Block Accesspoints		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator David Hose (Print Name) — David R. Hose (Signature)

Supervisor ____________ (Print Name) — ____________ (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
David Hose AECOM	David R. Hose
Mike Duffield Gravity	[signature]
J. WEATHERMAN CNI	J. Weatherman
John Schafer	[signature]
Jeff Walker	[signature]
Eric Weatherman	CNF
Rachel Zajac Fay	R Zajac Fay
Russ Bevill	Russ Bevill

Emergency Meeting / Assembly Area

Kollen Boat Launch / ~~Spring Canyon~~ Crescent Bay

Emergency Contact #

Emergency Radio Channel

Lincoln County Hospital is Closest

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) ____________________

Signature ____________________

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck American	**Permit No.**
Location Sanpoil River	**Job No.**
Description of Task Setting Cray Fish Traps	**Date** 9/18/16

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Beach Surveys	~~Hick~~ Hiking Through Brush		Boots with Pants Tucked in		
	Working River		Shirts ~~Tucked~~ in Tucked in		
	Ticks Hunters		Tick Checks, Remove Long-sleeved		
Cray Fish Trap Deployment	Same		Shirts Before Entering Cars		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator David Hose (Print Name) [signature] (Signature)

Supervisor ______ (Print Name) ______ (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print)	SIGNATURE
David Hose AECOM	David R. Hose
Jeff Waller	[illegible]
John Schaefer	[illegible]
Russ Bevill	Russ Bell
Rachel Zapata Fay	R Zapata Fay
Mike Duffield	Granity

I participated in the development and understand the content of this Task Hazard Assessment.

Emergency Meeting / Assembly Area

Pullout By Bridge

Emergency Contact #

Emergency Radio Channel

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) David R. Hose

Signature

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break — Initial

Lunch Break — Initial

Second Break — Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck American Inc.	**Permit No.**
Location Sandpoil River	**Job No.**
Description of Task Checking Crayfish Traps / Bead Surveys	**Date** 9/19/16 and 9/20/16

Basic Task Steps (explain how the task will be carried out)	**Hazards** (identify all hazards and potential hazards)	**Risk** (initial)	**Precautions** (describe how that hazard will be controlled)	**Risk** (final)	**Initials**
Bead Surveys and	Slippery Rocks, Black Bears		~~Poor~~ Step Carefully when in water		
Cray Fish Retrievals	Local Vehicular Traffic, Posion Oak		Be Aware when Crossing The Road,		
	occasional ~~Sh~~ Snake, and Ticks		Do not sit in The grass, Don't shake		
			Tree Limbs, Tuck in Pant Legs and		
			shirts at The waste		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator David R. Hose — Print Name; [signature] — Signature

Supervisor ______ Print Name; ______ Signature

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
David R. Hose AECOM	David R. Hose
Mike Duffield Gravity	
John Schaefer Gravity	
Russ Bevill	Russ Bevill
Rachel Zayac Fay	R Zayac Fay
Jeff Walker	
09/20/16	
David R. Hose AECOM	David R. Hose
Mike Duffield Gravity	
Russ Bevill	Russ Bevill
Jeff Walker	
John Schaefer	
Rachel Zayac Fay	R Zayac Fay

Emergency Meeting / Assembly Area

At Bridge

Emergency Contact #

Emergency Radio Channel

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences

	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability

Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) ____________________

Signature ____________________

VISITOR SIGN ON

NAME (Please Print) SIGNATURE TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck American	Permit No.
Location Crescent Harbor	Job No.
Description of Task Underwater Camera Survey	Date 9/21/16

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Slow Speed Camera Survey	Eye Strain, Sun Burn,		Be aware of Co-workers condition		
	Ferry Boat Wake, Watch over		Take Breaks		
	head				
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator David Hose (Print Name) David R. Hose (Signature)

Supervisor ____________ (Print Name) ____________ (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
David Hose / AECOM	David R. Hose
John Schaefer / Gravity	
J. WEATHERMAN GWC	J Weatherman
Eric Weatherman	Eric Weatherman
Rachel Zayn Fay	R Zayn Fay
Jeff Walker	
Russ Bevill	Russell Bevill
Mike Duffield	

Emergency Meeting / Assembly Area

Kollon Monunoa

Emergency Contact #

Emergency Radio Channel

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) ______________________

Signature ______________________

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break — Initial

Lunch Break — Initial

Second Break — Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Tuck American	Permit No.
Location 2-Rivers Boat Launch	Job No.
Description of Task Underwater Camera Surveys	Date 9/22/16

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Boating to survey area	changing weather conditions		Keep vigilant of water hazards;		
Driving to and from launch site	animals (deer); weather; sunshine on eyes		watch out for project team members		
Slow float with underwater camera	eye strain		take breaks		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator David R. Hoss — Print Name — [signature] Signature

Supervisor ____ Print Name ____ Signature

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Jeff Walker	[signature]
Rachel Zayne Fay	[signature]
Mike Duffield	
J WEATHERMAN CNI	J Weatherman
John Schaefer Gauth	[signature]
David Hose / David R Hose	AECOM
Eric Weatherman	CNI

Emergency Meeting / Assembly Area

Two Rivers Marina

Emergency Contact # Spokane Tribal Police

(509) 258-9119

Emergency Radio Channel

Lincoln County Memorial Hospital (Davenport)
(509) 725-7101

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) David R. Hose

Signature [signature]

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck American	Permit No.
Location 2 Rivers Boat Launch	Job No.
Description of Task Underwater Camera Surveys Area A5	Date 9/23/16

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Underwater Camera Surveys	Worker Exhaustion after 10 day		Watch out for your fellow workers		
	of on-water work				
	Eye Strain		Take Breaks after max 1 hour		
	slips Trips Falls		3-point contacts		
	overhead Hazards		watch Door jam		
	More Boat Traffic		Keep an eye out for Boats + wakes		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator David R. Hose (Print Name) — [signature] (Signature)

Supervisor ______ (Print Name) — ______ (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
David R. Hose / AECOM	David R. Hose
Mike Duffield	Gravity
Rachel Zayne	R. Zayne Fay
John Schaefer Gravity	
J. WEATHERMAN CNS	J. Weatherman
Eric Weatherman	Eric Weatherman
Jeff Walker	

Emergency Meeting / Assembly Area

2 Rivers Boat Launch

Emergency Contact #

Tribal Police

Emergency Radio Channel

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences

	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability

Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) David R. Hose

Signature David R. Hose

VISITOR SIGN ON

NAME (Please Print) SIGNATURE TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck	**Permit No.**
Location UCR - Macroinvert. Study. Northport, WA.	**Job No.** 60517029
Description of Task Collect macroinvert. / mussels	**Date** Wed., Sept. 28, 2016

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Travel to job site and return. Drive vehicles on Hwy 25/Williams Lake Rd.	People/children in road. Animals on road. Other drivers. Fatigue. Poor visibility.		Defensive driving. Watch for children @ bus stops. Watch for deer, turkey + other animals. Drive carefully + control speed. Buddy system.		
Load and unload gear and personnel at boat dock.	Slips, trips + falls on dock + boat. Lifting heavy gear.		Hand gear to others on boat. Do not trip on gear on dock. Use three points of contact.		
Enter/exit boat	Slips, trips + falls. Pinch points. Boat rise + fall.		Three points of contact, watch for ropes + other trip hazards. Step slowly. Exit front of boat on an angle.		
Collect Macroinvertebrate samples from river	Heat + sunburn. Pinch points. Fall in water. Sharp objects in water.		Wear sunscreen + long sleeves on boat. Drink water + other fluids. Watch hand placement around hardware.		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Russ Bevill (Print Name) Russell Bevill (Signature)

Supervisor Jennifer Pretare (Print Name) Jennifer Pretare (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Russ Bevill	Russ Bevill
Nancy Powers	Nancy Powers
Kris McCaig	Kris McCaig
Rob Pedersen	[illegible]
Rob Ray	[illegible]
Kris Leefers	[illegible]
Brent Richmond	[illegible]
Ed Sh	Ed [illegible]
J. Weatherman CNE	J Weatherman
E. Weatherman	" E Weatherman
Shawn Hinz	[illegible]
Chad Furulie	[illegible]
Mike Duffield	[illegible]
Glen Mejia	[illegible]
Jennifer Pretare	[illegible]

Emergency Meeting / Assembly Area

Northport Boat Launch

Emergency Contact #

1-800-348-5046 AECOM / 911

Emergency Radio Channel

VHF 16 /

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Jennifer Pretare

Signature [illegible]

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break — Initial

Lunch Break — Initial

Finished boating @ 1pm
Lunch @ boat dock

Second Break — Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck	**Permit No.**
Location UCR - Macroinvert. Study - Kettle Falls, WA	**Job No.** 60517029
Description of Task Collect mussels with divers	**Date** Thurs., Sept. 29, 2016

Basic Task Steps (explain how the task will be carried out)	**Hazards** (identify all hazards and potential hazards)	**Risk** (initial)	**Precautions** (describe how that hazard will be controlled)	**Risk** (final)	**Initials**
Travel to job site and return. Multiple vehicles driven on Hwy 25/395.	People/children in road. Other drivers. Animals in road. Fatigue/poor visibility.		Drive defensivly. Watch for children at bus stops. Stop for buses. Avoid animals. Control speed. Buddy system.		
Load and unload gear and personnel @ boat dock	Lifting heavy objects. Tripping on gear. Slips + falls.		Hand gear to others on boat. Walk slowly. Wear floatation device.		
Enter/exit boat	Slips, trips, falls. Pinch points.		Use three points of contact. Avoid putting hands + feet between boat and dock, or other boat.		
Collect mussels and process mussels on boat	Fall in water. Sharp objects in water. Pinch points. Heat and sunburn.		Step slowly when working on boat. Avoid objects on floor of boat. Wear sunscreen or long sleeves. Drink fluids. Watch hand placement.		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Russ Bevill (Print Name) — Russell Bevill (Signature)

Supervisor Jennifer Pretare (Print Name) — (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Russ Bevill	Russ Bevill
J. WEATHERMAN CWI	J Weatherman
E. Weatherman	Eric Weatherman
B Richmond	[illegible]
Kris Leefers	[illegible]
Rob Pedersen	[illegible]
Rob Rau	[illegible]
GLEN MEJIA	[illegible]
Mike Duffield	[illegible]
Chad Furulie	[illegible]
Jennifer Pretare	Jenn

Emergency Meeting / Assembly Area

Kettle Falls Boat Launch

Emergency Contact #

911 / 1-800-348-5046 AECOM

Emergency Radio Channel

VHF 16 / Handheld 05a

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Jennifer Pretare

Signature Jenny a Pr

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck	**Permit No.**
Location UCR - Gifford, WA	**Job No.**
Description of Task Mussel collection w/ divers	**Date** 9/30/2016

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Travel to job site and return	Other drivers, people in road, animals in road, poor visibility, wet road surface		Buddy system, defensive driving, control speed.		
Load gear @ docks	Slips, trips + falls, Lifting heavy gear		Buddy system, hand gear to others on boat, walk slowly. Wear		
Enter/exit boats	Slips, trips + falls, pinch points. Boat uplift/movement		flotation device. Watch for trip hazards.		
Collect and process mussels.	Fall in water.		Wear sunblock, long sleeves, watch for tripping on objects,		
	Sunburn, heat, hunger, thirst, pinch points. Bad weather - thunder/Lightning, wind + waves.		drink fluids, take breaks. Avoid rain/thunder/lightning Stay dry - stay inside		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Russ Bevill (Print Name) Russ Bevill (Signature)

Supervisor Jennifer Pretare (Print Name) [signature] (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print)	SIGNATURE
Russ Bevill	Russ Bevill
Mike Duffield	
B Richmond	
J. Weatherman CNI	J Weatherman
H. Weatherman CNI	H Weatherman
Chad Furulic	
K Leefers	
Rob Ray	
Rob Pederson	
Eric Weatherman CNI	E Weatherman
GLEN MEJIA	
Jennifer Pretare	

I participated in the development and understand the content of this Task Hazard Assessment.

Emergency Meeting / Assembly Area

Gifford boat launch

Emergency Contact #

911

Emergency Radio Channel

VHF 16 / Handheld 5

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences

	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability

Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Jennifer Pretare

Signature

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break	Initial

Lunch Break	Initial

Second Break	Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck - UCR Macroinvert.	**Permit No.**
Location Lake Roosevelt - A6	**Job No.**
Description of Task Mussel collection by divers	**Date** 10/1/2016

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
Travel to and from job site	Other drivers, people and animals in road, poor visibility		Drive defensively, control speed for conditions		
Launch boats/Load and unload gear @ dock	Slips, trips + falls, heavy gear, moving vehicles		Walk slowly, watch for tripping hazards, buddy system loading gear.		
Enter/exit boat	Pinch points, moving boats		Watch step, use three points of contact, wear pfd.		
Collect and process mussels	Heat, sunburn, slips, trips, + fall, fall in water, pinch points.		Drink fluids, use sunscreen + long sleeves, dress for cold		
Boat travel	Wood debris in water		Passengers help captain watch for debris		
Moving on boats	Low door thresholds		Duck and watch hitting head on door frame.		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Russ Bevill (Print Name) — Russ Bevill (Signature)

Supervisor Jennifer Pretare (Print Name) — [signature] (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Russ Bevill	Russ Bevill
Rob Rau	[illegible]
Rob Pedersen	[illegible]
Mike Duffield	[illegible]
GLEN MEJIA	[illegible]
K. Leefers	[illegible]
B Richmond	[illegible]
E. Weatherman CNI	E Weatherman
J. Weatherman CNI	J Weatherman
Chad Fuculic	[illegible]
Jenny Pretare	[illegible]

Emergency Meeting / Assembly Area

Crescent Bay Boat Launch or Keller Ferry Launch

Emergency Contact #

911/

Emergency Radio Channel

VHF 16 / Handheld 5a

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

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5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Jennifer Pretare

Signature [illegible]

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break	Initial

Lunch Break	Initial

Second Break	Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck - UCR Macroinvert.	**Permit No.**
Location Area 5 - Lake Roosevelt / Ft. Spokane	**Job No.**
Description of Task Mussel Collection by EPA divers	**Date** 10/2/2016 - Sunday

Basic Task Steps (explain how the task will be carried out)	**Hazards** (identify all hazards and potential hazards)	**Risk** (initial)	**Precautions** (describe how that hazard will be controlled)	**Risk** (final)	**Initials**
Travel from motel to job site and return.	People + animals in road. Other drivers. Poor visibility.		Keep windshield clean, drive defensively, control speed according to conditions, use buddy system.		
Launch boats/Load gear at docks.	Be cautious of moving vehicles, slips, trips + falls, Heavy gear, obstacles on dock.		Watch traffic, step carefully, hand gear to others on boat, drive heavy gear to boat and drop off.		
Enter + exit boats	Pinch points between boats and dock, moving boats.		Watch hand + foot placement, wear flotation device. Use three points of contact.		
Collect mussels and process mussels.	Sunburn, heat, fatigue, thirst, pinch points, low door thresholds, Fall in water		Wear long sleeves, use sunblock, drink plenty of fluids, watch hitting head on door frame, walk slowly + carefully.		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Russ Bevill
Print Name
Signature

Supervisor Jennifer Pretare
Print Name
Signature

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Russ Bevill	Russ Bevill
E. Weatherman	E. Weatherman
J. Weatherman cwr	J Weatherman
B Richmond	
K. Leefers	K. Lf
Rob Pedersen	E Rob
Rob Bau	
Chad Furulie	
Jennifer Pretare	
Mike Duffield	
GLEN MEJIA	

Emergency Meeting / Assembly Area

Ft. Spokane boat launch

Emergency Contact #

911 /

Emergency Radio Channel

VHF 16 / Handheld 5a

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

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5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences

	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability

Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Jennifer Pretare

Signature

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer	Teck - UCR Macroinvert.	**Permit No.**	
Location	Lake Roosevelt - China Bend - A2	**Job No.**	
Description of Task	Crayfish trap deployment	**Date**	10/4/2016

Basic Task Steps (explain how the task will be carried out)	**Hazards** (identify all hazards and potential hazards)	**Risk** (initial)	**Precautions** (describe how that hazard will be controlled)	**Risk** (final)	**Initials**
Travel from Colville to China Bend boat launch	animals crossing road		~~alert~~ alert driver of hazards passenger, pull over for emergency vehicles Signal team driving behind of turkeys in road, etc		
Launch boats, load/unload gear at dock	Slips, trips, falls, heavy gear		be aware of each step, move slowly		
enter/exit boat	~~B~~ boat stability, pinch points		3 points of contact at all times, hand over equipment to deckhand - don't carry on		
Deploy crayfish traps	ropes, Cluttered deck				
Boat travel	Wood debris in water		Watch water for hazards and alert Captain		
Moving on boats	~~wa~~ slips, trips, falls low door ~~thre~~ threshold		3 points of contact, ensure storage is secure, watch headspace		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator Michelle Stegner Print Name [signature] Signature

Supervisor [signature] Print Name Signature

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print) SIGNATURE

I participated in the development and understand the content of this Task Hazard Assessment.

NAME (Please Print)	SIGNATURE
Michelle Stegner	
Glen McJr	
Mike Duffield	
J Weatherman CWI	J Weatherman
E Weatherman " "	E Weatherman
E [illegible]	

Emergency Meeting / Assembly Area

China Bend boat launch

Emergency Contact #

911

Emergency Radio Channel

VHF 16 / Handheld 5A

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
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Risk Rating (Probability x Severity)	Risk Acceptance Authority
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10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences

	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability

Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) Michelle Stegner

Signature

VISITOR SIGN ON

NAME (Please Print) SIGNATURE TIME

Task Hazard Assessment Follow-Up/Review.

First Break Initial

Lunch Break Initial

Second Break Initial

AECOM

TASK HAZARD ASSESSMENT

Customer Teck American	Permit No.
Location China Bend Boat Launch	Job No. 60517029.01
Description of Task Checking Crayfish Traps Area A2	Date ~~01~~ 10-05-16

Basic Task Steps (explain how the task will be carried out)	Hazards (identify all hazards and potential hazards)	Risk (initial)	Precautions (describe how that hazard will be controlled)	Risk (final)	Initials
On Water Boat Work	Person overboard		Follow all Directions Given By		
			Boat Crew During Retrieval		
Trap Retrieval	Pinch Points, unstable surfaces		Retain 3-points of contact		
	Wet work surfaces		at all Times, Do not move		
			about boats while under way		
housekeeping	trips over ropes, bouys				
	slips on dock		Keep equipment organized		
			Highest Risk Index		

Review and attach to Tailgate Meeting as required. Number and attach additional pages if necessary.

Worker/Visitor acknowledgement and review of this content on back of this document.

Risk Matrix on Reverse

Originator David R. Nose (Print Name) — David R. Nose (Signature)

Supervisor ____________ (Print Name) — ____________ (Signature)

THIS FORM IS TO BE KEPT ON JOB SITE.

AECOM

TASK HAZARD ASSESSMENT

WORKER SIGN ON

NAME (Please Print)	SIGNATURE
Michelle Stegner	[signature]
SPL	
Eric Weatherman CNF	Eric Weatherman
J. Weatherman CNF	J. Weatherman
David R. Hose AECOM	David R. Hose
Mike Duffield	[signature]

I participated in the development and understand the content of this Task Hazard Assessment.

Emergency Meeting / Assembly Area

China Bend Boat Launch

Emergency Contact #

911

Emergency Radio Channel

Risk Rating Matrix

Probability	Severity				
	5-Catastrophic	4-Critical	3-Major	2-Moderate	1-Minor
5-Frequent	25	20	15	10	5
4-Probable	20	16	12	8	4
3-Occasional	15	12	9	6	3
2-Remote	10	8	6	4	2
1-Improbable	5	4	3	2	1

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/ Supervisor & Safety Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & Safety Director

Severity – Potential Consequences

	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability

Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unlikely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Area is safe and housekeeping completed at the end of task/shift.

Supervisor (print name) ______________________

Signature ______________________

VISITOR SIGN ON

NAME (Please Print)	SIGNATURE	TIME

Task Hazard Assessment Follow-Up/Review.

First Break — Initial

Lunch Break — Initial

Second Break — Initial

Appendix K

Table K-1. Personnel for Macroinvertebrate Tissue Study, by Date.

Date	Location	AECOM Staff	Gravity Staff	Columbia Navigation Inc. Staff	EPA Observer	Visitor(s)
9-7-16	A4	Jennifer Pretare, Linda Howard	Mike Duffield, Shawn Hinz, Ed Sloan	Eric Weatherman, Josh Weatherman	Matt Mayry	
9-8-16	A4	Jennifer Pretare, Linda Howard	Mike Duffield, Ed Sloan	Eric Weatherman, Josh Weatherman	Matt Mayry	
9-9-16	A4	Jennifer Pretare, Linda Howard	Mike Duffield, Rene Trudeau	Josh Weatherman, Dan Smith	Matt Mayry	
9-10-16	A3	Jennifer Pretare, Linda Howard	Mike Duffield, Rene Trudeau	Josh Weatherman, Dan Smith	Matt Mayry	
9-11-16	A3	Jennifer Pretare, Linda Howard	Mike Duffield, Rene Trudeau	Eric Weatherman, Dan Smith	Matt Mayry	
9-12-16	A3	Jennifer Pretare, Linda Howard	Mike Duffield, Rene Trudeau	Eric Weatherman, Dan Smith	Matt Mayry	
9-13-16	A1	Jennifer Pretare, Linda Howard, Russ Bevill	Mike Duffield, Rene Trudeau	Eric Weatherman, Dan Smith	Kathy Cerise	John Toll, Windward
9-14-16	A1	Jennifer Pretare, Linda Howard, Russ Bevill	Mike Duffield, Rene Trudeau	Eric Weatherman, Dan Smith	Kathy Cerise	John Toll, Windward
9-15-16	A1	Dave Hose, Jeff Walker, Russ Bevill	Mike Duffield, Rene Trudeau	Eric Weatherman, Dan Smith	Rachel Zajac-Fay	
9-16-16	A1	Dave Hose, Jeff Walker, Russ Bevill	Mike Duffield, John Schaefer	Eric Weatherman, Dan Smith	Rachel Zajac-Fay	
9-17-16	A6	Dave Hose, Jeff Walker, Russ Bevill	Mike Duffield, John Schaefer	Eric Weatherman, Josh Weatherman	Rachel Zajac-Fay	
9-18-16	Sanpoil River	Dave Hose, Jeff Walker, Russ Bevill	Mike Duffield, John Schaefer	-	Rachel Zajac-Fay	
9-19-16	Sanpoil River	Dave Hose, Jeff Walker, Russ Bevill	Mike Duffield, John Schaefer	-	Rachel Zajac-Fay	
9-20-16	Sanpoil	Dave Hose, Jeff	Mike Duffield, John	-	Rachel Zajac-Fay	

Table K-1. Personnel for Macroinvertebrate Tissue Study, by Date.

Date	Location	AECOM Staff	Gravity Staff	Columbia Navigation Inc. Staff	EPA Observer	Visitor(s)
	River	Walker, Russ Bevill	Schaefer			
9-21-16	A6	Dave Hose, Jeff Walker, Russ Bevill	Mike Duffield, John Schaefer	-	Rachel Zajac-Fay	
9-22-16	A5	Dave Hose, Jeff Walker, Russ Bevill	Mike Duffield, John Schaefer	Eric Weatherman, Josh Weatherman	Rachel Zajac-Fay	
9-23-16	A5	Dave Hose, Jeff Walker, Russ Bevill	Mike Duffield, John Schaefer	Eric Weatherman, Josh Weatherman	Rachel Zajac-Fay	
9-24-16	NO FIELD WORK					
9-25-16						
9-26-16						
9-27-16						
9-28-16	A1	Jennifer Pretare, Glen Mejia, Russ Bevill	Mike Duffield, Shawn Hinz, Chad Furulie, Ed Sloan	Eric Weatherman, Josh Weatherman	Rob Pederson, Rob Rau, Kris Leefers, Brent Richmond	Kris McCaig, Teck Nancy Judd, Windward
9-29-16	A3	Jennifer Pretare, Glen Mejia, Russ Bevill	Mike Duffield, Chad Furulie	Eric Weatherman, Josh Weatherman	Rob Pederson, Rob Rau, Kris Leefers, Brent Richmond	
9-30-16	A4	Jennifer Pretare, Glen Mejia, Russ Bevill	Mike Duffield, Chad Furulie	Eric Weatherman, Josh Weatherman	Rob Pederson, Rob Rau, Kris Leefers, Brent Richmond	Cameron Weatherman
10-1-16	A6	Jennifer Pretare, Glen Mejia, Russ Bevill	Mike Duffield, Chad Furulie	Eric Weatherman, Josh Weatherman	Rob Pederson, Rob Rau, Kris Leefers, Brent Richmond	
10-2-16	A5	Jennifer Pretare, Glen Mejia, Russ Bevill	Mike Duffield, Chad Furulie	Eric Weatherman, Josh Weatherman	Rob Pederson, Rob Rau, Kris Leefers, Brent Richmond	
10-3-16	NO FIELD WORK					
10-4-16	A2	Dave Hose, Glen Mejia, Michelle	Mike Duffield, Ed Sloan	Eric Weatherman, Josh Weatherman	-	

Table K-1. Personnel for Macroinvertebrate Tissue Study, by Date.

Date	Location	AECOM Staff	Gravity Staff	Columbia Navigation Inc. Staff	EPA Observer	Visitor(s)
		Stegner				
10-5-16	A2	Dave Hose, Glen Mejia, Michelle Stegner	Mike Duffield, Ed Sloan	Eric Weatherman, Josh Weatherman	-	

MADE IN TACOMA
— SINCE 1916 —
Rite in the Rain®
= DEFYING MOTHER NATURE =

Tieton Logbook 2

Name AECOM
Project Manager – Jennifer Pretare

Address 1111 3rd Ave, Suite 1600
Seattle, WA 98101

Phone 206-438-2700 ; 510-681-6401
Email

Projects Teck American, Inc
Macroinvertebrate Tissue Study
Upper Columbia River, WA
Spring 2016
Fall 2016

Lake level 1-800-824-4916

September 7, 2016 Linda Howard

Lake level: 12~~8~~78

Weather: Partly cloudy, 60°F Duffield

Tieton: Shawn Hinz, Mike Ketty, Ed Sloan, J. Pretare, L. Howard

Safety Boat: Eric Weatherman, Josh Weatherman

EPA monitor: Matt Mayry (CH2M)

8:42 Introductions on dock at Gifford Campground boat launch

8:45 Kick off - J. Pretare

H & S Plan, Permits, GPS & Data collection, Cultural monitor - not here today - no onshore work until Sept 12 when CCT cultural monitor arrives, QAPP Addendum - major changes - bait salmon only, traps set individually, check traps 2x daily, mussel recon w/ camera rover

9:05 H & S - E. Weatherman

VHF Emergency channel 16

9:35 Launching boats & preparing bait & crayfish traps

10:25 Depart dock for A-4

10:40 Setting crayfish traps

10:41 A4 CT 31

10:45 A4 CT 32

10:46 A4 CT 33

10:54 A4 CT 34

10:58 A4 CT 35

11:00 A4 CT 36

A4 CT 37

A4 CT 38

A4 CT 39

11: A4 CT 40

11:42 A4 CT 41

11:46 A4 CT 42

11:49 A4 CT 43

12:00 A4 CT 44

12:04 A4 CT 45

12:10 A4 CT 46

12:16 A4 CT 47

12:28 A4 CT 48

12:36 A4 CT 49

12:50 A4 CT 50

12:57 A4 CT 51

A4 CT 52

A4 CT 53

A4 CT 54

A4 CT 55

A4 CT 56

A4 CT 57

A4 CT 58

A4 CT 59

A4 CT 60

14:02 A4 CT 61

- End crayfish trap deployment

Pg 1

LH

Rite in the Rain

NSN: 7530-01-577-8866

Scale: 1 square = ______

Sept. 7, 2016 Pg 2 L. Howard

14:07 Finished setting crayfish traps.
return to dock to set up rover

14:46 Navigated to A4 mussel recon site at Bissel island

14:51 Deployed rover

14:52 Begin transect - start north and head south against the wind

15:22 End transect
Results: no mussels

15:50 Begin A4-T2
track
open shell
shell
transect crosses 2 ravines >60 ft)
trail?

16:20 End ~~A~~4-T2 transect Results - no mussels

16:44 Begin A4-T3
up to 65' depth
mussel
trail

17:14 End A4-T3 transect Results - 1 mussel

17:26 Begin A4-T4 transect
up to 75 ft deep

17:45 with cloud cover becoming difficult to see with rover camera

17:49 End A4 T4 transect
Results - no mussels

18:00 Arrived back at Gifford Campground Boat Launch

End Day LH. 18:01

[signature]
9-7-16

Scale: 1 square = ______

Sept. 8, 2016 Linda Howard, Jenny Pretare, Mike Duffield, Ed Sloan
Matt Maybry (EPA), Eric Weatherman, Josh Weatherman.

8:00 am arrive Gifford Campground Boat Launch
8:15 H&S briefing
8:30 head to A4 for crayfish trap retrieval
8:48 Check A4 CT 31
7 crayfish total - all Northern
redeploy trap at same location
8:56 check A4 CT 32
No crayfish
Reset trap at same location
8:58 check A4 CT 33
No crayfish - reset trap at same location
9:06 check A4 CT 34
10 crayfish - all Northern

Lake level
1278

0920 Processing Crayfish - JP+LH.

LH Calibrated Scales
Pesola Scale #1 ~~50~~ 20 gr. weight = 20 g.
with ziploc (sandwich size
and 10 g. weight + ziploc = 10 g.

LH decontaminated calipers

0929 Processed crayfish from A4-CT31 and
LH, ES, JP, MD A4-CT34

Data recorded on crayfish collection form
by JP. Completed processing at 1029. Samples
retained in cooler on wet ice.
Processed 7 crayfish from A4-CT31
" 10 crayfish from A4-CT34

1039 Checked A4. CT. 35 7 crayfish - all northern

1048 checked A4. CT. 36 12 crayfish - all northern

1138 - Processing crayfish A4-CT35 and A4-CT36

1222 finished processing crayfish. Processed only 4 crayfish from A4-CT36 and returning other ~~10~~ 8 per J. Pretare conversation with EPA. Jack who talked to EPA. Samples placed into cooler with ice

1255 A4-CT44 checked trap. 3 crayfish in trap. Returned to lake.

1310 Headed to rover transect location.

1320 Deployed rover and began A4 T5 mussel transect with rover. Stopped to untangle line.

1337 Redeployed rover @ A4 Inchelium site
1342 Start A4 T5
possible lim mussel - PM1
trail
mussel clusters
more mussel clusters

~~13~~ 1412 Stopped A4-T5.
Lots more mussels at Inchelium in comparison to Bissel Island. Recorded several clusters in the GPS. They are most clearly identifyable when lodged into the substrate vertically rather than horizontally

like this side ~~VB~~ View

1433 Switched to using the "drop camera" which is a single line (no sled). We will let the boat drift, no motor, over area where we saw the most mussels on T5.

1435 Started T6 @ Inchellium w/ drop camera. 53 ft depth. Stopped at 1441. Drop camera not nearly as clear as sled camera. It moved way too fast to see anything clearly.

Scale: 1 square = ______

1443. Going to try to put anchor out to make boat motionless. Then try drop camera again in area of mussel concentration.

1448 Deployed drop camera w/ boat stationary (but drifting + sailing a bit). We are going to record more GPS points for mussels here b/c they will be more accurate since we are right over them w/ GPS. Ended 1303.

We are ending ~~ED~~ underwater camera work and going to retrieve crayfish traps.

Tomorrow we will come back to Inchelium and try to narrow down the spatial location of mussels we saw today.

1520 – released 8 crayfish from this morning

1521: A4-CT52 – No crayfish. Retained trap on boat.
1523: A4 CT53 – No crayfish. " " " "
1526: A4-CT54 – " " " "
1529: A4-CT55 – 3 crayfish released. Traps on boat.
1532: A4-CT56 – 2 live crayfish + 1 that had been chewed in half & eaten by others (3 total)
1538: A4-CT57 – 2 crayfish, 1 very large. Weight taken just for fun. 94 grams. Took pictures w/ Jenny's personal camera
1545: A4-CT58 – 6 crayfish released. Trap retained on boat.
1550: A4-CT59 – no crayfish " "
1555. A4-CT60 – 1 crayfish " "
Rain started.
1557: A4-CT61 – no crayfish. Trap retained on boat
1604: A4-CT31 – no crayfish " " "
1606: A4-CT32 – no crayfish " " "
1608: A4-CT33 – " " " " "
1615: A4-CT34 – " " " "
1617 A4-CT35 – " " " "
1619 A4-CT36 " " " "

1624: A4-CT37 – •1 crayfish released. Trap retained on boat.
1627: A4-CT38 – •2 crayfish released. " " "
1631 A4-CT39 – no crayfish " " "
1635 A4-CT40 – •5 crayfish released " "
1641 A4-CT43 – •1 crayfish released " "
1645 A4-CT42 – no crayfish " "
1647: raining + windy now
1648 A4-CT41 no crayfish " "

1655 weather + chop very high. Unsafe conditions. Stopping work + returning to Gifford boat launch. Will retrieve remainder of traps tomorrow.

7 remaining to pick up tomorrow.

1700 @ boat launch. Samples transferred to car.

End 9/8/16 [signature]

[signature] 9/8/16

9 Sept 2016

Lake level 1278

pg 1

18

9 Sept. 2016
RV Tieton logbook

Forgot the big logbook in the hotel. Using this book instead and then will transfer.

Personnel: Linda Howard
Jenny Pretare
Mike Duffield
Rene Trudeau
Josh Weatherman
Dan Smith
Matt Mayberry

0755 - HS breifing @ Gifford campground.
- Wind yesterday - changed very quickly - Mike had graph.
- more boating today (Friday) more sidewaves -
- Video screen in Tieton swings under rough conditions, needs to be secured.

Rite in the Rain

NSN: 7530-01-577-8866

Scale: 1 square = ______

pg 2

20

9 Sept. 2016

Discussion about output for underwater mussel recon @ A3 today. Coordinates with priority like 1-10.

Coordinate points need some sort of radius on them because ~~points~~ boats are moving and sled are offset from boat.

8:35 depart dock to pick up 7 remaining crayfish traps.

Amount of time so far doing camera recon:

Bissel Island	Inchelium
30 min	30 min
30 min	6 min
30 min	15 min
23 min	
113 min	51 min

8:42 Pickup A4-CT45 - 2 Northerns

8:47 Pickup CT46 - 1 crayfish

Scale: 1 square = ______

9 Sept 2016 Pg3

0851 Pickup A4-CT47, 3crayfish
0900 Pulled A4-CT48, 6crayfish
0908 Pulled A4-CT49, 6 crayfish
0912 Pulled A4-CT51, 2crayfish
0918 Pulled A4-CT50, 9crayfish
all crayfish today were Northern;
no Signals caught.
0920 End crayfish collection at A-4.
0958 Begin A4 T8
seem to like the 60-65ft
depth at this location (need to
check water level for today).
We are seeing more mussels than
are indicated by individual points
in Tablet 2, b/c the GPS takes
a little while to register each
point.
1103 End transect A4T8
1156 Arrived at Bissel Island transect
~~[illegible]~~ Begin A4-T9 transect
~~mussels~~
~~possible~~
~~tract~~
1256 End A4-T9 transect

24

9 Sept. 2016 Pg 4

1338 Begin A4 T10 transect
1448 End A4 T10 transect

1511 Discussion between AECOM, EPA monitor, and ~~Columbia~~ Gravity regarding where to spend remainder of mussel reconnaisance time at A4 today. Agreed to head back to Inchelium to conduct more rover exploration because we have already spent 4 hrs. at Bissell Island transect.
KH.

1527 Began A4 T11 transect
1627 End A4 T11 transect

1642 Began A4 T12 transect
1754 End A4 T12 transect
Finished with mussel recon for today. Will pull camera up and head back to dock.
1815. Gifford boat launch

9 Sept 2016 p.5

All mussel recon data is on data sheets and spatial data is in Tablet 2. Here is a summary of the level of effort ~~for~~ for under-water Camera time in minutes

Transect #	~~Be~~ Bissel Island	Inchelium
T1	30	
T2	30	
T3	30	
T4	23	
T5		30
T6		6
T7		15
T8		64
T9	60	
T10	60	
T11		60
T12		82
	233 +	258 =

491 = 8.2 hours

28

9 Sept. 2016 p.6

These pages will be transfered into the main logbook at end of day.

Jenny a P

9-~~10~~ 9-16

Scale: 1 square = ______

10 Sept. 2016

Lake Level: 1278.2 thru
1277.8 Friday midnite

Personnel: Jenny Pretare, Linda Howard > AECOM
Mike Duffield, Rene Trudeau > Gravity
Josh Weatherman, Dan Smith > CNI

Site A3
Kettle Falls marina boat launch
Weather forecast - sunny, high of 80°

0820 - HS Briefing @ boat launch by LH.

0830 - Reviewed days objectives for site, which is to set 30 crayfish traps and do 4 hrs of underwater camera recon for mussels at Hayes Island. Gravity expressed concern over rocky bottom contact with camera. We will take it slow & try to protect the camera as much as possible.

0831 - Depart dock, headed to Hayes Island

~~Set Crayfish Traps~~

0900 started underwater camera recon @ Hayes Island bottom substrate is much rockier. Started at 30 ft. seeing some very steep drop offs. Takes more time to winch the sled up + down. Start @ 0900.

At 37 ft, started to see a few shells and mussels. At 55-65 ft. definitely started to see mussels End @ 1032.

1114 Started A3-T2. Saw mussels right away @ 60ft. But camera hit huge rock after a few minutes. We brought it up @ 1120 - one cable needs to be retaped.

1131 - Started A3-T3: Lots of big rocks. Silty/sandy areas between rocks seem to have a lots

9-10-16 p. 2

of mussels. Mussel areas appear as "puckers" on bottom in silt.

1228 Beginning A3 T4 Substrate = boulder/cobble with pockets of silty areas, opened up into larger silty area with scattered cobble/boulders → transitioned to very rocky substrate with few open areas of silt/sand.

1305 End A3 T4

1321 J. ~~Pretam~~ decontaminated bait canisters and prepared bait cannisters

1403	A3-CT31	Set trap
1407	A3-CT32	Set trap
1409	A3-CT33	Set trap
1420	A3-CT34	"
1424	A3-CT35	"
1433	A3-CT36	"
1436	A3-CT37	"
1440	A3-CT38	"
1451	A3-CT39	"
1454	A3-CT40	"
1502	A3-CT41	"
1506	A3-CT42	"
1511	A3-CT43	"
1519	A3-CT44	"
1522	A3-CT45	"
1537	A3-CT46	"
1548	A3-CT47	"
1558	A3-CT48	"
1601	A3-CT49	"
1603	A3-CT50	"
1612	A3-CT51	"
1620	A3-CT52	"
1625	A3-CT53	"
1628	A3-CT54	"
1642	A3-CT55	"
1648	A3-CT56	"
1653	A3-CT57	"
1657	A3-CT58	"

1536 Decontaminated crayfish sample buckets for tomorrow

Tablet 2 data - mistakenly used mussel capture on ~~th~~ A3-CT55

Scale: 1 square = ________

10 Sept 2016 Page 3

1701 A3 - CT59 Set trap
1706 A3 - CT60 "
Finished setting crayfish trap for today. Heading back to Kettle Falls campground boat launch.

Linda Howard 9/10/2016

[illegible]
9-10-16

0730 Begin day @ Kettle Falls boat launch for work at A3.

Personnel: Jennifer Pretare, Linda Howard - AECOM
Rene Trudeau, Mike Duffield - Gravity
Josh Weatherman, Dan Smith - CNI

0745 HS Briefing @ dock
0805 Leave dock - going to retrieve crayfish traps.

0819 Pull trap A3-CT31 → 0 crayfish, reset trap
0824 " A3-CT32 → 0 crayfish, reset
*1 juvenile sucker
0828 Pull trap A3-CT33 → 0 crayfish, reset
0832 " A3-CT34 → 0 crayfish, reset
0835 " A3-CT35 → 0 crayfish, reset
0841 " A3-CT36 → 2 crayfish, reset (veg)
0846 " A3-CT37 → 0 crayfish, reset (veg)
0849 " A3-CT38 → 0 crayfish, reset (veg)
* last 3 traps covered in vegetation
0855 Pull trap A3-CT39 → 1 crayfish, reset
0858 " A3-CT40 → 0 crayfish, reset
0903 " A3-CT41 → 0 crayfish, reset
0905 " A3-CT42 → 0 crayfish, reset
0909 " A3-CT43 → 0 crayfish, reset
0914 " A3-CT44 → 0 crayfish, reset
0917 " A3-CT45 → 0 crayfish, reset
0927 " A3-CT46 → 1 crayfish, reset
*1 small sculpin
0933 A3-CT47 → ~~0~~ crayfish, reset *1 small sculpin
0932 J. Pretare decontaminated calliphers & more sample buckets.
0943 Pull trap A3-CT48 → 0 crayfish, reset (some veg)
0944 L. Howard calibrated Pesola scale 1 with 20g & 10g weights
0946 Pull trap A3-CT49 → 0 crayfish, (some veg) reset
0947 " A3-CT50 → 3 crayfish, reset
0958 " A3-CT51 → 0 crayfish (veg), reset
1002 " A3-CT52 → 1 crayfish, reset

End Pg. 1 JH

9-11-16 Pg 2

1006 Pulled trap A3-CT53 → 0 crayfish, reset
1010 " A3-CT54 → 0 crayfish, reset
1017 " A3-CT55 → 0 crayfish, reset
1019 " A3-CT56 → 0 crayfish, reset
1024 " A3-CT57 → 0 crayfish, reset
1027 " A3-CT58 → 2 crayfish, reset
1031 " A3-CT59 → 0 crayfish, reset
1036 " A3-CT60 → 1 crayfish, reset (1 sculpin)

Total of 12 crayfish in traps this morning.

1037 End crayfish trap collection at 1037
Heading to ~~Hayes Island~~ Dock. Will process crayfish then begin ~~mussel recon~~. head to Hayes Island.

1050 - Begin ~~crafs~~ crayfish processing.
Calibrated 10g and 100g Pesola Scales.
with 5g weight & 20g. weight
We realized that all the crayfish samples at A4 may have been measured incorrectly for total length and carapace length, likely +/- 10 mm. Weights from A4 are correct.

11:42 - End Crayfish processing
Reviewed photos and noted that the whiteboard for A3-CT50-CR02 states A3-CT50-CR03 on board. Photo number in Camera Roll file is named as A3-CT50-CR02 taken at 11:19am Photo# 111903.

1250 - Depart Kettle Falls marina dock, headed to Hayes Island for underwater camera recon.

1305 - Arrived at Hayes Island, began A3 T5 transect navigating along 22° contour to extent possible.

mussels in pockets between the rocks and in one location on top of rocks.

1319 End A3 T5 - camera hit rock, need to check for damage.

1328 Begin A3 T6 with drop camera
1338 Begin A3 T7 w/ drop camera
1345 Begin A3 T8 w/ drop camera

9-11-16 p3

1356 - Begin T9 with drop camera

Camera results for this afternoon: we expanded the number of mussel records in areas we had hits from yesterday. Camera minutes not yet to 4 hours (total approx. 3.5). Ground conditions & choppy water makes it difficult to ~~have~~ sustain continuous recording.

1405 - Stopping camera work. Going to check crayfish traps again instead.

1419 A3-CT31 → 0 trap covered in veg. → reset trap
1422 A3-CT32 → 0 "
1424 A3-CT33 → 0 "
1429 A3-CT34 → 0 "
1433 A3-CT35 → 0 "
1439 A3-CT36 → 0 "
1451 A3-CT41 → 0 "
↳ Reset in new location closer to shore

14:52 A3-CT61 depth = 11 ft. Photo # 145248
Coord. 48° 37' 29" N
118° 4' 24" W

1456 Check A3-CT42 → 0 crayfish
Reset in new location closer to shore
1457 A3-CT62 depth = 12 ft Photo # ~~15042~~ 145756
Coord. 48° 37' ~~24"~~ 26"
118° 4' ~~24"~~ 25"

1502 Check A3-CT44 → 0 crayfish, reset closer to shore

A3-CT63 depth = 12 ft. Photo 150425
1504 Coord. 48° 36' 58"
118° 4' 42"
1510 Heading back to Kettle Falls boat launch
End of activities today.

LH.
9-11-16

Scale: 1 square = ______

9-12-16 Pg. 1

0730 Begin day at Kettle Falls boat launch for work at A3

Personnel: J. Pretare, L. Howard - AECOM
R. Trudeau, M. Duffied - Gravity
E. Weatherman, D. Smyth - CNI
Matt Magry - CH2M (EPA monitor)

08:10 H&S Briefing LH, EW, MD, RT.
at dock

0828 Arrive Hayes Island area for mussel recon.
0835 Setting up camera

0836 Begin A3 T10 few mussels, silty substrate with scattered
~~0900~~ 0858 End A3 T10 rock & cobble, around 45' depth

0905 Begin A3T10
0921 End A3T0

0939 Begin A3T12 @ 60 ft. depth
1007 End A3T12 mussels @ 65' depth
End mussel recon in A3.

Checking crayfish traps
1022 Pulled A3-CT31 → 0 crayfish, reset trap
1025 " A3-CT32 → 0 " "
1030 " A3-CT33 → 0 " "
1034 " A3-CT34 → 0 " "
1037 " A3-CT35 → 0 " "
10:43 " A3-CT36 → 0 " "
10:47 " A3-CT37 → 0 " "
10:49 " A3-CT38 → 0 " "
10:55 " A3-CT39 → 0 " "
10:59 " A3-CT40 → 0 " "
10:02 " A3-CT41 → 0 " "
11:05 " A3-CT62 → ~~0~~ 1 crayfish, reset trap
11:09 " A3-CT43 → 0, reset trap
11:14 " A3-CT63 → 1, ~~reset trap~~ pulled trap, no reset

Rite in the Rain NSN: 7530-01-577-8866 Scale: 1 square = ________

9-12-16 Pg 2

Check crayfish traps

11:17	A3- CT45 →	~~Ø~~ 2,	pulled trap, no reset	
✓ 11:28	A3- CT46 →	2,	no reset	
11:34	A3- CT47 →	0 crayfish	(+2 sculpin),	no reset of trap
11:42	A3- CT48 →	2	"	"
11:45	A3- CT49 →	1	"	"
11:49	A3- CT50 →	0	"	"
1209	A3- CT51 →	0	"	"
1214	A3- CT52 →	0	"	"
1218	A3- CT53 →	1	"	"
~~1220~~ 1224	A3- CT54 →	0	"	"
1238	A3- CT55 →	0	"	"
1244	A3- CT56 →	0	"	"
1252	A3- CT57 →	0	"	"
1255	A3- CT58 →	0	"	"
1258	A3- CT59 →	0	"	"
1302	A3- CT60 →	0	"	"

~~End of crayfish collection at A3.~~

1305 Heading back to check & pull crayfish traps that were reset this morning.

1322	A3- CT43 →	0	"	no reset of trap
1325	A3- CT62 →	0	"	"
1330	A3- CT61 →	0	"	"
1334	A3- CT40 →	0	"	"
1337	A3- CT39 →	0	"	"
1344	A3- CT38 →	0	"	"
1348	A3- CT37 →	1	"	"
1350	A3- CT36 →	0	"	"
1356	A3- CT35 →	0	"	"
1359	A3- CT34 →	0	"	"
1402	A3- CT33 →	0	"	"
1405	A3- CT32 →	0	"	"
1408	A3- CT31 →	0	"	"

1410 Total of 11 crayfish collected today. Heading back to Kettle Falls boat launch to process.

Scale: 1 square = ______

9.12.16 Pg 3

1442 Began crayfish processing — MD & RD

LH decontaminated calipers & calibrated 100g & 10g scales with 20, 10g & 5g.

1516 Finished processing crayfish.

1534 Ended activities for today

1600 Samples transferred to hotel by Jennifer Pretare; put into freezer.

Jen A Pretare

9-12-16

Rite in the Rain. NSN: 7530-01-577-8866 Scale: 1 square = ________

13 Sept 2016

0745 Northport Boat Launch - A1
Jenny Pretare, Linda Howard, Russ Bevill - AECOM
John Toll - Windward
Cathy Cerise - EPA oversight.
Mike Duffield, Rene Trudeau - Gravity
Eric Weatherman, Dan Smith - CNI

0802 J. Pretare provided overview of objectives for today

L Howard H & S Briefing followed by boat captains H & S briefing on boat safety.

0808 HS Briefing by Linda Howard
0825 Boat Safety briefing by Eric Weatherman.

0930 Arrived & deployed mussel beach team at Deadman's Eddy. Radio check with CNI boat.
Russ Bevin and Linda Howard mussel beach recon.
Reconned entire shore of Deadman's Eddy in water up to knee depth and along shore's edge. Substrate predominantly cobble and cobble boulder; scattered pockets of sand and vegetation. Saw numerous scattered shells ranging from 2-3 inches long most with holes in center. After recon of this shore, mussel team picked up by CNI and taken back to starting point. ~~Met up with~~ Gravity/Tieton crayfish team (J. Pretare, M. Duffield, & Renee Trudeau) joined for break and lunch.

At ≈ Tieton and CNI departed to set additional crayfish traps and mussel beach team stayed on shore to continue mussel beach recon.

Set two mussel beach transects - A1 MB31 & A1-MB32. No mussels found. 1 broken shell observed. A1-MB31 & MB32 in predominantly sandy substrate.

At ≈ Tieton and CNI picked up mussel beach team and all departed to perform underwater mussel recon.

Scale: 1 square = ________

13 Sept 2016 Pg. 2

1515 to 1610 conducted underwater camera recon.
AIT1

1611 moved to shore to recon beach adjacent to underwater mussel observations - ~~the~~ east of A1-MB11 approx 350 meters. Few shells observed; no live mussels. Mostly snail shells.

1645 Arrived back at Northport Boat launch. Will conduct 30 minutes of underwater mussel recon at Northport ~~mussel recon~~ boat launch area.

1652 Began A1T2
1720 End A1T2
Will head back to dock. End of activities for today.

9-13-16

9-14-2016 Pg. 1

0745 Newport Boat Launch

L. Howard, R. Bevill - AECOM
J. Toll - Windward
Cathy Cerise - EPA oversight
Mike Duffield, Renee Trudeau - Gravity
Eric Weatherman, Dan Smith - CNI

0815 L. Howard went over objectives for day

0820 R. Bevill H&S Briefing

0845 Landed at first mussel beach. R. Bevill & L. Howard to conduct mussel beach transect. M. Duffield & R. Trudeau to check crayfish traps.

0850 Set two beach transects - A1 MB 33 & A1 MB34
No mussels found in either beach transect.

~~10:20~~
10:10 Boats picked up mussel team ~~and~~
10:15 Called Jenny to report results. No mussels or crayfish collected
10:30 Transferred mussel beach team to new beach - A1 MB-35.

11:15 Set A1 MB35. No mussels found.

11:50 Boats joined mussel beach team for lunch break
No crayfish found. 7 more traps to pick up.

≈12:30 Transferred to A1 MB36 while Teton crayfish team collected last 7 traps. No mussels found. 1 dead but fresh crayfish found while conducting A1 MB36. Assigned Location ID → A1 CT61. Will process.
1356 Began A1 T3
1445 Ended A1 T3
Taking John Toll & Cathy Cerise back to Northport boat launch and will continue with underwater camera in boat launch area.

Scale: 1 square = ______

9-14-2016 Pg 2

15:20 R. Bevill & L. Howard processed crayfish.

15:33 Began A4T4 around Northport Boat Launch area
15:59 Ended A4T4 variable depths, lots of transition between depths and substrate type.

Jem A. R
9-14-16

9/15/16

0730 Arrive at Boat Launch - Northport and Load Gear
0745 EPA observer arrives at Boat Launch
0800 Dock Health & Safety Briefing
0830 Russ & Jeff Begin Beach Surveys Near Boat Launch. Remainder of Team Begins Process of Checking Traps

Arcadis Field Team: David Nose, Jeff Walker, Russ Bievill
EPA Oversight: Rachel Zajac

Location	Time	Number	Location	Time	Number
CTA1-31	0837	0 crayfish	CTA1-46	0953	0 crayfish
CTA1-32	0842	0 crayfish	CTA1-47	0958	0 crayfish
CTA1-33	0845	0 crayfish	CTA1-48 (A)	1006	0 crayfish
CTA1-34	0848	0 crayfish	CTA1-49	1020	0 crayfish
CTA1-35	0856	0 crayfish	CTA1-50	1025	0 crayfish
CTA1-36	0859	0 crayfish	CTA1-51	1029	0 crayfish
CTA1-37	0900	0 crayfish	CTA1-52	1033	0 crayfish
CTA1-38	0908	0 crayfish	CTA1-53	1037	0 crayfish
CTA1-39	0913	0 crayfish	CTA1-54	1041	0 crayfish
CTA1-40	0920	0 crayfish	CTA1-55	1047	0 crayfish
CTA1-41	0925	0 crayfish	CTA1-56	1050	0 crayfish
CTA1-42	0928	0 crayfish	CTA1-57	1054	0 crayfish
CTA1-43	0936	0 crayfish	CTA1-58	1059	0 crayfish
CTA1-44	0945	Trap Gone!!	CTA1-59	1105	0 crayfish
CTA1-45	0950	0 crayfish	CTA1-60	1110	0 crayfish

(A) Trap at Location CTA1-48 was ~~at the~~ found 242 meters upstream from the established Location ~~48°56'11" + 117°45'29.55"~~
we Returned the Trap to Original Coordinates

The plan for Location CTA1-44 is to Bait 2 Traps and Re-deploy them at that Location to Achieve our required number of nights. Will confirm this with project Team at Noon Call

1130 Arrive Back at the dock to Meet the Beach Crew, obtain lunch, Buy Salmon for additional Traps

1200 Conduct Daily Status Call with Project Team
1230 Call ended - Lunch
Gravity is Retrieving 4 Crayfish Traps to add to A1 this afternoon. These will replace CTA1-44 ~~and~~ (2) and 2 will Be deployed at Existing Locations as extra Traps

Scale: 1 square = ________

9/15/16

1315 Additional Crayfish Traps are Ready for Deployment. Departed The Boat Dock To Conduct Camera surveys at Dead Man Eddy.

1330 Began Camera Surveys at Dead Man Eddy
~~1455~~ 1435 Beached for a break in The shade

1505 Redeployed ~~Camera~~ Camera for Additional Surveys

1556 Completed ~~Camera~~ Camera Surveys

1600 Deployed A1-CT62 at 20ft ~~17ft~~ Coordinates in Tablet

1605 Deployed A1-CT63 at 12ft Coordinates in Tablet

1605 Motored Back To A1-CT44 To Replace Trap
1630 Replaced A1-CT44 with A1-CT64 at 10ft Coordinates in Tablet
1635 Deployed A1-CT65 @ 8ft Coordinates in Tablet
1645 Arrive at Boat Launch to Complete Day
Unload Boat and Depart for Hotel
1800 Arrive at Hotel

David R. Kerr
9/15/16

Rite in the Rain NSN: 7530-01-577-8866* Scale: 1 square = ______

9/16/16

0730 Field Team Assembles at Boat Launch

0750 Dock safety Meeting we Reviewed the Man overboard procedures
Anchor staff: David Hose, Jeff Walker, Russ Brill
CH2M Hill: Rachael Zajac EPA Representative
Gravity: Mike Duffield, John Stratton
Columbia Nav.: Eric Weatherman + Dan

0810 Depart Dock

0820 Drop Beach Survey Team

Begin Pulling Traps

Location	Time	# Crayfish		Location	Time	# Crayfish	
A1-CT31	0830	0		A1-CT45	0925	0	
A1-CT32	0836	0		A1-CT46	0928	0	
A1-CT33	0840	0		A1-CT47	0930	0	
A1-CT34	0844	0		A1-CT48	0933	0	
A1-CT35	0850	0		A1-CT49	0937	0	
A1-CT36	0852	0		A1-CT50	0940	0	
A1-CT37	0854	0		A1-CT51	0944	0	
A1-CT38	0857	0		A1-CT52 (A)	0947	—	Partial Trap
A1-CT39	0901	0		A1-CT53	0950	0	
A1-CT40	0905	0		A1-CT54	0953	0	
A1-CT41	0909	0	1-inch Sculpin	A1-CT62	0957	0	
A1-CT42	0912	0		A1-CT63	1000	0	
A1-CT43	0915	0		A1-CT55	1002	0	
A1-CT65	0913	0		A1-CT56	1003	0	
A1-CT64	0922	0		A1-CT57	1006	0	
				A1-CT58	1009	0	
				A1-CT59	1013	0	
				A1-CT60	1015	0	

(A) Trap at A1-CT52 was only Partially Recovered in that ½ of the Trap and the ~~bate~~ bait bucket was missing

1030 Picked up Beach Survey Party and Returned to the dock.
1045 Arrive at Dock. Waiting for Boat Traffic to Clear

Scale: 1 square = ________

9/16/16

1115 Off The water and Begin Transfer of Boats and stuff to Grand Coulee

1645 Arrive at Grand Coulee

David R. [illegible]

signed on 9-16-16
J.P. 12-29-16

Rite in the Rain NSN. 7530-01-577-8866 Scale: 1 square = ______

9/18/16

For Notes Taken 9/17/16 See The Next Pages

0700 Meet for Breakfast
0800 ~~Mod~~ Mobe To Keller and assemble at Bridge
0900 Safety Briefing and Prep For The Day
1000 Travel To Downstream end of Study Area and Begin To Set up Traps and Conduct Beach Surveys

Black Bear Spotted at Locations SR-CT31 + CT32

1230 - 1300 Lunch

1620 Completed Setting Crayfish traps SR-CT31 thru SR-CT63 we placed 3 extra Traps in case The Black Bear Returns and Takes some Traps

1630 Return To Grand Coulee

1710 Arrive @ Grand Coulee

[signature]

signed on 9-18-16
J.P. 12-29-16

9/17/17

0715 Meet at Crescent Bay Boat Launch.
AECOM Staff: David Hose, Jeff Walker, Russ Bevill
EPA Oversight: ~~Rachael~~ Rachiel Zajac
Gravity: Mike Duffield + John Shelton
Columbia Nav.: Eric and Josh Weatherman

Lake Level 1779.1 feet
Weather conditions 63°F Overcast with light wind from the south
Expecting afternoon Rainshowers followed By Windy Conditions.

0730 Health + Safety Morning Briefing
0745 Depart the Dock
0830 Arrive Area A6 and Set up to Commence Camera Surveys at
Areas where Mussels were found in the spring
0835 Camera in the water:
- First two Surveys are along the 40 foot water depth. Substrate appears smooth and Sandy. No mussels were observed at this Depth. These Transects are at the edge of Study Area A6 East of Sandpoint River
- Transect A6-T3 Between First 2 Transects + Shore 30 sec. video Traversed for 35 minutes observed nothing
- Transect A6-T4 we will attempt to Survey ~~the~~ closer to the shore near where Mussels were found in the spring since nothing was found in deeper water. Observed single ~~cray~~ small cray fish at start of Run and 2 fish
- Transect A6-T5 will Traverse along the near shore toward the extreme Eastern end of Area A6. This area has not been surveyed yet from the Beach

11:45 - 12:15 Lunch
- Transect A6-T6 conducted in Cove at extreme Eastern edge of Area A6. Depths Ranged from 8 ft to 94 ft and no mussels were observed
- Transect A6-T7 perpendicular to the Shore ~~than~~ former Beach transect observed no mussels
- Transect A6-T8 perpendicular to the shore at west end of Eastern section of Area

1130 Moved to Area West of the Kootenai Ferry

Scale: 1 square = ________

9/17/16

- A6-T9 Surveyed a Beach at 55 ft within an embayment with no mussels observed
- A6-T10 Attempted to survey shoreline in the embayment. Needed to abandon the survey because Bottom was very rocky with dramatic depth variations
- A6-T11 Survey Sandy Bottom ~~at~~ along the ~~Eastern~~ Western shore of the embayment observed ~~nothing~~ no mussels
- A6-T12 Conducted a ~~Second~~ Transect in Shallow Water Between Shore and a rock island near the western end of Area A6
- A6-T13 Conducted a circular survey around a rocky islet in mouth of a bay at the extream western end of Area A6. The bay is blocked by a log boom placed there by the Tribes to protect a prehistoric site
- A6-T14 Conducted a second Transect in the area of A6-T12 that circled the north end of the island to the edge of the Area A6

1530 Pull Camera and Head for the Dock
1605 Arrive at Dock and Load Boats

For Notes Taken 9/18/16 Turn Back one Page

David [illegible]

Signed on 9-17-16
J.P. 12-29-16

9/19/16

0800 Mobe To San Poil River
0900 Arrive At Bridge Assembly Point and Prep for The day

0910 TailGate Safety Meeting

0920 Begin To Check Cray Fish Traps

Time	Location	#	Type
0940	SR-CT31	0	—
0943	SR-CT32	1	Northern
0947	SR-CT33	0	—
0949	SR-CT34	0	—
1000	SR-CT35	0	—
1001	SR-CT36	0	2 Sculpin
1002	SR-CT37	0	—
1003	SR-CT38	0	—
1004	SR-CT39	0	—
1005	SR-CT40	0	—
1016	SR-CT41	3	Northern
1020	SR-CT42	0	—
1031	SR-CT43	0	—
1032	SR-CT44	1	Northern
1040	SR-CT45	0	—
1051	SR-CT46	0	—
1052	SR-CT47	1	Northern
1057	SR-CT48	0	—
1058	SR-CT49	0	1 Sculpin

Time	Location	#	Type
1113	SR-CT50	1	Signal
1114	SR-CT51	2	Both Northern
1131	SR-CT52	0	—
1132	SR-CT53	0	—
1135	SR-CT54	0	—
1146	SR-CT55	0	—
1148	SR-CT56	0	—
1200	SR-CT57	0	—
1201	SR-CT58	0	—
1212	SR-CT59	0	—
1215	SR-CT60	0	—
1226	SR-CT61	0	—
1235	SR-CT62	1	Signal
1239	SR-CT63	0	—

1240 Completed Checking C.F. Traps
Bought Ice for Cray Fish
1310 Departed for Grand Coulee To Process Catch

1400 Arrive At Hotel in Grand Coulee To Process The Samples
1415 Scale #6 calibrated to 5grams
1630 Completed Processing Samples and Called Project Manager

David R. [signature]

Signed on 9-19-26
J.P. 12-29-16

Scale: 1 square = ________

0800 Depart Grand Coulee for Sanpoil 9/20/16

0845 Arrive at the Site and Conduct Safety Briefing

0900 Travel to CT31 to Begin Pulling the Traps

Time	Location	#	Species
0919	SR-CT31	0	—
0919	SR-CT32	0	—
0924	SR-CT33	0	—
0927	SR-CT34	Destroyed by Bear	
0942	SR-CT36	0	—
0945	SR-CT35	0	—
0946	SR-CT37	0	—
0948	SR-CT38	0	—
0950	SR-CT39	0	—
0952	SR-CT40	0	—
1007	SR-CT41	0	Rainbow
1008	SR-CT42	0	—
1019	SR-CT43	0	
1018	SR-CT44	0	—
1026	SR-CT45	0	—
1039	SR-CT46	0	—
1039	SR-CT47	0	—
1043	SR-CT48	0	—

Time	Location	#	Species
1046	SR-CT49	0	—
1158	SR-CT50	0	Sculpin
1158	SR-CT51	0	Sculpin
1110	SR-CT52	0	—
1111	SR-CT53	0	—
1113	SR-CT54	0	—
1121	SR-CT55	1	Signal
1125	SR-CT56	0	—
1144	SR-CT57	0	—
1144	SR-CT58	0	Sculpin
1155	SR-CT59	0	—
1154	SR-CT60	0	—
1204	SR-CT61	0	—
1214	SR-CT62	0	—
1214	SR-CT63	0	2 Sculpin

1215 Completed Pulling CrayFish Pots. Return to Grand Coulee To Process Catch

1310 Arrive at Grand Coulee to Process the Catch

1335 Scale #6 100gm Calibrated to 20gm

1640 Mussel Team Returns with 6 more mussels and Began to ~~Pro~~ Process the Catch

1715 Catch Processed. Updating Spreadsheet for Team

David R. [signature]

Signed on 9-20-16
JP 12-29-16

Rite in the Rain NSN: 7530-01-577-8866 Scale: 1 square = ______

9/21/16

0700 Arrive at Crossent Bay Boat Launch To Launch Boats
Lake Roosevelt Water Elevation 1280.45 ft

Beautiful calm Sunny morning, no wind, 48°F

0715 Conduct Dock Safety Briefing

0730 Boats Depart Return To Hotel and Pack up Room

0830 Depart for Moses Lake to Obtain Dry Ice
1300 Returned to Grand Coulee
1545 Crew Returns To Hotel

1700 Mobe To 2 Rivers - Dinner

1900 Arrive at 2 Rivers

David [illegible]

Signed on 9-21-16
J.P. 12-29-16

Scale: 1 square = ______

MADE IN TACOMA
— SINCE 1916 —
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— DEFYING MOTHER NATURE —

Tieton Logbook 3

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Projects Teck American, Inc.
Macroinvertebrate Tissue Study
Upper Columbia River, WA
Fall 2016

Lake Level 1-800-824-4916

13 Sept. 2016 — Started 2nd logbook at A1 because mussel crew is working on shore and crayfish crew is ~~&~~ separate, on the boat. (J. Pretare notes)

0915 — Dropped mussel crew at Deadman's Eddy (LH, RB, JH, ~~E~~ CC).

0935 — Preparing crayfish traps on Tieton: JP, RT, MD using salmon as bait — has been left out for several days.

Water level in A1 seems (visual obs. only) to be just as high as in the spring. Russ Bevill was at A1 ~~there &~~ in spring.

Gauge height today — 100.5 ft. (morning)

1016	Deployed	A1-CT31	— Starting @ S. end of A1
1028	"	A1-CT32	— Coordinates in Tablet 3 and written data sheet
1035	"	A1-CT33	
1042	"	A1-CT34	
1055	"	A1-CT35	— All w/ salmon bait
1059	"	A1-CT36	
1103	"	A1-CT37	
1113	"	A1-CT38	
1121	"	A1-CT39	
1131	"	A1-CT40	
1136	"	A1-CT41	
1141	"	A1-CT42	
1148	"	A1-CT43	
~~1205~~ 1156	"	A1-CT44	
1205		A1-CT45	
1210	"	A1-CT~~[illegible]~~ 46	
1214	"	A1-CT47	
1220	"	A1-CT48	
1233	"	A1-CT49	
1238	"	A1-CT50	

1244 Break for lunch @ Deadman's Eddy

13 Sept. 2016
A1

Resumed crayfish trap deployment.

1334 Deployed A1-CT51
1337 " A1-CT52
~~1348~~ "
1341 Deployed A1-CT53
1348 " A1-CT54
1357 " A1-CT55
1401 " A1-CT56
1406 " A1-CT57
1415 " A1-CT58
1424 " A1-CT59
1431 " A1-CT60

Ended crayfish trap deployment. Back to Deadman's Eddy to do camera recon.

1505: Gauge height reading: 100.75 ft. (USGS Border station). So up just slightly since this morning.

Picked up Linda + Russ and set up underwater camera gear. They got 2 mussels at Deadman's Eddy and did 2 transects.

1510 - Starting just east of Deadman's Eddy
1515 - A1-T1 begin river cobble interspersed w/ sand
mussels @ 30 feet
Mussels here seem a lot larger than those at A3 + A4. Wedged in between cobble + rock
more mussel at 16 feet depth. Can sometimes even seen the foot of the mussel stuck out.
20ft - lots of mussels
24ft " "

1630 - Refer back to other Logbook.
Jenny A[illegible]

Scale: 1 square = ________

15 Sept. 2016 - 2nd logbook today because crayfish team has other book

8:30 am - Jeff + Russ dropped off at Northport boat launch to survey mussel beaches. Began ~~#~~ A1MB37 at 8:37. End at 9:17. No mussels found. No shells found either

9:30 am - Start survey ~~[illegible]~~ of A1MB38. Ended transect at 9:48. No mussels found. Transect adjacent to dock; beach is cobbly and sandy.

9:44am began survey of A1MB39. Ended survey at 9:58. No mussels found. Two mussel shells observed. Also observed recent footprints under water. Appears water level here has fluctuated very recently. Beach is very cobbly; not much sand/silt.

10:25am - began survey of A1MB40. Ended survey at 10:44 am. Swift moving river upstream of bridge. No live mussels found. Many shells observed in deeper water (all broken). Very cobbly shore.

16 Sept. 2016 - 2nd logbook today because crayfish team has other book

8:25 am - Jeff and Russ dropped off at mussel beach locations at south end of A1. Rest of crew will check and retrieve crayfish traps.

8:28 am - began A1MB41. Ended survey at 8:50 am. The beach is at the south end of a "seasonal" island (it's completely inundated when water is high; but transects in spring 2016 were at lower elevations ~~that~~ than today - water level is higher than in spring). The transect is along a point: 300 feet to the southeast of the starting point and then 200 feet back north to the end point of the transect. Beach is sandy and flat. No mussels or shells found

8:57 am - began A1MB42. Ended survey at 9:12am. Beach is very cobbly, on the east side of "seasonal" island. Relatively flat beach. No mussels or shells found.

[Photos located on Tablet #2, This PC folder, ~~Pictures~~, Windows (C:), Camera Roll]

Sept. 18, 2016

Sanpoil River

10:18 am - Russ + Jeff began survey of SR-MB31. Ended transect at 10:51 am. No mussels or shell were observed. Surveyed about 280 ft. of west bank. Rocky, cobbly gravel bar. Noted numerous dead crayfish in water.

11:14 am - Russ + Jeff began transect @ SR-MB32. Ended transect @ 11:37 am. Transect crosses river at midsection. Started on east bank and crossed to west bank, then returned. Cobbly substrate. No mussels observed, but did see one shell on gravel bar. Numerous dead + live crayfish observed.

12:02 pm - Russ + Jeff began transect @ SR-MB33. Ended @ 12:17 pm. Transected center of river. Cobbly substrate. There was a narrow gravel bar in center of river. Light vegetation on bar. Walked North on west side of bar and returned on east side. No mussels observed.

13:15 pm - Russ + Jeff began transect @ SR-MB34. Started just east of bridge and walked east in river for about 500 ft. Some rounded boulders and cobbly substrate. Silty mud near bridge. Finer gravels in patches. Ended @ 13:54 pm. Collected one mussel from near North bank of river @ east end of transect. Mussel was partially buried in sand and gravel. Noted 30+ complete mussel shells in river.

14:13 pm - Russ + Jeff began SRMB35 transect just west of bridge. Walked west for about 500 ft along the North river bank. Cobbly substrate with boulders. Finished transect @ 14:37 pm. Collected two mussels. Noted 20+ mussel shells.

14:58 pm - Russ + Jeff started SR-MB36 transect. Ended @ 15:19 pm. Walked shallow river channel along north river bank. Cobbly, gravelly + sandy substrate. Collected two mussels from gravelly, sandy area near west end of transect. Observed about 5 mussel shells.

Scale: 1 square = ______

Sept. 18, 2016

The collected mussels were put in ice chest and transported to motel for processing. Processed at ca. 18:15 pm. The specimens were tentatively identified as Anodonta sp., although Gonidea ~~sp~~ specimens were previously identified from this area. The processed specimens from SRMB-34, SR-MB35, + SR~~H~~MB36 were placed in the freezer in Dave's room at 18:30 pm.

Jenny AP 12-29-16

Sept. 19, 2016

9:40 - Russ + Jeff began transecting SR-MB37. Ended @ 9:58 am. Transect crossed river from one bank to the other. A mix of slow water and silty, gravelly substrate to swift water and cobbles. Noted one half shell of a mussel. No mussels collected.

9:58 am - Russ + Jeff started SR-MB38. Ended @ 10:28 am. Followed river northwest and crossed from one bank to the other bank. Noted about 10 complete mussel shells. Cobbly substrate with patchy sand and gravel, mainly on the northeast side of river. More shells were noted at the north end of transect. Collected two live mussels.

Transects for SRMB37 + SR-MB38 are near the SR-MB09 transect from the spring. The earlier transect crossed a gravel bar that is now above the waterline.

11:09 am - Russ + Jeff started SR-MB39 transect. Ended @ 11:20 am. Started @ rip-rap near edge of road and went northwest. Mix of gravelly, silty + cobbly beaches / substrate. No shell observed in water and no mussels collected.

11:23 am - started transect @ SR-MB40. Followed river north around a bend / gravel bar. Mix of silty, sandy + cobbly substrate. Noted 3+ mussel shells in water. No live mussels were collected. Previous mussel transects from spring crossed a gravel/cobble bar that is now above water.

Sept. 19, 2016

12:45 pm - Russ + Jeff started transect @ SRMB-41. Ended transect @ 13:10 pm. Observed 20+ mussels shells in water and on stream bank. Collected one live mussel from east end of transect. Was found in swift water against the cut bank, attached to grass roots. Cobbly substrate.

13:11 pm - Russ + Jeff began transect of SRMB-42 just southeast of SR-MB41. Ended transect @ 13:33 pm. Walked around a bend in the river. Gravelly + cobbly substrate with patchy sand. Observed about five mussel shells. Collected one small, live mussel.

Processed four mussels total @ 15:00 pm @ the motel in Grand Coulee. Took about 20 minutes to process + bag.

Sept. 20, 2016

9:02 am - Russ + Jeff returned to SR-MB34 just south of bridge. Walked transect south. Found two small mussels in area of muddy silt. Then found a large mussel below a rip-rap boulder on the west river bank. Concentrated our effort on the rip-rap where water was deeper, up to about 12 inches deep. Found additional mussels in the boulders, most partially buried in sand. Collected seven large mussels. Because we had nine mussels, we put the smallest one back in the river. Our goal was to capture 8 mussels. Ended the transect @ 9:33 am. Put mussels in ice chest.

12:00 pm - Processed the 8 mussels @ the Grand Coulee Motel. Completed @ 12:55 pm. Placed mussels in freezer.

Jenny [illegible] 12-29-16

Scale: 1 square = ______

Sept. 20, 2016

Returned to Sanpoil River @ SR-MB34 and documented shells to determine genus of the mussels from the beach. Identified the shells as Margaritifera.

15:30 pm - Russ + Jeff collected six additional mussels from SR-MB34 from the west bank. All six were found in a pool of water adjacent to large boulders. The shells were found with decomposing tree leaves in the water. Transported mussels back to motel for processing.

16:47 pm - Russ + Jeff processed the six mussels from SR-MB34. Completed @ 17:02 pm.

September 21, 2016

Returned to A6 for another underwater camera session. Russ and Jeff began observations at 8:35 with transect A6T15. This transect is near A6-MB03. A6T15 begins at approx 60 feet in depth. Transect depths ranged from 30' to 75' (drifted to 80' in a couple of spots). Traversed A6MB03 and A6-MB09. One shell observed.

Transect A6-T16: substrate is mostly silt/sand with scattered gravels; This transect is very close to A6-T15 in effort to thoroughly investigate this area and look for any pockets of mussels. The ~~*~~ transect weaves due to wind blowing the boat around; Depths ranged from 50 feet to 25 feet across most of transect. Substrate ~~[illegible]~~ becomes slightly rocky at end. Started transect @ 9:23; ended at 10:03

Transect A6-T17: started transect at 10:15; depths range from 5 to 25 feet. Substrate is mostly sand/silt, but end of transect has more wood debris (sticks, bark, cones)

Transect A6-T18: began at 11:38; starting depth at 35 feet, Depths range from 12 to 45 feet along transect. end transect at 12:53. Substrate alternates between sandy and rocky (but not cobbly). One shell observed; one possible trail: No live mussels observed.

Transect A6-T19: began transect at 13:24. Transect is parallel to A6-T18, but deeper. depths range from 45 to 70+ feet. observed possible mussels at start of transect. ~~[illegible]~~ Finished at 14:16 but A6-T20 in area where we saw mussels. Saw an additional mussel, shell, + trail at 50-55 feet in depth. Finish A6-T20 @ 14:42

9/22/16

Two Rivers Boat Launch Lake Level 1780.7 ft

0745 Arrive a Launch to Put Boats in
0815 Both Boats in The Water
0830 Conducted Health + Safety Meeting
0845 Departed Dock for North end of Area A5
0915 Arrive at northern limit of Area A5. Bottom <120 ft deep with larger Rock Terraces near the Shore, Will begin surveys in ~~[illegible]~~ an unnamed Cove
0930 Began Surveys in ~~[illegible]~~ Unnamed Cove
1000 Completed Surveys in Cove "30 sec. video
1008 Began A5-T3 and will travel South Through A5
1031 End A5-T3 no mussels observed. Depth Range 36-65 ft
Moved to South end of A5 Because information from PM indicated This as a higher priority Area
1046 Began Transect A5-T4 Target Depth 50 feet "30 sec. video"
1045 Finished Transect A5-T4
Lunch
1245 Begin Transect A5-T5 Depth 40-60 ft
1407 End Transect A5-T5 End of transect 10-20 ft
1440 Return to Bottom of A5 to Run a deeper Transect
~~1455~~ 1506 Begin Transect A5-T6 Depth Ranged from 40-102 ft Averaged ≈ 70 ft
no mussels observed, One Shell "30 sec. video"
1530 Completed Transect A5-T6 no mussels observed
1534 Began Transect A5-T7. Target depth 30 ft
1602 Completed A5-T7. Depth Ranged from 25-35 feet.
1610 Return To Dock
1630 Pull Boats and Return to Hotel

[signature]

Signed 9-22-16

J.P. 12-29-16

Scale: 1 square = ______

7/23/16

0800 Arrive At 2-Rivers Boat Launch to Load Boat and Prep for the day Lake Level 1281.2 feet : Weather Sunny + Calm

0815 Launch Boats

0830 Dock Safety Briefing

0900 Arrive at Abraham Cove and Set up for Camera Transects

0902 Begin Transect AS-T8 in Abraham Cove.
0940 Completed AS-T8. Depth Ranged from 25-35 ft within Cove no $ Mussels were observed

0955 Began Transect AS-T9 on Broad Beach offshore from Tribal Campground. This area was recommended by Tribal fisheries person we met yesterday
1105 Completed AS-T9 Depth Ranged from 40 to 60 feet with a depth of 70 ft at the end of the Transect. No Mussels observed.

1120 Beach the Boat for A Break
1210 Conclude Break Return to Camera Surveys

1215 Began AS-T10 Target depth 30 ft
1344 Completed AS-T10 Depth Ranged from 30-40 ft. No mussels observed one possible shell observed

1403 Begin AS-T11 Target Depth 40-60 ~~ft~~
1500 Completed AS-T11 Depths Ranged from 30-60 ft, No Mussels observed.
1520 Arrive @ Boat Launch To Remove Boats

1600 All Team Members Depart Boat Launch For Their Homes

[signature]

Signed 9-22-16
J.P. 12-29-16

Rite in the Rain NSN: 7530-01-577-8866 Scale: 1 square = ______

28 SEP 2016

NORTHPORT BOAT LAUNCH · SAMPLING AREA 1

0730 LOAD EQUIPMENT / LOGISTICS.

· FIELD OPEN

JENNY PROTME · SHAWN HINZ · KRIS MEYER · ROB RAU · ERIC WERTHMAN

GLEN MEJIA · MIKE DUFFIELD · NANCY POWERS · ROB PETERSEN · JOSH WERTHMAN

RUSS BEVILL · CHAD FURNUE · BRENT RICHMAN

ERIC ?AW · KRIS KRIS LEFFERS

AREA 1

0800 · ~~[KICK OFF.~~ BRIEFING AGENDA] 5 COMPOSITES / 2 SPECIMENS

0819 · PROJECT ROLES · ADDITIONAL MUSSELS FOR ANALYSIS

SAFETY ~~SIMULATION~~ SIMULTANEOUS BOAT OPERATION

CULTURAL BRIEFING · VHF 16

QUESTIONS. · CHANNEL 5

SAFETY TOPICS. DRIVING TO/FROM SITE · EVAC – top parking lot

SCHOOL BUS

WILDLIFE

WOOLRIDGE BOAT FATIGUE

DOCK · OPERATIONS

"WOOL DIVE" · CALL · SIM OPS. · COMMUNICATION

DIVER ?? · – ERIC NAV LEAD. FOLLOW

GAS · – ANCHOR

DIVE profile · – TETHERED DIVER (300 ft)

emulsion. · – OFF STATION

NITROX 32% O_2 · – WEATHER

EVAC · SEATTLE · – RADIO / TETHER · COM WIRE COMM.

– DIVERS · RESCUE OPS

9am · FRI – BUDGET · – DIVERS · WATER TEMP

– ROL. TRAINING 61 F

MAN OVERBOARD

LIVE IDLE.

1017. CALIBRATE PESOLA SCALES · Also decontaminated holding buckets, calipers, and processing table. washed w/ Alconox + ~~FIS~~ rinsed w/ site water.

100 g · 20 g · 50 g ✓

10 g · 2 g · 5 g ✓

1030 Depart Northport Boat launch with 3 boats: CNI, EPA, Tieton

1042 Arrive A1 target location adjacent to Deadmans Eddy. Tieton drops 2 anchors.

1105: Rob Pedersen (EPA) will be doing first dive solo. Calling this A1-Dive 1, Depth at 20 feet. Diver in water at 1120. Back up at 1127. 31 mussel gathered. Goodie bag handed to Russ Bevill for inspection and okayed.

Scale: 1 square = ______

We will retain & process 20 mussels on the boat.
Rob Pedersen reported very good visibility and not having to travel very far to collect the mussels. We are calling ~~the~~ this location MB-43
A1-

Began processing @ 1149. End processing 1253. GM, RB, JP processed 20 mussels. mussels placed into cooler. All are Anadonta.
Released 11 mussels back into the same location at A1.

1309 - Return to Northport Boat Launch.

Spatial location for A1-Dive 1 recorded in Tablet 2. Diver was within 30 feet of that location during mussel collection. 117 43 35.2667 W
48 56 02.4772 N

1530 mussels transferred to vehicle, then placed in freezer at lodging in Northfork, WA.

Jerry G P[illegible]
9-28-16

Rite in the Rain. NSN: 7530-01-577-8866 Scale: 1 square = ______

9-29-16 A3

Kettle Falls Marina

0900

	Lake Level	
	1283.5	1 pm 9/27
	1283.2	noon 9/28
	1283.2	9/28 midnite

AECOM: Jenny Pretare
Glen Mejia
Russ Bevill
Gravity: Mike Duffield
Chad Furulie
CNI: Eric Weatherman
Josh Weatherman
EPA Dive Team: Rob Pederson
Rob Rau
Brent R.
Chris Leefers

A3 mussel target for today: 12-22

NPS permit requirements

Cultural Resource sensitivity @ Hayes Island.
- EPA needs to anchor
- Russ (CR monitor) will work with Mike (Teton captain) to look at underwater bathymetry and mapped cultural features before putting the anchor down.

HS briefing by Russ. Josh mentioned the tribal boats are out today.

Dive team → at 70 feet they can dive for 50 minutes. with safety ~~spots~~ stops, etc it might only be 20 minute of work time. each.

Departed launch at 0935
GM calibrated ~~weight~~ scales.
JP decontaminated calipers and buckets

1000 - At Hayes Island. RB + MD working to find location to put down anchors. We are at south end of Hayes Island mussel recon

Scale: 1 square = ________

area.
1010 - fully anchored at dive coordinates point 1.
Depth is about 50 feet

1015 - Chris Leeferts suiting up to dive
This will be A3 - Dive 1. Coordinates in Table + 2
118 06 50.7067 W
48 35 51.5037 N

Diver in the water 1029-1049. Pulled up 24.
live mussels & 5 shells filled with silt.
Russ inspected the bag and cleared it for processing.
Diver reported bottom depth at boat was
approx. 43 feet. She floated due south
for about 40 meters from boat. Bottom substrate
was rocky and silty. Went to as deep as ~~47~~ 61 feet.

1050 mussels handed over to AECOM for processing.

A3-MB13 was last transect in spring, so
we will call this location A3-MB14

After further inspection, we have only 19 live
mussels. They will proceed with a 2nd dive
GM + RB to ~~[illegible]~~ begin processing at 1104.

A3-Dive 2 in same location as A3-Dive 1
Rob Pederson doing Dive 2. Dive begins at 1108.
46 feet depth @ bottom, max depth was 66
feet. Went due south.
1108-1134 7 dead - shells tossed back (empty)
8 alive
RB inspected & cleared mussels in goodie bag for
cultural resources. transferred to holding bucket
for processing

1140 Dive team will do additional practice dives while
AECOM processes

1234 - Completed processing 22 mussels. Put 5 live mussels back in the lake.

1250 pulled up anchor and headed back to launch

1300 From Kettle Fall's marina, mussel samples were transferred to Eric Weathermans shop in Kettle Falls, where they were placed in the freezer overnight, in a locked, gated shop building.

Jenny a [illegible]

9-29-16

Scale: 1 square = ________

0805 @ Gifford Boat Launch - for work at A4.

~~080~~

0830 - H/S briefing by Russ Bevill
Objectives for day by J. Pretare.

On site today:
AECOM: J. Pretare, G. Mejia, R. Bevill
Gravity: M. Duffield, C. Furulie
~~C~~ CNI: E. Weatherwen, J. Weatherman, Cameron Weatherman.

EPA: Rob Pederson, Rob Rau, Chris Leefers, Brent R.

0851 - Shoved off dock and headed to Inchellium.

0915 - GM calibrated PESOLA 100 gram scale with 50/20/10 wts

Freezer with samples is onboard Tieton today, plugged in to electrical outlet + functioning normally. Reading -11°F

0923 Anchored @ Inchellium
A4-Dive 1 location is 70 feet deep. Diver Rob Rau will descend here ~~and proceed southwest to shallower water~~. In the water 0930 - 0950
Diver reports 60 feet depth at boat. He headed east to ~~shall~~ slightly deeper water. Visibility is bad because there is no current. He went about 20 meters total ~~15~~ distance to the east + north. Rob could not see his guage underwater to determine safety stop location. Surfaced w/ goody bag. RB checked for CR issues + cleared: 13 empty shells + 1 with a crayfish (put back)
30 live mussels - kept.
19 live mussels - returned to water.

1000 - pulling anchor ē heading to Bissell Island

Mussels collected on A4-Dive1 will be A4-MB18
Location: 118 11 12.4896 W
48 19 41.2505 N

1025 - Drop anchor at Bissell Island. Boat depth finder says 68 feet.

1042 - Rob Pedersen is preparing to dive. In the water @1048.
Location: 118 09 41.1508 W.
48 17 28.7036 N
Direction of dive - SE to about 40-50 meters.
Depth reported by diver - 52 feet. It's been pretty flat throughout the dive. Switched to east of boat to 64 feet depth, found some more mussels
Surfaced at 1127 with the following:
3 empty mussel shells
15 live mussels

1135 - Started processing mussels from A4-Dive 1 (GM, RB, CF) as A4-MB18. 15 total processed

1235 - Started processing mussels from A4-Dive 2 (GM, RB, CF) as A4-MB19. 15 total processed

1322 - Processing completed. Heading back to Gifford boat launch. Mussel samples placed on wet ice in cooler. 15 remaining live mussels returned to the lake at A4-Dive 2 location.

1336 @ dock.
transferred freezer to hotel at 1630.

[signature]
9-30-16

0800 at Cresent Bay boat launch. 51°F
lightwind
0815 boats in water
0830 Russ Bevill gives H/S briefing

Personnel present:
AECOM: J. Pretare, R. Bevill, G. Mejia
Gravity: M. Duffield, C. Funke
CNI: Josh + Eric Weathermen
EPA: Rob Pedersen, Chris Leeferts, Rob Rau, Brent R.

0845: EPA divers suiting up in gear.
0858: Left launch
0945: Arrive at location for A6-Dive 1
and anchor. ~~118 38 35.3786 W~~
69 feet depth. ~~47 56 17.6067 N~~

1000 Chris Leeferts suiting up to do the 1st dive and she will proceed east along shoreline.
1010 had to reset the anchors because we drifted to deep. Location: 118 3834.7695 W
47 56 17.4176 N

1031: Diver in water, reports
61 feet on bottom @ boat.
visibility - good - 20 feet. Finding mussels along 60 foot contour. Travelled about 35 m. north of boat before turning around.

GM calibrated weights & decontaminated buckets + calipers

Diver to surface @ 1111 with 21 live mussels max. depth 65 feet. Not much current, substrate is more sandy then silty. visibility very good.

This will be A6-MB11.

Rough calculation of average mussel mass is 15 g. per mussel. If 7.5 g ww x 5 individuals = 37.5 g ww per composite.
This amount should be adequate to meet the number + mass ~~m~~ needed for 4 new composites and have enough left ~~for~~ to supplement existing composite #2. However, another dive will be conducted at this location to collect a few more mussels while processing is taking place.

1134: Diver Rob Pedersen will be doing ~~a~~ ~~s~~ A6-Dive 2 to the ~~south~~/west of boat. Dive A6-2 is the same location as A6-Dive1 but in a different direction.

GM, RB + CF begin processing mussels as A6-MB11.

1137: Rob P. in water. 63 feet depth reported by diver. He went about 60 meters out from the boat. Diver returned to surface at 1200
13 live mussels
1 shell
2 pebbles
} returned to water.
These will be processed as A6-MB12
Processed 4 mussels from A6-Dive 2, then released the other 9. My field calculation after processing (spreadsheet) is that we ended up with 46 grams of mass (w/o shell) per composite for 4 composites. Plus 1 mussel of 23 g. for a supplement.

25 total mussels processed at A6. Completed at 1310.

1325 – Departed A6, heading to boat launch

1408 – Return to Cresent Bay launch.
Transfer samples to vehicles on wet ice in cooler

Jenny A. R[illegible] 10-1-16

Scale: 1 square = ______

02 OCT 2016 SUNDAY
SAMPLING AREA 5 – MUSSEL DIVE

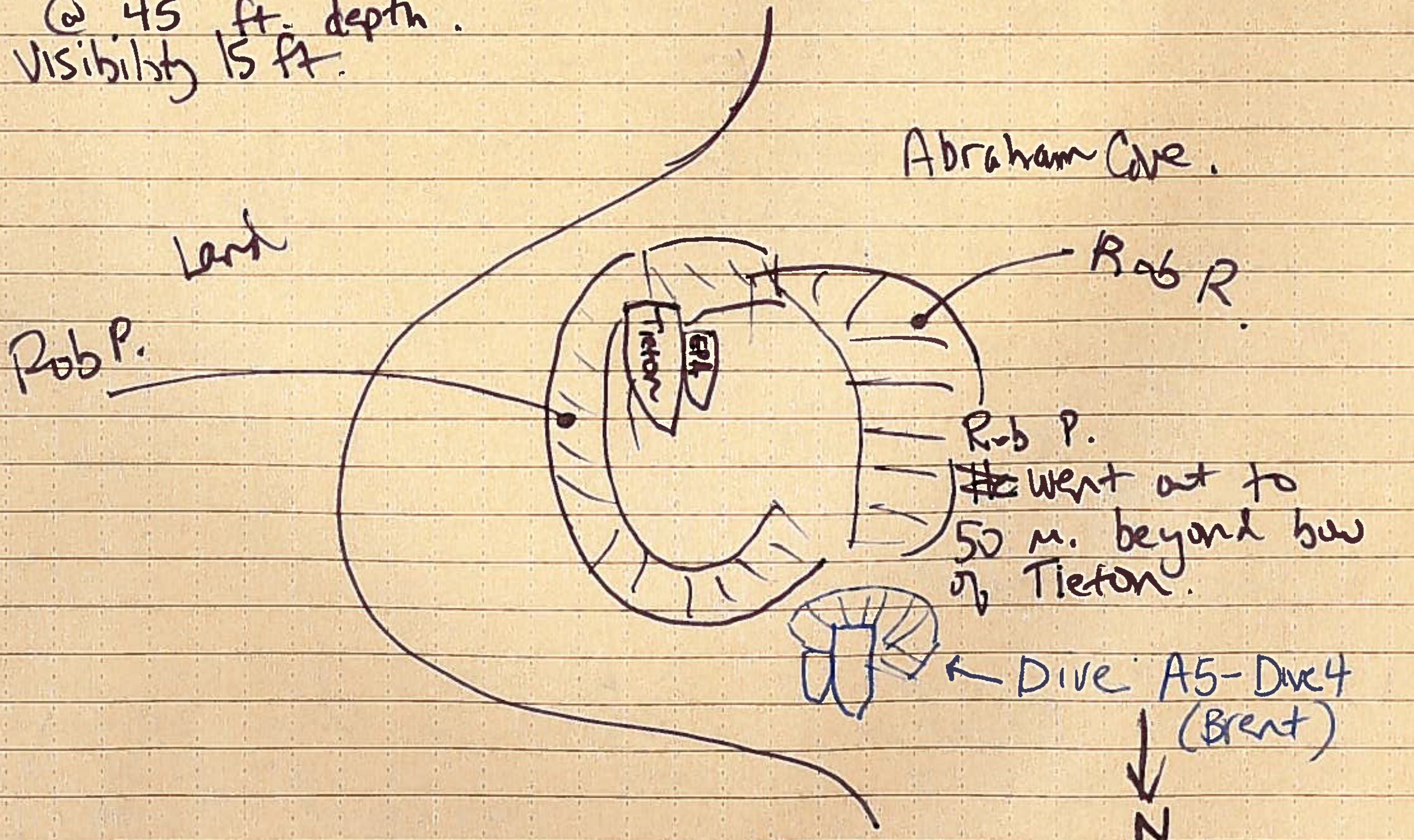
0830 CREWS meet at FORT SPOKANE BOAT LAUNCH

AECOM: J. PRETARE, R. BOLIN, G. MEJIA
EPA: R. PETERSON, B. [illegible], R. ROW, C. LEPORTS
GRAVITY: M. RUFFING, C. FUNK
CAI: E. WEBSTER, J. WETHERMAN

0900 DAILY CREW ~~BRIE~~ BRIEFING (JP)
SAFETY MEETING (RB)
DIVE SAFETY (RR)
WEATHER. RIVER REACH INFO (EW)

0930 – Depart Fort Spokane Launch
0950 – DROP ANCHOR. (Abraham Cove)
A5 – DIVE 1 Coordinates: 118 20 45.1079 W
47 55 02.8286 N
Depth: 31 feet as reported on Tieton depth finder

1015 – First diver in water is Rob Pedersen. Diving to south of vessel. Bottom substrate is silty. Diver reports 31 feet depth @ boat. Initially went east into cove, the headed west into deeper water. 1 mussel @ 45 ft. depth.
Visibility 15 ft.



Rob reported he dropped 1 mussel before putting it inside bag. Diver up at 1045 with 18 live mussels !!

Rob P. reports mussels few & far between mussels barely exposed above the ground surface. 68 max depth.

Rob Rau will do a second dive at this same anchor location but more of a westerly bearing from the boats.

1100 GM, RB, CF to process mussels from A5-Dive1 as A5-MB21.

1107 Rob Rau in water.
Reporting 38 ft. depth due west of boats @ 20 m. distance.
Up at 1137 with 6 live mussels. These will be A5-MB22.

1150 - Pull anchor & depart Abraham Cove.
Bathroom break @ campground.

1237 - Anchor in ~~[illegible]~~ cove @ north end of site.
Chris L. preparing for A5-Dive 3. (~~MB~~ A5-MB23)
Depth @ boat location is 60 ft.

1249 - Diver in the water. Visibility ~10 ft. muddy bottom. Lots of crayfish here.
1322 - Diver to surface. with 2 live mussels.
Coordinates: 118 20 47.5523 W
47 57 11.7753 N
64 feet max depth.

1340 - Depart location of A5-Dive 3 heading back to Abraham Cove // Depth @ anchor point is 60 feet. Coordinates: 118 20 45.4770 W
47 55 05.1376 N
A5-Dive 4 → A5-MB24

Scale: 1 square = ________

1350 - Anchor again at Abraham Cove but on the north side of the entrance

GM, CF, RB finished processing 26 mussels, placed them on wet ice in the cooler.

Coordinates on last page.

1408 - Brent R. suiting up for final dive of the trip. A5-Dive4
1415 - Diver in the water.
1428 - Diver at surface. 12 live mussels. Cluster of mussels at 51 feet just below boat. Going to keep ~~8~~ 10 mussels and put 2 back. So there will be 6 mussels per composite.
Mussels processed as A5-MB24 J.P 12-29-16
1440 - Departing Abraham Cove to return to Fort Spokane. We will process the remaining mussels at the dock.

1530 - Back to Fort Spokane Launch. processed the remaining 10 mussels. transferred mussels to cooler on dry ice and then to J. Pretare vehicle. Put in freezer at ~~loging~~ lodging in Grand Coulee.

Jenny G P
10-2-16

04 OCTOBER 2016
SAMPLING AREA 2
DEPLOY CRAYFISH TRAPS.

0800 LEAVE HOTEL MEET AT WEATHERMANS WAREHOUSE
0900 AT CHINA BEND BOAT LAUNCH
FIELD CREW:
CNI SAFETY BOAT: E. WEATHERMAN, J. WEATHERMAN
GRAVITY : M. DUFFIELD · E SLOANE
AECOM: MICHELLE STEINER, G. MEJIA
· SAFETY MEETING: (MS)
- HAZARDS ASSOCIATED WITH DEPLOYING CRAYFISH TRAPS / ROPES / WEIGHTS.
- TURKEY ON ROAD
0930 · STARTING WITH A2- CT31 Depth

1017	A2-CT31	23 ft	All Salmon bait
1021	A2-CT32	17 ft	
	See Data Sheet for crayfish trap location info		
1024	A2-CT33	25 ft	
1037	A2-CT34	24 ft	
1041	A2-CT35	21 ft	
1049	A2-CT36	33 ft	
1054	A2-CT37	15 ft	
1058	A2-CT38	22 ft	
1103	A2-CT39	23 ft	
1110	A2-CT40	25 ft	
1113	A2-CT41	22 ft	
1123	A2-CT42	19 ft	
1127	A2-CT43	8 ft	
1132	A2-CT44	9 ft	
1137	A2-CT45	22 ft	
1144	A2-CT46	21 ft	
1149	A2-CT47	35 ft	
1154	A2-CT48	27 ft	
1200	A2-CT49	6 ft	
1204	A2-CT50	20 ft	
1212	A2-CT51	35 ft	
1215	A2-CT52	27 ft	
1221	A2-CT53	28 ft	

Scale: 1 square = ________

04 OCTOBER 2016

1225	A2-CT54	15 feet	salmon bait
1301	A2-CT55	28 feet	
1305	A2-CT56	20 feet	
1309	A2-CT57	30 ft	
1316	A2-CT58	6 ft	
1320	A2-CT59	15 ft	
1341	A2-CT60	30 ft	
1344	A2-CT61	19 ft	
1350	A2-CT62	25 ft	
1353	A2-CT63	30 ft	

1400 AT CHINA BEND BOAT LAUNCH.

[signature] 10/4/16

10/05/16

0730 Arrive at China Bend Boat Launch
Weather Overcast + 40°F No Wind

0745 Conduct Boat Dock Safety Briefing

0800 Decon Sample Containers and Prep To Pull Traps

0810 Leave Dock To Begin Checking Traps

Location	Time	#	Type
A2-CT31	0815	3	Northern
A2-CT32	0820	1	Northern
A2-CT33	0823	0	—
A2-CT34	0830	1	Northern
A2-CT35	0833	1	Northern
A2-CT36	0840	0	—
A2-CT37	0843	0	—
A2-CT38	0847	0	—
A2-CT39	0850	0	—
A2-CT40	0856	1	Northern
A2-CT41	0900	0	snails
A2-CT42	~~1003~~ 0903	0	—
A2-CT43	~~1006~~ 0906	0	—
A2-CT44	~~1010~~ 0910	0	—
A2-CT45	~~1015~~ 0915	4	3 Signal, 1 Northern
A2-CT46	0924	1	Northern
A2-CT47	0930	0	sculpin
		$\boxed{12}$	

Location	Time	#	Type
A2-CT48	0934	3	Northern
A2-CT49	0942	0	—
A2-CT50	0947	0	5 Sculpin
A2-CT51	0956	0	—
A2-CT52	0959	0	—
A2-CT53	1003	1	Northern
A2-CT54	1012	2	Northern
A2-CT55	1020	1	Northern
A2-CT56	1025	2	Northern
A2-CT57	1031	0	—
A2-CT58	1039	1	Northern
A2-CT59	1044	0	—
A2-CT60	1048	0	—
A2-CT61	1052	0	—
A2-CT62	1058	1	Northern
A2-CT63	1103	0	—
		$\boxed{11}$	23 Total

115 gm Signal CF
659 gm Northern CF

1120 Scale # 1 Calibrated To 35 grams

1300 Completed Processing Crayfish and Sent info To Project Team from The Boat.

1325 Depart The Dock To Pull C.F. Traps

1503 Caught and Released 1 Northern CrayFish at A2-CT53

1540 Completed Pulling Crayfish Traps from River/Lake

Scale: 1 square = ________

10/5/16

1545 Return to Dock

1615 Finished Loading Boats on to Trailers and Transferring Gear

1620 Depart Boat Launch for Colville

1645 Arrive at Hotel and Place Cray Fish in Freezer from Iced Cooler

1700 End of Day

[signature]

Signed 10-5-16
J.P. 12-21-16

APPENDIX B

TISSUE COMPOSITING PLAN

Table of Contents

Section 1:
TAI’s initial draft plan submitted 6/9/16

Kessel Cristy SPOK

From:	McCaig Kris SPOK
Sent:	Thursday, June 9, 2016 5:08 PM
To:	Dustan Bott (Bott.Dustan@epa.gov); Cameron.Irvine@CH2M.com; Marc Stifelman (stifelman.marc@epa.gov); John Toll (JohnT@windwardenv.com); Dina Johnson (DLJohnson@ramboll.com); Henselen Becky SPOK; Nancy Judd (NancyJ@windwardenv.com); Berit Bergquist (BeritB@windwardenv.com); Jennifer Pretare (Jennifer.Pretare@aecom.com); Cristy Kessel (cristy.kessel@outlook.com)
Subject:	RE: Draft BMI Compositing Plan materials for EPA
Attachments:	UCR: Updated compositing spreadsheet

See the attached from Berit.

Thanks again for the call today. We look forward to hearing from EPA and answering any further questions you may have.

Kris

Kris McCaig
Manager, Environment & Public Affairs
Teck American Incorporated
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Fax: +1.509.922.8767
Mobile: +1.509.434.8542
eMail: Kris.McCaig@teck.com
www.teck.com

From: McCaig Kris SPOK
Sent: Wednesday, June 08, 2016 3:06 PM
To: Dustan Bott (Bott.Dustan@epa.gov); Cameron.Irvine@CH2M.com; Marc Stifelman (stifelman.marc@epa.gov); John Toll (JohnT@windwardenv.com); Dina Johnson (DLJohnson@ramboll.com); Henselen Becky SPOK; Nancy Judd (NancyJ@windwardenv.com); Berit Bergquist (BeritB@windwardenv.com); Jennifer Pretare (Jennifer.Pretare@aecom.com); Cristy Kessel (cristy.kessel@outlook.com)
Subject: FW: Draft BMI Compositing Plan materials for EPA

Please see the attached and below from Berit for review prior to our call tomorrow afternoon at 2:00 PM.

Thanks,

Kris

Kris McCaig
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Mobile: +1.509.434.8542
eMail: Kris.McCaig@teck.com
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From: Berit Bergquist [mailto:BeritB@windwardenv.com]
Sent: Wednesday, June 08, 2016 12:51 PM
To: McCaig Kris SPOK

Cc: Henselen Becky SPOK; Nancy Judd; John Toll; Kate McPeek
Subject: UCR: Draft BMI Compositing Plan materials for EPA

Hi Kris,

Attached are two files containing: 1) an Excel workbook with the draft macroinvertebrate tissue compositing plan, and 2) draft maps to assist with the compositing plan discussion tomorrow.

In order to help EPA become familiar with the worksheet before our discussion tomorrow, the following provides a description for each of the worksheets in the workbook:

- "Mussel Data" and "Crayfish Data": These worksheets contain the raw data, including sample locations, date and time of collection, sample IDs, measurements, health (i.e., live or dead), whether sample shipment was delayed, whether catfood was used for crayfish bait, and species. Some of these factors were treated as follows in the proposed compositing plan:
    - Only live mussels are proposed to be analyzed
    - Samples in delayed shipment are proposed to be analyzed (provided samples are further inspected in the lab and no anomalies are noted)
    - Crayfish caught with catfood bait are proposed to be excluded for locations with organic analyses, if sufficient organisms are available at a location. However, in Area 5 three crayfish from one trap (CT15) were captured using catfood and are proposed to be analyzed in one single composite.
    - For crayfish, both northern and native signal crayfish were collected within certain areas, and not proposed to be treated separately in the composites (i.e., in some cases it is proposed that they be combined).

- "Mussel Worksheet" and "Crayfish Worksheet": These worksheets present the proposed compositing options (and some alternative options), that were selected based on locations, number of organisms, and target weights, along with factors noted above. Options that involve distributing specimens differently within a mussel beach are labeled 1 and 1a (e.g., 2 composites containing 6 mussels each or 6 composites containing 2 mussels each), whereas options that involve different combinations of mussel beaches or traps are labeled 1 and 2 and are separated with a dashed line. TAI's proposed option is highlighted in bright green.

- "Mussel Composites" and "Crayfish Composites": These worksheets identify the specific samples that go into each proposed composite sample, and assign a composite ID. In addition, field splits and field replicates are identified.

- "Mussel Pivot" and "Crayfish Pivot": These pivot tables provide a summary of the number of samples, weights, and sample type (original, field split, or field replicate) for each composite, based on the information in the "Composites" worksheets.

- "Composite Summary": This worksheet summarizes the following per composite: the composite ID, the number of individuals in the composite, the total estimated weight available for analysis, and the chemicals to be analyzed (for some samples the number of analytes is reduced because of insufficient sample mass).

- "Overall Summary": This table summarizes the total number of actual/proposed composites, compared to the targeted number.

- "QAPP Target Numbers" and QAPP Analytes and Mass": These are tables A7-2 and A7-3 from the QAPP as a reference for the source on target numbers, analytes, and mass required for analysis.

The attached maps are the same draft maps sent to EPA last week, but they have been hand-marked to show the beach and crayfish trap locations where live specimens were caught. In addition, the number of specimens and their weights are shown. These maps are provided to help visualize the allocation of specimens to different composites. Note that the target level of effort from the QAPP was met in all areas (12 mussel beaches and 90 crayfish trap nights); the locations that are hand-marked are the only ones where live specimens were collected.

Berit

Berit Bergquist
Senior Associate
Windward Environmental
200 West Mercer St.
Suite 401
Seattle, WA 98119
206.812.5403

Mussel Composite Worksheet

1	TAL metals and mercury	2	
2	Total mercury	1.5	3.5
3	MeHg	1.5	5
4	Inorganic As	3	8
5	PCBs	10	18
6	Dioxins/furans	10	28

Shaded yellow = mussels in delayed cooler

Shaded blue = clams also collected

	Target sample Weights (g)				Actual sample Weights							Options						
Sampling Area	Original Sample (Type 1)	Original With EPA Split (Type 1a)	Original With Field Split (Type 1b)	Field Replicate (Type 2)	Area	Beach	# Dead Mussels	# Live Mussels	Mussel Species	Total Live Weight	Live Weight for Analysis	Option #	Mussels per sample	# samples	Enough for EPA Split?	Enough for Field Split?	Enough for Field Replicate?	Analytes
A1	4.5	7	9	4.5	A1	MB05	0	12	A	181	90.5	1	2	6	yes	yes	yes	all (1 and 2)
A1									A			1a	6	2	yes	yes	yes	all (1 and 2)
A2	30	32.5	60	30	A2	MB01	2	1	A	2	1		not enough mass for any analyses					
A2						MB04	6	16	A	47.6	23.8	1	7-8	3	yes	no	yes	all
A2						MB05	0	7	A	236	118	1a	23	1	yes	yes	yes	all
A2						MB06	0	30	A	1047	523.5	1	10	3	yes	yes	yes	all
A2												1a	15	2	yes	yes	yes	
A3	4.5	7	9	4.5	A3	MB01	0	4	A	81	40.5	1	1 and 3	2	yes	yes	~~no~~ yes	all (1 and 2)
A3												1a	4	1	yes	yes	no	all (1 and 2)
A3						MB04	0	1	A	3.5	1.75	1	1 and 3	2	yes	~~no~~ yes	no	all
A3						MB06	2	3	A	19.3	9.65							
A3						MB12	1	0	A				only dead collected, and not enough mass					
A3						MB13	1	1	A	4	2		one live and one dead collected, and not enough mass					
A4	4.5	7	9	4.5	A4	MB07	1	0	A				only dead collected					
A4						MB10	1	0	A				only dead collected					
A4						MB13	2	0	A				only dead collected					
A5	30	32.5	60	30	A5	MB08	1	0	A				only dead collected, and only enough mass for metals					
A6	30	32.5	60	30	A6	MB01	8	19	A	36.3	18.15	1	19	1	no	no	no	1-5 (no D/F)
A6						MB03	0	7	A	19	9.5	1	7	1	no	no	no	1-4 (no PCBs or D/F)
A6						MB04	1	0	A				only dead collected, and not enough mass					
A6						MB05	3	4	A	7.5	3.75	1	4	1	no	no	no	1 and 2
A6						MB07	1	10	A	25.7	12.85		only dead collected, and not enough mass					
A6						MB08	7	7	A	11.6	5.8	1	7	1	no	no	no	1,2,3
A6						MB09	1	9	A	18.4	9.2	1	9	1	no	no	no	1-4 (no PCBs or D/F)
A6						MB10	0	0					only clams collected					
						MB01												
						MB07												
A6					A6	MB08	16	36	A	73.6	36.8	2	36	1	yes	no	no	all
A6						MB03	0	7	A	19	9.5	2	7	1	no	no	no	1-4 (no PCBs or D/F)
A6						MB09	1	9	A	18.4	9.2	2	9	1	no	no	no	1-4 (no PCBs or D/F)
A6						MB05	3	4	A	7.5	3.75	2	4	1	no	no	no	1 and 2
A6					A6	all beaches		56	A	118.5	59.25	3	28	2	yes	no	no	all
Sanpoil River	30	32.5	60	30	SR	MB09		7	WP	40.6	20.3	1	7	1	no	no	no	1-5 (no D/F)
Sanpoil River						MB04		1	WP	10.1	5.05	1	2	1	no	no	no	1-5 (no D/F)
Sanpoil River						MB03		1	WP	32	16							
Sanpoil River						MB01		4	WP	22.2	11.1	1	4	1	no	no	no	1-4 (no PCBs or D/F)
Sanpoil River						MB08		3	WP	16.9	8.45	1	4	1	no	no	no	1-4 (no PCBs or D/F)
Sanpoil River						MB11		1	WP	1.2	0.6							
Sanpoil River					SR	MB09		7	WP	40.6	20.3	2	9	1	yes	no	no	all
Sanpoil River						MB04		1	WP	10.1	5.05							
Sanpoil River						MB03		1	WP	32	16							
Sanpoil River						MB01		4	WP	22.2	11.1	2	4	1	no	no	no	1-4 (no PCBs or D/F)
Sanpoil River						MB08		3	WP	16.9	8.45	2	4	1	no	no	no	1-4 (no PCBs or D/F)
Sanpoil River						MB11		1	WP	1.2	0.6							
Sanpoil River					SR	all beaches		17	WP	123	61.5	3	17	1	yes	yes	no	all

Compositing proposal for mussels

Area	Sample ID	Location ID	Species	Health	Weight (g)	Delayed Cooler Sample?	Estimated Tissue Weight (g)	Composite ID	Sample Type
A1	A1-MB05-MU-01	A1-MB05	Anodonta sp.	Live	2	Y	1	A1-MU-C001-ST-A	1
A1	A1-MB05-MU-02	A1-MB05	Anodonta sp.	Live	1	Y	0.5	A1-MU-C001-ST-A	1
A1	A1-MB05-MU-03	A1-MB05	Anodonta sp.	Live	2	Y	1	A1-MU-C001-ST-B	2
A1	A1-MB05-MU-04	A1-MB05	Anodonta sp.	Live	2	Y	1	A1-MU-C001-ST-B	2
A1	A1-MB05-MU-05	A1-MB05	Anodonta sp.	Live	2	Y	1	A1-MU-C002-ST-SP	1b
A1	A1-MB05-MU-06	A1-MB05	Anodonta sp.	Live	8	Y	4	A1-MU-C002-ST-SP	1b
A1	A1-MB05-MU-07	A1-MB05	Anodonta sp.	Live	9	Y	4.5	A1-MU-C002-ST-SP	1b
A1	A1-MB05-MU-08	A1-MB05	Anodonta sp.	Live	25	Y	12.5	A1-MU-C002-ST-SP	1b
A1	A1-MB05-MU-09	A1-MB05	Anodonta sp.	Live	24	Y	12	A1-MU-C002-ST-SP	1b
A1	A1-MB05-MU-10	A1-MB05	Anodonta sp.	Live	30	Y	15	A1-MU-C002-ST-SP	1b
A1	A1-MB05-MU-11	A1-MB05	Anodonta sp.	Live	36	Y	18	A1-MU-C001-ST-B	2
A1	A1-MB05-MU-12	A1-MB05	Anodonta sp.	Live	40	Y	20	A1-MU-C001-ST-A	1
A2	A2-MB01-MU-01	A2-MB01	Anodonta sp.	Live	2	N	1	archive	
A2	A2-MB01-MU-02	A2-MB01	Anodonta sp.	Dead	1	N	0.5	archive	
A2	A2-MB01-MU-03	A2-MB01	Anodonta sp.	Dead	2	N	1	archive	
A2	A2-MB04-MU-01	A2-MB04	Anodonta sp.	Dead	2.3	N	1.15	archive	
A2	A2-MB04-MU-02	A2-MB04	Anodonta sp.	Dead	1.5	N	0.75	archive	
A2	A2-MB04-MU-03	A2-MB04	Anodonta sp.	Dead	3.2	N	1.6	archive	
A2	A2-MB04-MU-04	A2-MB04	Anodonta sp.	Live	2.6	N	1.3	A2-MU-C001-ST-A	1
A2	A2-MB04-MU-05	A2-MB04	Anodonta sp.	Live	4.3	N	2.15	A2-MU-C001-ST-A	1
A2	A2-MB04-MU-06	A2-MB04	Anodonta sp.	Live	4.2	N	2.1	A2-MU-C001-ST-A	1
A2	A2-MB04-MU-07	A2-MB04	Anodonta sp.	Live	3.5	N	1.75	A2-MU-C001-ST-B	2
A2	A2-MB04-MU-08	A2-MB04	Anodonta sp.	Live	3.9	N	1.95	A2-MU-C001-ST-B	2
A2	A2-MB04-MU-09	A2-MB04	Anodonta sp.	Live	2.3	N	1.15	A2-MU-C001-ST-B	2
A2	A2-MB04-MU-10	A2-MB04	Anodonta sp.	Live	2.2	N	1.1	A2-MU-C001-ST-A	1
A2	A2-MB04-MU-11	A2-MB04	Anodonta sp.	Live	2.5	N	1.25	A2-MU-C003-ST	1
A2	A2-MB04-MU-12	A2-MB04	Anodonta sp.	Live	3.5	N	1.75	A2-MU-C002-ST	1
A2	A2-MB04-MU-13	A2-MB04	Anodonta sp.	Live	2.5	N	1.25	A2-MU-C002-ST	1
A2	A2-MB04-MU-14	A2-MB04	Anodonta sp.	Live	1.3	N	0.65	A2-MU-C003-ST	1
A2	A2-MB04-MU-15	A2-MB04	Anodonta sp.	Live	1.6	N	0.8	A2-MU-C003-ST	1
A2	A2-MB04-MU-16	A2-MB04	Anodonta sp.	Dead	1.7	N	0.85	archive	
A2	A2-MB04-MU-17	A2-MB04	Anodonta sp.	Live	3.3	N	1.65	A2-MU-C002-ST	1
A2	A2-MB04-MU-18	A2-MB04	Anodonta sp.	Dead	1.3	N	0.65	archive	
A2	A2-MB04-MU-19	A2-MB04	Anodonta sp.	Live	3.2	N	1.6	A2-MU-C002-ST	1
A2	A2-MB04-MU-20	A2-MB04	Anodonta sp.	Dead	1.8	N	0.9	archive	
A2	A2-MB04-MU-21	A2-MB04	Anodonta sp.	Live	4	N	2	A2-MU-C003-ST	1
A2	A2-MB04-MU-22	A2-MB04	Anodonta sp.	Live	2.7	N	1.35	A2-MU-C002-ST	1
A2	A2-MB05-MU-01	A2-MB05	Anodonta sp.	Live	48	N	24	A2-MU-C002-ST	1
A2	A2-MB05-MU-02	A2-MB05	Anodonta sp.	Live	33	N	16.5	A2-MU-C001-ST-A	1
A2	A2-MB05-MU-03	A2-MB05	Anodonta sp.	Live	24	N	12	A2-MU-C001-ST-A	1
A2	A2-MB05-MU-04	A2-MB05	Anodonta sp.	Live	40	N	20	A2-MU-C001-ST-B	2
A2	A2-MB05-MU-05	A2-MB05	Anodonta sp.	Live	23	N	11.5	A2-MU-C001-ST-B	2
A2	A2-MB05-MU-06	A2-MB05	Anodonta sp.	Live	26	N	13	A2-MU-C003-ST	1
A2	A2-MB05-MU-07	A2-MB05	Anodonta sp.	Live	42	N	21	A2-MU-C003-ST	1
A2	A2-MB06-MU-01	A2-MB06	Anodonta sp.	Live	51	N	25.5	A2-MS-C005-ST-B	2
A2	A2-MB06-MU-02	A2-MB06	Anodonta sp.	Live	43	N	21.5	A2-MS-C005-ST-A	1
A2	A2-MB06-MU-03	A2-MB06	Anodonta sp.	Live	50	N	25	A2-MS-C005-ST-A	1
A2	A2-MB06-MU-04	A2-MB06	Anodonta sp.	Live	50	N	25	A2-MS-C004-ST-SP	1b
A2	A2-MB06-MU-05	A2-MB06	Anodonta sp.	Live	44	N	22	A2-MS-C004-ST-SP	1b
A2	A2-MB06-MU-06	A2-MB06	Anodonta sp.	Live	47	N	23.5	A2-MS-C004-ST-SP	1b
A2	A2-MB06-MU-07	A2-MB06	Anodonta sp.	Live	27	N	13.5	A2-MS-C004-ST-SP	1b
A2	A2-MB06-MU-08	A2-MB06	Anodonta sp.	Live	42	N	21	A2-MS-C004-ST-SP	1b
A2	A2-MB06-MU-09	A2-MB06	Anodonta sp.	Live	32	N	16	A2-MS-C004-ST-SP	1b
A2	A2-MB06-MU-10	A2-MB06	Anodonta sp.	Live	28	N	14	A2-MS-C004-ST-SP	1b
A2	A2-MB06-MU-11	A2-MB06	Anodonta sp.	Live	25	N	12.5	A2-MS-C004-ST-SP	1b
A2	A2-MB06-MU-12	A2-MB06	Anodonta sp.	Live	27	N	13.5	A2-MS-C004-ST-SP	1b
A2	A2-MB06-MU-13	A2-MB06	Anodonta sp.	Live	23	N	11.5	A2-MS-C004-ST-SP	1b
A2	A2-MB06-MU-14	A2-MB06	Anodonta sp.	Live	18	N	9	A2-MS-C005-ST-A	1
A2	A2-MB06-MU-15	A2-MB06	Anodonta sp.	Live	20	N	10	A2-MS-C005-ST-A	1
A2	A2-MB06-MU-16	A2-MB06	Anodonta sp.	Live	29	N	14.5	A2-MS-C005-ST-B	2
A2	A2-MB06-MU-17	A2-MB06	Anodonta sp.	Live	34	N	17	A2-MS-C005-ST-B	2
A2	A2-MB06-MU-18	A2-MB06	Anodonta sp.	Live	40	N	20	A2-MS-C005-ST-A	1
A2	A2-MB06-MU-19	A2-MB06	Anodonta sp.	Live	40	N	20	A2-MS-C006-ST-A	1
A2	A2-MB06-MU-20	A2-MB06	Anodonta sp.	Live	41	N	20.5	A2-MS-C006-ST-A	1
A2	A2-MB06-MU-21	A2-MB06	Anodonta sp.	Live	28	N	14	A2-MS-C005-ST-B	2
A2	A2-MB06-MU-22	A2-MB06	Anodonta sp.	Live	51	N	25.5	A2-MS-C006-ST-A	1
A2	A2-MB06-MU-23	A2-MB06	Anodonta sp.	Live	29	N	14.5	A2-MS-C005-ST-B	2
A2	A2-MB06-MU-24	A2-MB06	Anodonta sp.	Live	23	N	11.5	A2-MS-C006-ST-A	1
A2	A2-MB06-MU-25	A2-MB06	Anodonta sp.	Live	20	N	10	A2-MS-C006-ST-A	1
A2	A2-MB06-MU-26	A2-MB06	Anodonta sp.	Live	28	N	14	A2-MS-C006-ST-B	2
A2	A2-MB06-MU-27	A2-MB06	Anodonta sp.	Live	27	N	13.5	A2-MS-C006-ST-B	2
A2	A2-MB06-MU-28	A2-MB06	Anodonta sp.	Live	41	N	20.5	A2-MS-C006-ST-B	2
A2	A2-MB06-MU-29	A2-MB06	Anodonta sp.	Live	32	N	16	A2-MS-C006-ST-B	2
A2	A2-MB06-MU-30	A2-MB06	Anodonta sp.	Live	57	N	28.5	A2-MS-C006-ST-B	2
A3	A3-MB01-MU-01	A3-MB01	Anodonta sp.	Live	4	N	2	A3-MU-C002-ST	1
A3	A3-MB01-MU-02	A3-MB01	Anodonta sp.	Live	70	N	35	A3-MU-C001-ST	1
A3	A3-MB01-MU-03	A3-MB01	Anodonta sp.	Live	3	N	1.5	A3-MU-C002-ST	1
A3	A3-MB01-MU-04	A3-MB01	Anodonta sp.	Live	4	N	2	A3-MU-C002-ST	1
A3	A3-MB04-MU-01	A3-MB04	Anodonta sp.	Live	3.5	N	1.75	A3-MU-C004-ST	1
A3	A3-MB06-MU-01	A3-MB06	Anodonta sp.	Dead	1	N	0.5	archive	
A3	A3-MB06-MU-02	A3-MB06	Anodonta sp.	Dead	1	N	0.5	archive	
A3	A3-MB06-MU-03	A3-MB06	Anodonta sp.	Live	1.9	N	0.95	A3-MU-C004-ST	1
A3	A3-MB06-MU-04	A3-MB06	Anodonta sp.	Live	3.4	N	1.7	A3-MU-C004-ST	1
A3	A3-MB06-MU-05	A3-MB06	Anodonta sp.	Live	14	N	7	A3-MU-C003-ST	1
A3	A3-MB12-MU-01	A3-MB12	Anodonta sp.	Dead	2.4	N	1.2	archive	
A3	A3-MB13-MU-01	A3-MB13	Anodonta sp.	Dead	2.1	N	1.05	archive	
A3	A3-MB13-MU-02	A3-MB13	Anodonta sp.	Live	4	N	2	archive	
A4	A4-MB07-MU-01	A4-MB07	Anodonta sp.	Dead	11	N	5.5	archive	
A4	A4-MB10-MU-01	A4-MB10	Anodonta sp.	Dead	22	N	11	archive	
A4	A4-MB13-MU-01	A4-MB13	Anodonta sp.	Dead	10	N	5	archive	
A4	A4-MB13-MU-02	A4-MB13	Anodonta sp.	Dead	5.8	N	2.9	archive	
A5	A5-MB08-MU-01	A5-MB08	Anodonta sp.	Dead	4.2	Y	2.1	archive	
A6	A6-MB01-MU-01	A6-MB01	Anodonta sp.	Live	3	N	1.5	A6-MU-C001-ST	1
A6	A6-MB01-MU-02	A6-MB01	Anodonta sp.	Live	2	N	1	A6-MU-C001-ST	1
A6	A6-MB01-MU-03	A6-MB01	Anodonta sp.	Dead	1	N	0.5	archive	

Area	Sample ID	Location ID	Species	Health	Weight (g)	Delayed Cooler Sample?	Estimated Tissue Weight (g)	Composite ID	Sample Type
A6	A6-MB01-MU-04	A6-MB01	Anodonta sp.	Live	2	N	1	A6-MU-C001-ST	1
A6	A6-MB01-MU-05	A6-MB01	Anodonta sp.	Dead	1	N	0.5	archive	
A6	A6-MB01-MU-06	A6-MB01	Anodonta sp.	Live	1	N	0.5	A6-MU-C001-ST	1
A6	A6-MB01-MU-07	A6-MB01	Anodonta sp.	Live	3.4	N	1.7	A6-MU-C001-ST	1
A6	A6-MB01-MU-08	A6-MB01	Anodonta sp.	Live	1.5	N	0.75	A6-MU-C001-ST	1
A6	A6-MB01-MU-09	A6-MB01	Anodonta sp.	Live	2.2	N	1.1	A6-MU-C001-ST	1
A6	A6-MB01-MU-10	A6-MB01	Anodonta sp.	Live	1.1	N	0.55	A6-MU-C001-ST	1
A6	A6-MB01-MU-11	A6-MB01	Anodonta sp.	Live	1.8	N	0.9	A6-MU-C001-ST	1
A6	A6-MB01-MU-12	A6-MB01	Anodonta sp.	Live	1.6	N	0.8	A6-MU-C001-ST	1
A6	A6-MB01-MU-13	A6-MB01	Anodonta sp.	Live	1.4	N	0.7	A6-MU-C001-ST	1
A6	A6-MB01-MU-14	A6-MB01	Anodonta sp.	Live	1.5	N	0.75	A6-MU-C001-ST	1
A6	A6-MB01-MU-15	A6-MB01	Anodonta sp.	Live	1.7	N	0.85	A6-MU-C001-ST	1
A6	A6-MB01-MU-16	A6-MB01	Anodonta sp.	Dead	1.1	N	0.55	archive	
A6	A6-MB01-MU-17	A6-MB01	Anodonta sp.	Live	2.1	N	1.05	A6-MU-C001-ST	1
A6	A6-MB01-MU-18	A6-MB01	Anodonta sp.	Live	2	N	1	A6-MU-C001-ST	1
A6	A6-MB01-MU-19	A6-MB01	Anodonta sp.	Live	1.8	N	0.9	A6-MU-C001-ST	1
A6	A6-MB01-MU-20	A6-MB01	Anodonta sp.	Live	2.7	N	1.35	A6-MU-C001-ST	1
A6	A6-MB01-MU-21	A6-MB01	Anodonta sp.	Live	1.2	N	0.6	A6-MU-C001-ST	1
A6	A6-MB01-MU-22	A6-MB01	Anodonta sp.	Dead	1.6	N	0.8	archive	
A6	A6-MB01-MU-23	A6-MB01	Anodonta sp.	Live	2.3	N	1.15	A6-MU-C001-ST	1
A6	A6-MB01-MU-24	A6-MB01	Anodonta sp.	Dead	1.2	N	0.6	archive	
A6	A6-MB01-MU-25	A6-MB01	Anodonta sp.	Dead	2	N	1	archive	
A6	A6-MB01-MU-26	A6-MB01	Anodonta sp.	Dead	1.4	N	0.7	archive	
A6	A6-MB01-MU-27	A6-MB01	Anodonta sp.	Dead	1.9	N	0.95	archive	
A6	A6-MB03-MU-01	A6-MB03	Anodonta sp.	Live	2	N	1	A6-MU-C002-ST	1
A6	A6-MB03-MU-02	A6-MB03	Anodonta sp.	Live	3	N	1.5	A6-MU-C002-ST	1
A6	A6-MB03-MU-03	A6-MB03	Anodonta sp.	Live	3	N	1.5	A6-MU-C002-ST	1
A6	A6-MB03-MU-04	A6-MB03	Anodonta sp.	Live	3	N	1.5	A6-MU-C002-ST	1
A6	A6-MB03-MU-05	A6-MB03	Anodonta sp.	Live	4	N	2	A6-MU-C002-ST	1
A6	A6-MB03-MU-06	A6-MB03	Anodonta sp.	Live	2	N	1	A6-MU-C002-ST	1
A6	A6-MB03-MU-07	A6-MB03	Anodonta sp.	Live	2	N	1	A6-MU-C002-ST	1
A6	A6-MB04-MU-01	A6-MB04	Anodonta sp.	dead	2.1	N	1.05	archive	
A6	A6-MB05-MU-01	A6-MB05	Anodonta sp.	Live	2.4	N	1.2	A6-MU-C004-ST	1
A6	A6-MB05-MU-02	A6-MB05	Anodonta sp.	Live	2	N	1	A6-MU-C004-ST	1
A6	A6-MB05-MU-03	A6-MB05	Anodonta sp.	Live	0.9	N	0.45	A6-MU-C004-ST	1
A6	A6-MB05-MU-04	A6-MB05	Anodonta sp.	Live	2.2	N	1.1	A6-MU-C004-ST	1
A6	A6-MB05-MU-05	A6-MB05	Anodonta sp.	Dead	1.5	N	0.75	archive	
A6	A6-MB05-MU-06	A6-MB05	Anodonta sp.	Dead	1.8	N	0.9	archive	
A6	A6-MB05-MU-07	A6-MB05	Anodonta sp.	Dead	1.6	N	0.8	archive	
A6	A6-MB07-MU-01	A6-MB07	Anodonta sp.	Live	1.6	N	0.8	A6-MU-C001-ST	1
A6	A6-MB07-MU-02	A6-MB07	Anodonta sp.	Live	1.5	N	0.75	A6-MU-C001-ST	1
A6	A6-MB07-MU-03	A6-MB07	Anodonta sp.	Live	2.4	N	1.2	A6-MU-C001-ST	1
A6	A6-MB07-MU-04	A6-MB07	Anodonta sp.	Live	3.3	N	1.65	A6-MU-C001-ST	1
A6	A6-MB07-MU-05	A6-MB07	Anodonta sp.	Live	3	N	1.5	A6-MU-C001-ST	1
A6	A6-MB07-MU-06	A6-MB07	Anodonta sp.	Live	3.6	N	1.8	A6-MU-C001-ST	1
A6	A6-MB07-MU-07	A6-MB07	Anodonta sp.	Live	2.7	N	1.35	A6-MU-C001-ST	1
A6	A6-MB07-MU-08	A6-MB07	Anodonta sp.	Live	3.1	N	1.55	A6-MU-C001-ST	1
A6	A6-MB07-MU-09	A6-MB07	Anodonta sp.	Live	3.2	N	1.6	A6-MU-C001-ST	1
A6	A6-MB07-MU-10	A6-MB07	Anodonta sp.	Live	1.3	N	0.65	A6-MU-C001-ST	1
A6	A6-MB07-MU-11	A6-MB07	Anodonta sp.	Dead	1.5	N	0.75	archive	
A6	A6-MB08-MU-01	A6-MB08	Anodonta sp.	Live	2	Y	1	A6-MU-C001-ST	1
A6	A6-MB08-MU-02	A6-MB08	Anodonta sp.	Live	2	Y	1	A6-MU-C001-ST	1
A6	A6-MB08-MU-03	A6-MB08	Anodonta sp.	Live	2	Y	1	A6-MU-C001-ST	1
A6	A6-MB08-MU-04	A6-MB08	Anodonta sp.	Live	1.9	N	0.95	A6-MU-C001-ST	1
A6	A6-MB08-MU-05	A6-MB08	Anodonta sp.	Live	1	N	0.5	A6-MU-C001-ST	1
A6	A6-MB08-MU-06	A6-MB08	Anodonta sp.	Live	1.4	Y	0.7	A6-MU-C001-ST	1
A6	A6-MB08-MU-07	A6-MB08	Anodonta sp.	Live	1.3	Y	0.65	A6-MU-C001-ST	1
A6	A6-MB08-MU-08	A6-MB08	Anodonta sp.	Dead	1	Y	0.5	archive	
A6	A6-MB08-MU-09	A6-MB08	Anodonta sp.	Dead	0.7	N	0.35	archive	
A6	A6-MB08-MU-10	A6-MB08	Anodonta sp.	Dead	1.9	N	0.95	archive	
A6	A6-MB08-MU-11	A6-MB08	Anodonta sp.	Dead	1.1	Y	0.55	archive	
A6	A6-MB08-MU-12	A6-MB08	Anodonta sp.	Dead	0.6	N	0.3	archive	
A6	A6-MB08-MU-13	A6-MB08	Anodonta sp.	Dead	1.3	N	0.65	archive	
A6	A6-MB08-MU-14	A6-MB08	Anodonta sp.	Dead	0.8	N	0.4	archive	
A6	A6-MB09-MU-01	A6-MB09	Anodonta sp.	Live	2	N	1	A6-MU-C003-ST	1
A6	A6-MB09-MU-02	A6-MB09	Anodonta sp.	Live	3	N	1.5	A6-MU-C003-ST	1
A6	A6-MB09-MU-03	A6-MB09	Anodonta sp.	Live	3	N	1.5	A6-MU-C003-ST	1
A6	A6-MB09-MU-04	A6-MB09	Anodonta sp.	Live	2.3	N	1.15	A6-MU-C003-ST	1
A6	A6-MB09-MU-05	A6-MB09	Anodonta sp.	Live	2.5	N	1.25	A6-MU-C003-ST	1
A6	A6-MB09-MU-06	A6-MB09	Anodonta sp.	Live	2.1	N	1.05	A6-MU-C003-ST	1
A6	A6-MB09-MU-07	A6-MB09	Anodonta sp.	Live	2	N	1	A6-MU-C003-ST	1
A6	A6-MB09-MU-08	A6-MB09	Anodonta sp.	Dead	1.1	N	0.55	archive	
A6	A6-MB09-MU-09	A6-MB09	Anodonta sp.	Live	0.5	N	0.25	A6-MU-C003-ST	1
A6	A6-MB09-MU-10	A6-MB09	Anodonta sp.	Live	1	N	0.5	A6-MU-C003-ST	1
SR	SR-MB01-MU-01	SR-MB01	Margaritifera falca	Live	1.1	N	0.55	SR-MU-C002-ST	1
SR	SR-MB01-MU-02	SR-MB01	Margaritifera falca	Live	2.5	N	1.25	SR-MU-C002-ST	1
SR	SR-MB01-MU-03	SR-MB01	Margaritifera falca	Live	8.4	N	4.2	SR-MU-C002-ST	1
SR	SR-MB01-MU-04	SR-MB01	Margaritifera falca	Live	10.2	N	5.1	SR-MU-C002-ST	1
SR	SR-MB03-MU-01	SR-MB03	Margaritifera falca	Live	32	N	16	SR-MU-C001-ST	1
SR	SR-MB04-MU-01	SR-MB04	Margaritifera falca	Live	10.1	N	5.05	SR-MU-C001-ST	1
SR	SR-MB08-MU-01	SR-MB08	Margaritifera falca	Live	4.8	N	2.4	SR-MU-C003-ST	1
SR	SR-MB08-MU-02	SR-MB08	Margaritifera falca	Live	5.6	N	2.8	SR-MU-C003-ST	1
SR	SR-MB08-MU-03	SR-MB08	Margaritifera falca	Live	6.5	N	3.25	SR-MU-C003-ST	1
SR	SR-MB09-MU-01	SR-MB09	Margaritifera falca	Live	1.3	N	0.65	SR-MU-C001-ST	1
SR	SR-MB09-MU-02	SR-MB09	Margaritifera falca	Live	1.4	N	0.7	SR-MU-C001-ST	1
SR	SR-MB09-MU-03	SR-MB09	Margaritifera falca	Live	2.3	N	1.15	SR-MU-C001-ST	1
SR	SR-MB09-MU-04	SR-MB09	Margaritifera falca	Live	2.1	N	1.05	SR-MU-C001-ST	1
SR	SR-MB09-MU-05	SR-MB09	Margaritifera falca	Live	8.5	N	4.25	SR-MU-C001-ST	1
SR	SR-MB09-MU-06	SR-MB09	Margaritifera falca	Live	10	N	5	SR-MU-C001-ST	1
SR	SR-MB09-MU-07	SR-MB09	Margaritifera falca	Live	15	N	7.5	SR-MU-C001-ST	1
SR	SR-MB11-MU-01	SR-MB11	Margaritifera falca	Live	1.2	N	0.6	SR-MU-C003-ST	1

Summary of crayfish composites

1	TAL metals	2	
2	Total mercury	1.5	3.5
3	MeHg	1.5	5
4	Inorganic As	3	8
5	PCBs	10	18
6	Dioxins/furans	10	28

Shaded yellow = crayfish in delayed cooler
Shaded blue = catfood bait
Shaded purple = did not meet 3.25 in size limit for native crayfish

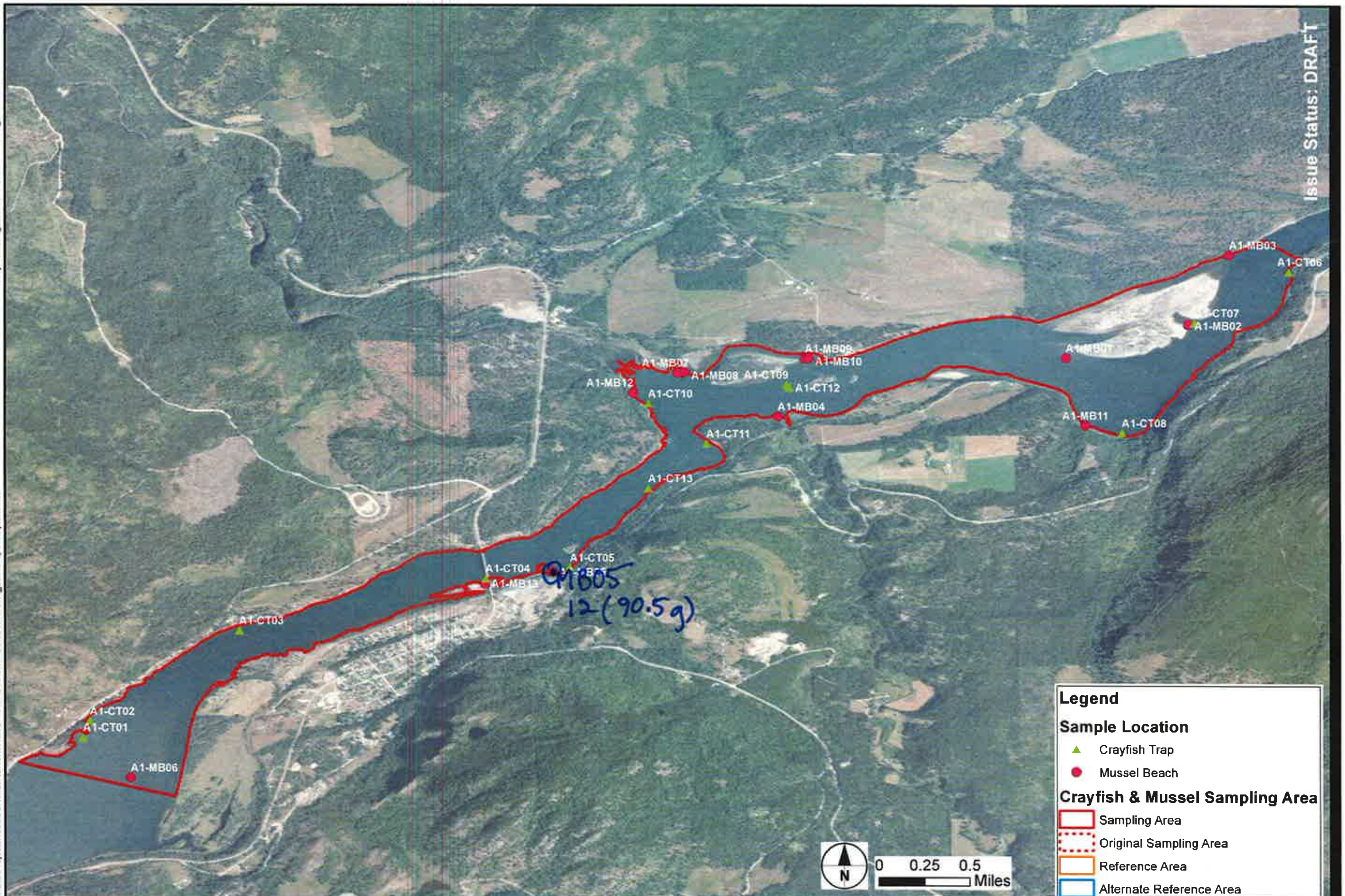
	Target Sample Weights - WB only (g)				Target Sample Weights - PB and CS separately (g)				Actual sample Weights						Options						
Sampling Area	Original Sample (Type 1)	Original With EPA Split (Type 1a)	Original With Field Split (Type 1b)	Field Replicate (Type 2)	Original Sample (Type 1)	Original With EPA Split (Type 1a)	Original With Field Split (Type 1b)	Field Replicate (Type 2)	Area	Trap	Health	Species	Total Live Weight	Bait Type	Option #	Organisms per sample	# samples	Enough for EPA Split?	Enough for Field Split?	Enough for Field Replicate?	Analytes
A2	na	na	na	na	60	65	120	60	A2	A2-CT01	Live	OV	4	C	1	7	1	yes	yes	no	all
A2										A2-CT06	Live	PL	60	C							
A2										A2-CT10	Live	OV	7	C							
A2										A2-CT13	Live	OV	10	NB							
A2										A2-CT13	Live	OV	5	NB							
A2										A2-CT13	Live	OV	39	C							
A2										A2-CT14	Live	PL	54	C							
A2										A2-CT01	Live	OV	4	C	2	4	1	yes	~~yes~~ no	no	all
A2										A2-CT06	Live	PL	60	C							
A2										A2-CT13	Live	OV	10	NB							
A2										A2-CT13	Live	OV	5	NB							
A2										A2-CT10	Live	OV	7	C	2	3	1	yes	~~yes~~ no	no	all
A2										A2-CT13	Live	OV	39	C							
A2										A2-CT14	Live	PL	54	C							
A3	4.5	7	9	4.5	na	na	na	na	A3	A3-CT01	Live	OV	28	C	1	2	1	yes	yes	no	all (1 and 2)
A3										A3-CT02	Live	OV	3.9	C							
A3										A3-CT13	Live	OV	23	NB	1	2	1	yes	yes	no	
A3										A3-CT14	Live	OV	21	NB							
A4	4.5	7	9	4.5	na	na	na	na	A4	A4-CT01	Live	OV	3.1	C	1	2	1	yes	no	no	all (1 and 2)
A4										A4-CT04	Live	OV	4.7	CF	OK to include even though catfood because not analyzed for PCBs, D/Fs						
A4										A4-CT15	Dead	OV	21	C	exclude - dead						
A4										A4-CT17	Dead	OV	18	S	exclude - dead						
A5	na	na	na	na	60	65	120	60	A5	A5-CT15	Live	OV	48	CF	1	3	1	yes	no	no	all
A5										A5-CT15	Live	OV	27	CF							
A5										A5-CT15	Live	OV	5	CF							
A5										A5-CT16	Live	OV	20	S	1	3	1	yes	no	no	all
A5										A5-CT11	Live	OV	1.2	S							
A5										A5-CT11	Live	OV	52	S							
A5										A5-CT01	Live	OV	50	S	1	3	1	yes	no	no	all
A5										A5-CT25	Live	OV	11	C							
A5										A5-CT25	Live	OV	1	C							
A5										A5-CT12	Live	OV	51	S	1	2	1	yes	yes	no	all
A5										A5-CT02	Live	OV	61	S							
A5										A5-CT02	Live	PL	47	S	1	2	1	yes	yes	no	
A5										A5-CT04	Live	PL	75	S							all
A5										A5-CT04	Live	PL	69	S	1	2	1	yes	yes	no	
A5										A5-CT05	Live	OV	27	S							
A6	na	na	na	na	60	65	120	60	A6	A6-CT01	Live	OV	43	C	1	3	1	yes	yes	~~yes (if no field split)~~ n	all
A6										A6-CT01	Live	OV	62	S							
A6										A6-CT01	Live	OV	20	S							
A6										A6-CT02	Live	OV	20	C	1	5	1	yes	yes	yes (if no field split)	all
A6										A6-CT02	Live	OV	51	S							
A6										A6-CT02	Live	OV	23	S							
A6										A6-CT02	Live	OV	44	S							
A6										A6-CT02	Live	OV	40	S							
A6										A6-CT04	Live	OV	42	C	1	2	1	yes	no	no	all
A6										A6-CT06	Live	OV	27	C							
A6										A6-CT07	Live	OV	45	C	1	2	1	yes	no	no	
A6										A6-CT07	Live	OV	44	C							
A6										A6-CT12	Live	OV	39	C	1	5	1	yes	yes	yes	all
A6										A6-CT12	Live	OV	9	C							
A6										A6-CT13	Live	OV	39	C/S							
A6										A6-CT13	Live	OV	31	C/S							
A6										A6-CT13	Live	OV	28	C/S							
A6										A6-CT13	Live	OV	25	C/S	1	3	1	yes	no	no	all
A6										A6-CT14	Live	OV	20	C/S							
A6										A6-CT14	Live	OV	24	C/S							
Buffalo Lake	na	na	na	na	60	65	120	60	RL	RL-CT01	Live	OV	46	CF	exclude - catfood						
Buffalo Lake										RL-CT01	Live	OV	27	CF	exclude - catfood						
Buffalo Lake										RL-CT01	Live	OV	57	S	1	10	1	yes	yes	yes	all
Buffalo Lake										RL-CT01	Live	OV	42	S							
Buffalo Lake										RL-CT01	Live	OV	41	S							
Buffalo Lake										RL-CT01	Live	OV	38	S							
Buffalo Lake										RL-CT01	Live	OV	46	S							
Buffalo Lake										RL-CT01	Live	OV	36	S							
Buffalo Lake										RL-CT01	Live	OV	18	S							
Buffalo Lake										RL-CT01	Live	OV	28	S							
Buffalo Lake										RL-CT01	Live	OV	23	S							
Buffalo Lake										RL-CT01	Live	OV	5.9	S							
Buffalo Lake										RL-CT02	Live	OV	25	CF	exclude - catfood						
Buffalo Lake										RL-CT02	Live	OV	44	CF	exclude - catfood						
Buffalo Lake										RL-CT02	Live	OV	43	S	1	7	1	yes	yes	yes	all
Buffalo Lake										RL-CT02	Live	OV	45	S							
Buffalo Lake										RL-CT02	Live	OV	44	S							
Buffalo Lake										RL-CT02	Live	OV	24	S							
Buffalo Lake										RL-CT02	Live	OV	26	S							
Buffalo Lake										RL-CT02	Live	OV	21	S							
Buffalo Lake										RL-CT02	Live	OV	3	S							
Buffalo Lake										RL-CT03	Live	OV	27	S	1	6	1	yes	yes	yes (if no field split)	all
Buffalo Lake										RL-CT03	Live	OV	28	S							
Buffalo Lake										RL-CT03	Live	OV	47	S							
Buffalo Lake										RL-CT03	Live	OV	3.8	S							
Buffalo Lake										RL-CT03	Live	OV	4.1	S							
Buffalo Lake										RL-CT03	Live	OV	30	S							
Buffalo Lake										RL-CT04	Live	OV	33	S	1	6	1	yes	yes	yes (if no field split)	all
Buffalo Lake										RL-CT04	Live	OV	11	S							
Buffalo Lake										RL-CT04	Live	OV	40	S							
Buffalo Lake										RL-CT04	Live	OV	48	S							
Buffalo Lake										RL-CT04	Live	OV	25	S							
Buffalo Lake										RL-CT04	Live	OV	19	S							
Buffalo Lake										RL-CT05	Live	OV	3	S	Archive because of small size in only sample from CT05						
Buffalo Lake										RL-CT11	Live	OV	5.9	S	Archive because of small size in onlyone of two samples from CT11						
Buffalo Lake										RL-CT11	Live	OV	3.6	S	Archive because of small size in onlyone of two samples from CT11						
Buffalo Lake										RL-CT07	Live	OV	5.5	CF	exclude - catfood and small sample size						
Buffalo Lake										RL-CT08	Live	OV	26	S	1	8	1	yes	yes	yes	all
Buffalo Lake										RL-CT08	Live	OV	53	S							
Buffalo Lake										RL-CT08	Live	OV	33	S							
Buffalo Lake										RL-CT08	Live	OV	27	S							
Buffalo Lake										RL-CT08	Live	OV	40	S							
Buffalo Lake										RL-CT08	Live	OV	36	S							
Buffalo Lake										RL-CT08	Live	OV	21	S							
Buffalo Lake										RL-CT08	Live	OV	5.9	S							
Buffalo Lake										RL-CT09	Live	OV	11	CF	exclude - catfood and small sample size						
Buffalo Lake										RL-CT09	Live	OV	3.6	S	archive because of small size in only sample from CT09						
Buffalo Lake										RL-CT10	Live	OV	4.1	S	1	5	1	yes	yes	yes (if no field split)	
Buffalo Lake										RL-CT10	Live	OV	52	S							
Buffalo Lake										RL-CT10	Live	OV	46	S							
Buffalo Lake										RL-CT10	Live	OV	4.2	S							
Buffalo Lake										RL-CT10	Live	OV	23	S							
Sanpoil River	na	na	na	na	60	65	120	60	SR	SR-CT11	Live	OV	24	C	1	4	1	yes	no	no	all
Sanpoil River										SR-CT11	Live	PL	25	C							
Sanpoil River										SR-CT09	Live	PL	20	S							
Sanpoil River										SR-CT12	Live	PL	12	C							
Sanpoil River										SR-CT08	Live	OV	29	S	1	4	1	yes	no	no	all
Sanpoil River										SR-CT08	Live	OV	50	S							
Sanpoil River										SR-CT06	Live	OV	6.5	S							
Sanpoil River										SR-CT07	Live	OV	28	S							
Sanpoil River										SR-CT16	Live	OV	18	S	1	4	1	yes	yes	yes (if no EPA or field	all
Sanpoil River										SR-CT04	Live	OV	71	S							
Sanpoil River										SR-CT02	Live	OV	16	S							
Sanpoil River										SR-CT01	Live	OV	14	S							

Area	Sample ID	Location ID	Species	Health	Weight (g)	Bait	Composite ID	Sample Type
A2	A2-CT01-CR-01	A2-CT01	Orconectes virilis	Live	4	Chicken	A2-CR-C001	1
A2	A2-CT06-CR-01	A2-CT06	Pacifastacus leniusculus	Live	60	Chicken	A2-CR-C001	1
A2	A2-CT10-CR-01	A2-CT10	Orconectes virilis	Live	7	Chicken	A2-CR-C002	1
A2	A2-CT13-CR-01	A2-CT13	Orconectes virilis	Live	10	No Bait, captured	A2-CR-C001	1
A2	A2-CT13-CR-02	A2-CT13	Orconectes virilis	Live	5	No Bait, captured	A2-CR-C001	1
A2	A2-CT13-CR-03	A2-CT13	Orconectes virilis	Live	39	Chicken	A2-CR-C002	1
A2	A2-CT14-CR-01	A2-CT14	Pacifastacus leniusculus	Live	54	Chicken	A2-CR-C002	1
A3	A3-CT01-CR-01	A3-CT01	Orconectes virilis	Live	28	Chicken	A3-CR-C001	1
A3	A3-CT02-CR-01	A3-CT02	Orconectes virilis	Live	3.9	Chicken	A3-CR-C001	1
A3	A3-CT13-CR-01	A3-CT13	Orconectes virilis	Live	23	No Bait, captured	A3-CR-C002-SP	1b
A3	A3-CT14-CR-01	A3-CT14	Orconectes virilis	Live	21	No Bait, captured	A3-CR-C002-SP	1b
A4	A4-CT01-CR-01	A4-CT01	Orconectes virilis	Live	3.1	Chicken	A4-CR-C001	1
A4	A4-CT04-CR-01	A4-CT04	Orconectes virilis	Live	4.7	Cat Food	A4-CR-C001	1
A4	A4-CT15-CR-01	A4-CT15	Orconectes virilis	Dead	21	Chicken	archive	
A4	A4-CT17-CR-01	A4-CT17	Orconectes virilis	Dead	18	Salmon	archive	
A5	A5-CT01-CR-01	A5-CT01	Orconectes virilis	Live	50	Salmon	A5-CR-C003	1
A5	A5-CT02-CR-01	A5-CT02	Orconectes virilis	Live	61	Salmon	A5-CR-C004	1
A5	A5-CT02-CR-02	A5-CT02	Pacifastacus leniusculus	Live	47	Salmon	A5-CR-C005-SP	1b
A5	A5-CT04-CR-01	A5-CT04	Pacifastacus leniusculus	Live	75	Salmon	A5-CR-C005-SP	1b
A5	A5-CT04-CR-02	A5-CT04	Pacifastacus leniusculus	Live	69	Salmon	A5-CR-C006	1
A5	A5-CT05-CR-01	A5-CT05	Orconectes virilis	Live	27	Salmon	A5-CR-C006	1
A5	A5-CT11-CR-01	A5-CT11	Orconectes virilis	Live	52	Salmon	A5-CR-C002	1
A5	A5-CT11-CR-02	A5-CT11	Orconectes virilis	Live	1.2	Salmon	A5-CR-C002	1
A5	A5-CT12-CR-01	A5-CT12	Orconectes virilis	Live	51	Salmon	A5-CR-C004	1
A5	A5-CT15-CR-01	A5-CT15	Orconectes virilis	Live	48	Cat Food	A5-CR-C001	1
A5	A5-CT15-CR-02	A5-CT15	Orconectes virilis	Live	27	Cat Food	A5-CR-C001	1
A5	A5-CT15-CR-03	A5-CT15	Orconectes virilis	Live	5	Cat Food	A5-CR-C001	1
A5	A5-CT16-CR-01	A5-CT16	Orconectes virilis	Live	20	Salmon	A5-CR-C002	1
A5	A5-CT25-CR-01	A5-CT25	Orconectes virilis	Live	11	Chicken	A5-CR-C003	1
A5	A5-CT25-CR-02	A5-CT25	Orconectes virilis	Live	1	Chicken	A5-CR-C003	1
A6	A6-CT01-CR-01	A6-CT01	Orconectes virilis	Live	43	Chicken	A6-CR-C001-SP	1b
A6	A6-CT01-CR-02	A6-CT01	Orconectes virilis	Live	62	Salmon	A6-CR-C001-SP	1b
A6	A6-CT01-CR-03	A6-CT01	Orconectes virilis	Live	20	Salmon	A6-CR-C001-SP	1b
A6	A6-CT02-CR-01	A6-CT02	Orconectes virilis	Live	20	Chicken	A6-CR-C002-A	1
A6	A6-CT02-CR-02	A6-CT02	Orconectes virilis	Live	51	Salmon	A6-CR-C002-A	1
A6	A6-CT02-CR-03	A6-CT02	Orconectes virilis	Live	23	Salmon	A6-CR-C002-A	1
A6	A6-CT02-CR-04	A6-CT02	Orconectes virilis	Live	44	Salmon	A6-CR-C002-B	2
A6	A6-CT02-CR-05	A6-CT02	Orconectes virilis	Live	40	Salmon	A6-CR-C002-B	2
A6	A6-CT04-CR-01	A6-CT04	Orconectes virilis	Live	42	Chicken	A6-CR-C003	1
A6	A6-CT06-CR-01	A6-CT06	Orconectes virilis	Live	27	Chicken	A6-CR-C003	1
A6	A6-CT07-CR-01	A6-CT07	Orconectes virilis	Live	45	Chicken	A6-CR-C004	1
A6	A6-CT07-CR-02	A6-CT07	Orconectes virilis	Live	44	Chicken	A6-CR-C004	1
A6	A6-CT12-CR-01	A6-CT12	Orconectes virilis	Live	39	Chicken	A6-CR-C005-A	1
A6	A6-CT12-CR-02	A6-CT12	Orconectes virilis	Live	9	Chicken	A6-CR-C005-B	2
A6	A6-CT13-CR-01	A6-CT13	Orconectes virilis	Live	39	Chicken, Salmon	A6-CR-C005-B	2
A6	A6-CT13-CR-02	A6-CT13	Orconectes virilis	Live	25	Chicken, Salmon	A6-CR-C006	1
A6	A6-CT13-CR-03	A6-CT13	Orconectes virilis	Live	28	Chicken, Salmon	A6-CR-C005-B	2
A6	A6-CT13-CR-04	A6-CT13	Orconectes virilis	Live	31	Chicken, Salmon	A6-CR-C005-A	1
A6	A6-CT14-CR-01	A6-CT14	Orconectes virilis	Live	20	Chicken, Salmon	A6-CR-C006	1
A6	A6-CT14-CR-02	A6-CT14	Orconectes virilis	Live	24	Chicken, Salmon	A6-CR-C006	1
RL	RL-CT01-CR-01	RL-CT01	Orconectes virilis	Live	46	Cat Food	archive	
RL	RL-CT01-CR-02	RL-CT01	Orconectes virilis	Live	27	Cat Food	archive	
RL	RL-CT01-CR-03	RL-CT01	Orconectes virilis	Live	57	Salmon	RL-CR-C001-A	1
RL	RL-CT01-CR-04	RL-CT01	Orconectes virilis	Live	42	Salmon	RL-CR-C001-A	1
RL	RL-CT01-CR-05	RL-CT01	Orconectes virilis	Live	41	Salmon	RL-CR-C001-A	1
RL	RL-CT01-CR-06	RL-CT01	Orconectes virilis	Live	38	Salmon	RL-CR-C001-B	2
RL	RL-CT01-CR-07	RL-CT01	Orconectes virilis	Live	46	Salmon	RL-CR-C001-B	2
RL	RL-CT01-CR-08	RL-CT01	Orconectes virilis	Live	36	Salmon	RL-CR-C001-B	2
RL	RL-CT01-CR-09	RL-CT01	Orconectes virilis	Live	18	Salmon	RL-CR-C001-B	2
RL	RL-CT01-CR-10	RL-CT01	Orconectes virilis	Live	28	Salmon	RL-CR-C001-B	2
RL	RL-CT01-CR-11	RL-CT01	Orconectes virilis	Live	23	Salmon	RL-CR-C001-A	1
RL	RL-CT01-CR-12	RL-CT01	Orconectes virilis	Live	5.9	Salmon	RL-CR-C001-A	1
RL	RL-CT02-CR-01	RL-CT02	Orconectes virilis	Live	25	Cat Food	archive	
RL	RL-CT02-CR-02	RL-CT02	Orconectes virilis	Live	44	Cat Food	archive	
RL	RL-CT02-CR-03	RL-CT02	Orconectes virilis	Live	43	Salmon	RL-CR-C002-A	1
RL	RL-CT02-CR-04	RL-CT02	Orconectes virilis	Live	45	Salmon	RL-CR-C002-B	2
RL	RL-CT02-CR-05	RL-CT02	Orconectes virilis	Live	44	Salmon	RL-CR-C002-B	2
RL	RL-CT02-CR-06	RL-CT02	Orconectes virilis	Live	24	Salmon	RL-CR-C002-B	2
RL	RL-CT02-CR-07	RL-CT02	Orconectes virilis	Live	26	Salmon	RL-CR-C002-A	1
RL	RL-CT02-CR-08	RL-CT02	Orconectes virilis	Live	21	Salmon	RL-CR-C002-A	1
RL	RL-CT02-CR-09	RL-CT02	Orconectes virilis	Live	3	Salmon	RL-CR-C002-A	1
RL	RL-CT03-CR-01	RL-CT03	Orconectes virilis	Live	27	Salmon	RL-CR-C003-A	1

Area	Sample ID	Location ID	Species	Health	Weight (g)	Bait	Composite ID	Sample Type
RL	RL-CT03-CR-02	RL-CT03	Orconectes virilis	Live	28	Salmon	RL-CR-C003-B	2
RL	RL-CT03-CR-03	RL-CT03	Orconectes virilis	Live	47	Salmon	RL-CR-C003-B	2
RL	RL-CT03-CR-04	RL-CT03	Orconectes virilis	Live	3.8	Salmon	RL-CR-C003-B	2
RL	RL-CT03-CR-05	RL-CT03	Orconectes virilis	Live	4.1	Salmon	RL-CR-C003-A	1
RL	RL-CT03-CR-06	RL-CT03	Orconectes virilis	Live	30	Salmon	RL-CR-C003-A	1
RL	RL-CT04-CR-01	RL-CT04	Orconectes virilis	Live	33	Salmon	RL-CR-C004	1
RL	RL-CT04-CR-02	RL-CT04	Orconectes virilis	Live	11	Salmon	RL-CR-C004	1
RL	RL-CT04-CR-03	RL-CT04	Orconectes virilis	Live	40	Salmon	RL-CR-C004	1
RL	RL-CT04-CR-04	RL-CT04	Orconectes virilis	Live	48	Salmon	RL-CR-C004	1
RL	RL-CT04-CR-05	RL-CT04	Orconectes virilis	Live	25	Salmon	RL-CR-C004	1
RL	RL-CT04-CR-06	RL-CT04	Orconectes virilis	Live	19	Salmon	RL-CR-C004	1
RL	RL-CT05-CR-01	RL-CT05	Orconectes virilis	Live	3	Salmon	archive	
RL	RL-CT07-CR-01	RL-CT07	Orconectes virilis	Live	5.5	Cat Food	archive	
RL	RL-CT08-CR-01	RL-CT08	Orconectes virilis	Live	26	Salmon	RL-CR-C005	1
RL	RL-CT08-CR-02	RL-CT08	Orconectes virilis	Live	53	Salmon	RL-CR-C005	1
RL	RL-CT08-CR-03	RL-CT08	Orconectes virilis	Live	33	Salmon	RL-CR-C005	1
RL	RL-CT08-CR-04	RL-CT08	Orconectes virilis	Live	27	Salmon	RL-CR-C005	1
RL	RL-CT08-CR-05	RL-CT08	Orconectes virilis	Live	40	Salmon	RL-CR-C005	1
RL	RL-CT08-CR-06	RL-CT08	Orconectes virilis	Live	36	Salmon	RL-CR-C005	1
RL	RL-CT08-CR-07	RL-CT08	Orconectes virilis	Live	21	Salmon	RL-CR-C005	1
RL	RL-CT08-CR-08	RL-CT08	Orconectes virilis	Live	5.9	Salmon	RL-CR-C005	1
RL	RL-CT09-CR-01	RL-CT09	Orconectes virilis	Live	11	Cat Food	archive	
RL	RL-CT09-CR-02	RL-CT09	Orconectes virilis	Live	3.6	Salmon	archive	
RL	RL-CT10-CR-01	RL-CT10	Orconectes virilis	Live	4.1	Salmon	RL-CR-C006	1
RL	RL-CT10-CR-02	RL-CT10	Orconectes virilis	Live	52	Salmon	RL-CR-C006	1
RL	RL-CT10-CR-03	RL-CT10	Orconectes virilis	Live	46	Salmon	RL-CR-C006	1
RL	RL-CT10-CR-04	RL-CT10	Orconectes virilis	Live	4.2	Salmon	RL-CR-C006	1
RL	RL-CT10-CR-05	RL-CT10	Orconectes virilis	Live	23	Salmon	RL-CR-C006	1
RL	RL-CT11-CR-01	RL-CT11	Orconectes virilis	Live	5.9	Salmon	archive	
RL	RL-CT11-CR-02	RL-CT11	Orconectes virilis	Live	3.6	Salmon	archive	
SR	SR-CT01-CR-01	SR-CT01	Orconectes virilis	Live	14	Salmon	SR-CR-C003	1
SR	SR-CT02-CR-01	SR-CT02	Orconectes virilis	Live	16	Salmon	SR-CR-C003	1
SR	SR-CT04-CR-01	SR-CT04	Orconectes virilis	Live	71	Salmon	SR-CR-C003	1
SR	SR-CT06-CR-01	SR-CT06	Orconectes virilis	Live	6.5	Salmon	SR-CR-C002	1
SR	SR-CT07-CR-01	SR-CT07	Orconectes virilis	Live	28	Salmon	SR-CR-C002	1
SR	SR-CT08-CR-01	SR-CT08	Orconectes virilis	Live	29	Salmon	SR-CR-C002	1
SR	SR-CT08-CR-02	SR-CT08	Orconectes virilis	Live	50	Salmon	SR-CR-C002	1
SR	SR-CT09-CR-01	SR-CT09	Pacifastacus leniusculus	Live	20	Salmon	SR-CR-C001	1
SR	SR-CT11-CR-01	SR-CT11	Orconectes virilis	Live	24	Chicken	SR-CR-C001	1
SR	SR-CT11-CR-02	SR-CT11	Pacifastacus leniusculus	Live	25	Chicken	SR-CR-C001	1
SR	SR-CT12-CR-01	SR-CT12	Pacifastacus leniusculus	Live	12	Chicken	SR-CR-C001	1
SR	SR-CT16-CR-01	SR-CT16	Orconectes virilis	Live	18	Salmon	SR-CR-C003	1

A1 - Mussel

mussels(weight)



Project Management Initials: JP Designer: MI/sea

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AECOM

Figure: 1

AREA 1

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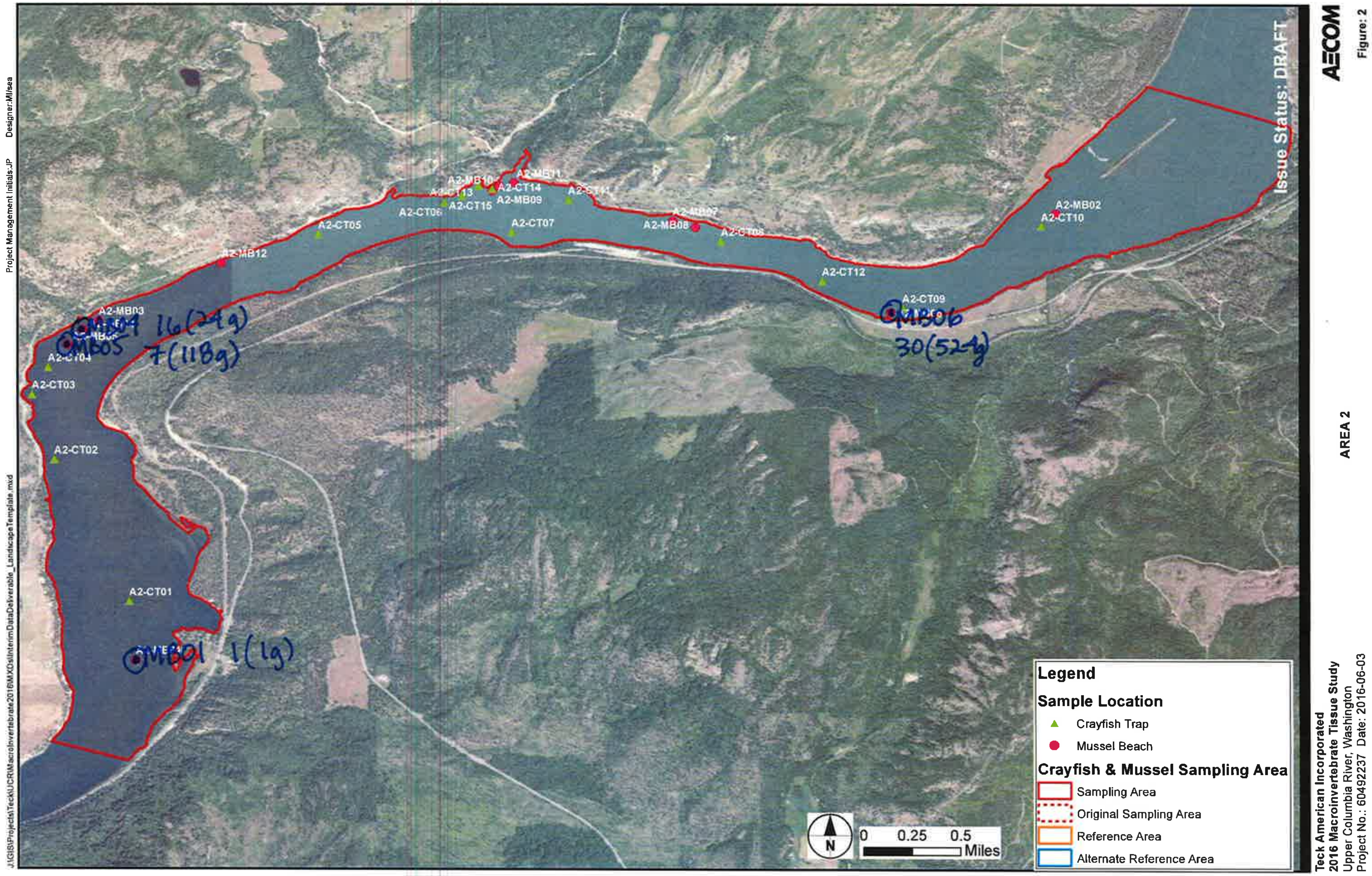
Upper Columbia River, Washington
Project No.: 60492237 Date: 2016-06-03

A2 - Mussel # mussels (weight)

2



A3 - Mussel #mussels (weight) 3

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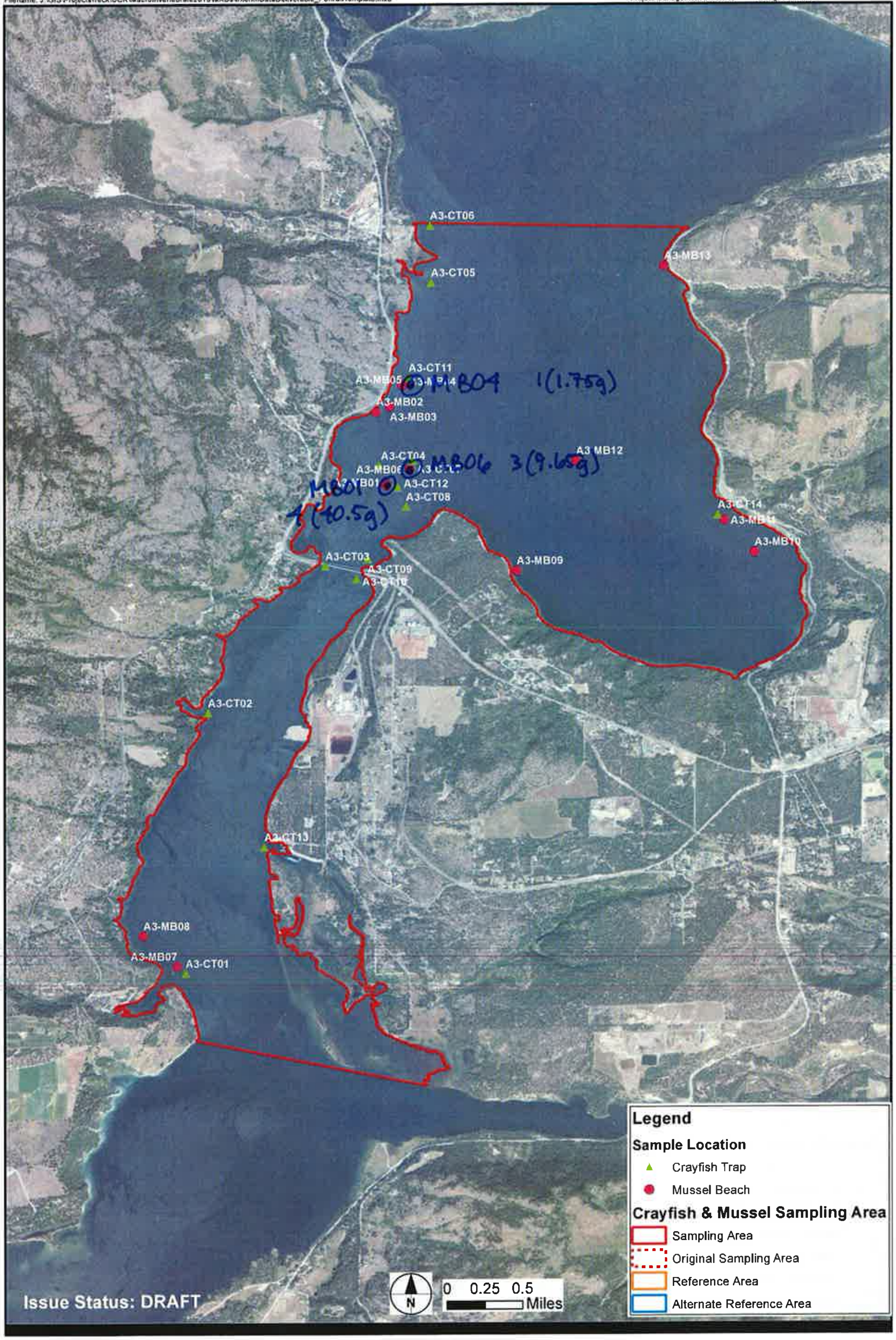

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2016 Macroinvertebrate Tissue Study
Upper Columbia River, Washington
Project No.: 60492237 Date: 2016-06-03

AREA 3

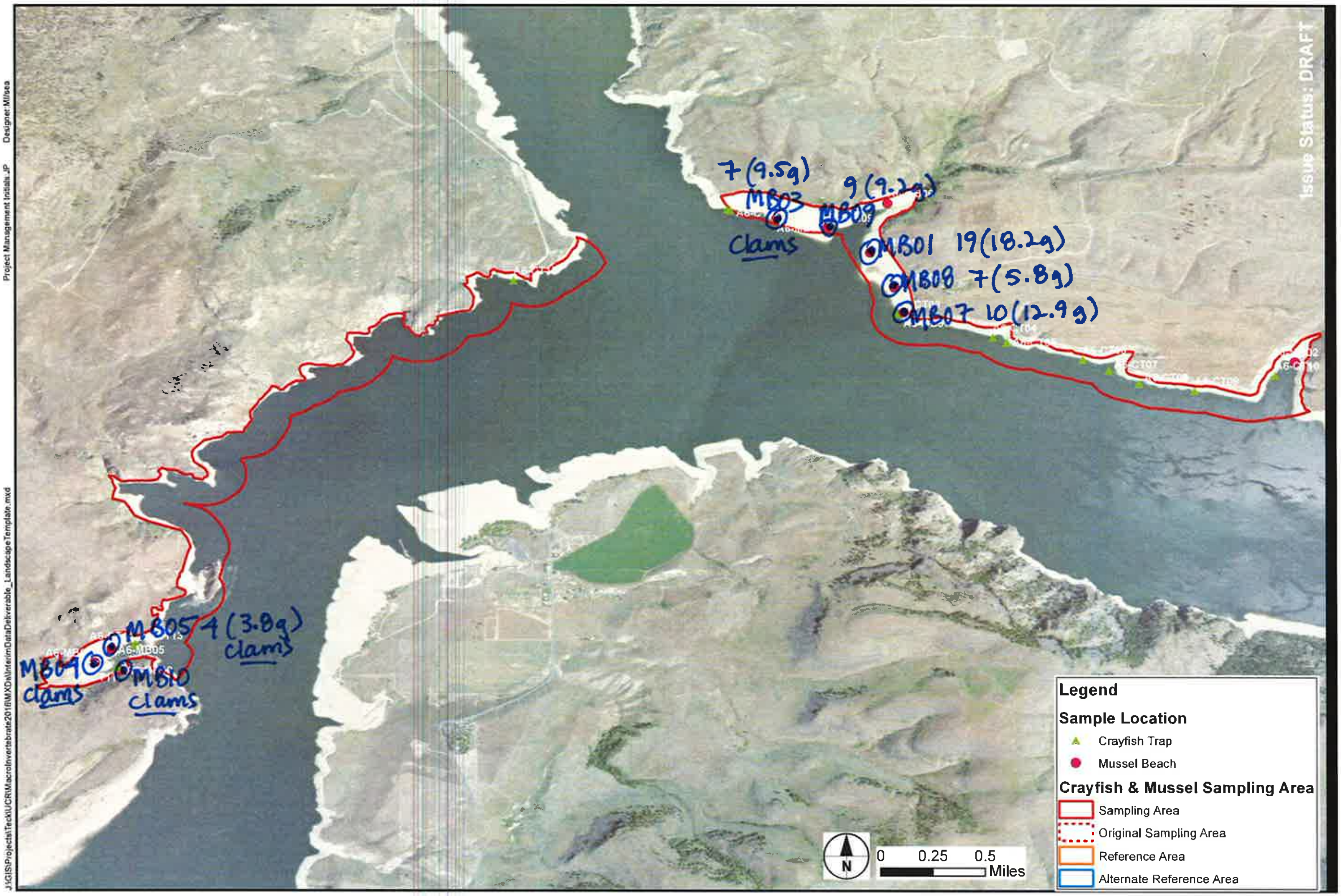
AECOM

Figure:3

A6 - Mussel

#mussels(weight)

4



AECOM

Figure: 6

AREA 6

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2016 Macroinvertebrate Tissue Study
Upper Columbia River, Washington
Project No.: 60492237 Date: 2016-06-03

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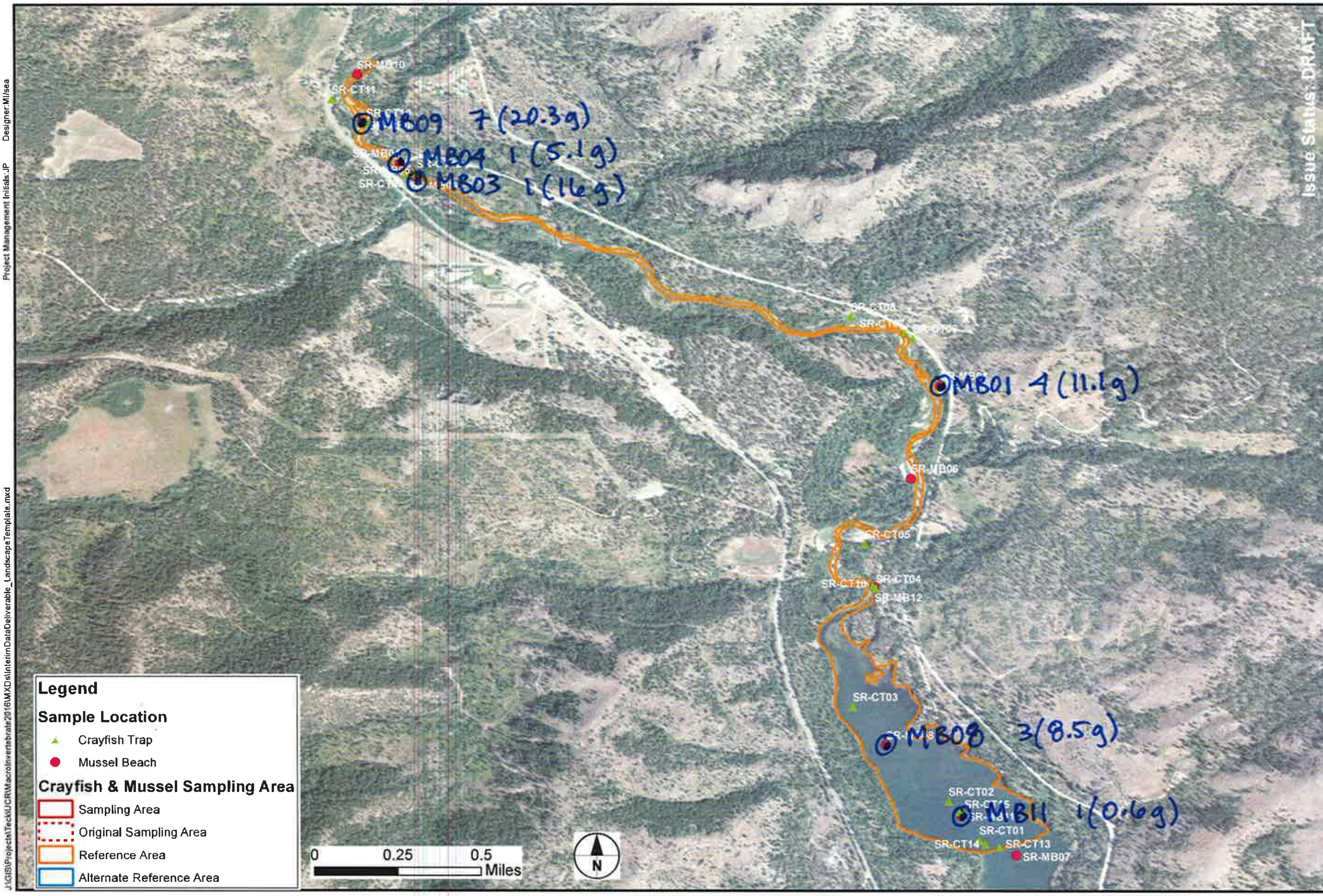
Project Management Initials: JP Designer: MI/sea

SR- Mussels #mussels(weight)



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Project Management Initials:JP Designer:MI/sea

AECOM

Figure: 8

SANPOIL RIVER

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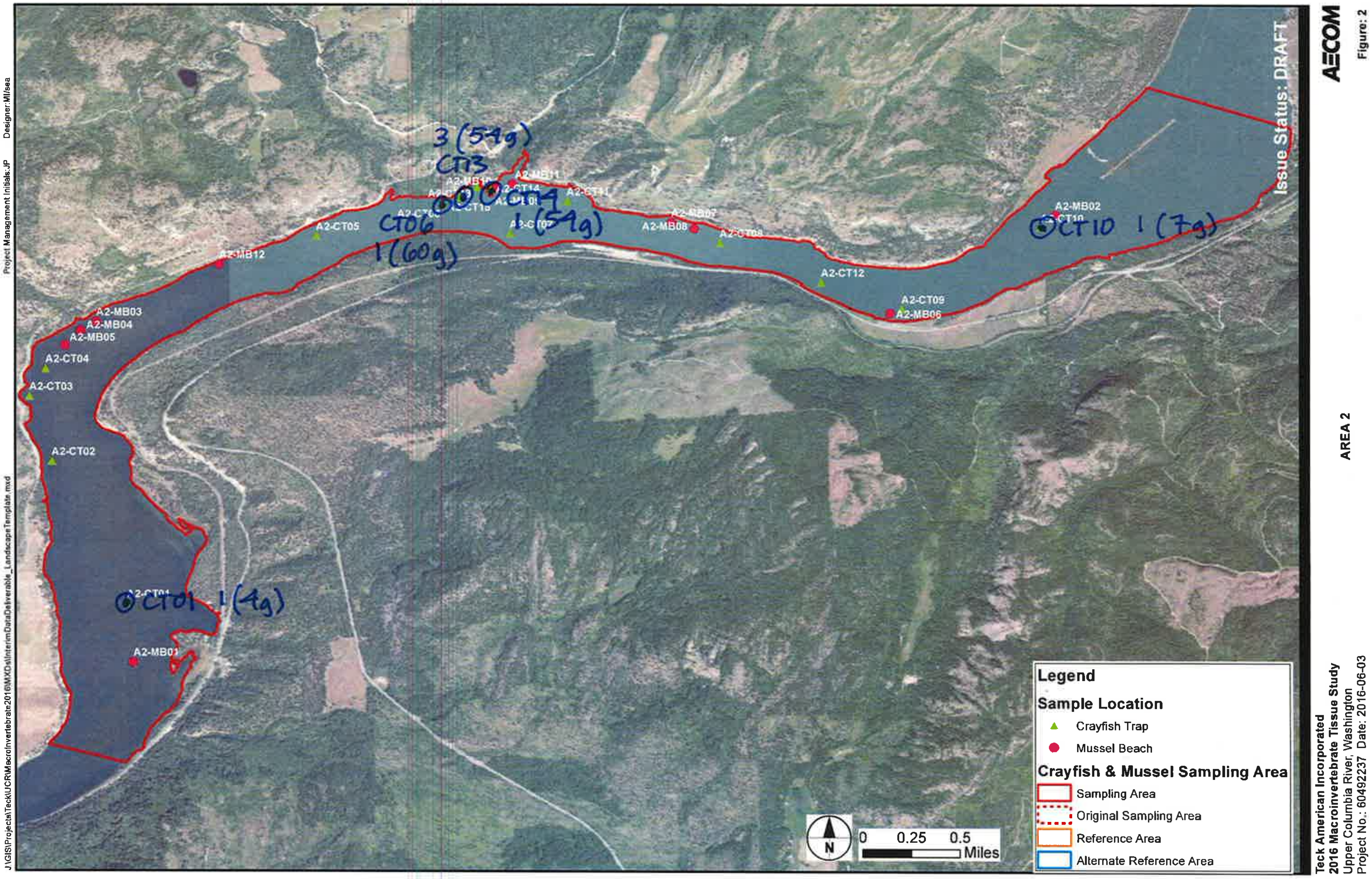
Upper Columbia River, Washington
Project No.: 60492237 Date: 2016-06-03

A2 - Crayfish #crayfish (weight) 6



A3- Crayfish # crayfish (weight) 7

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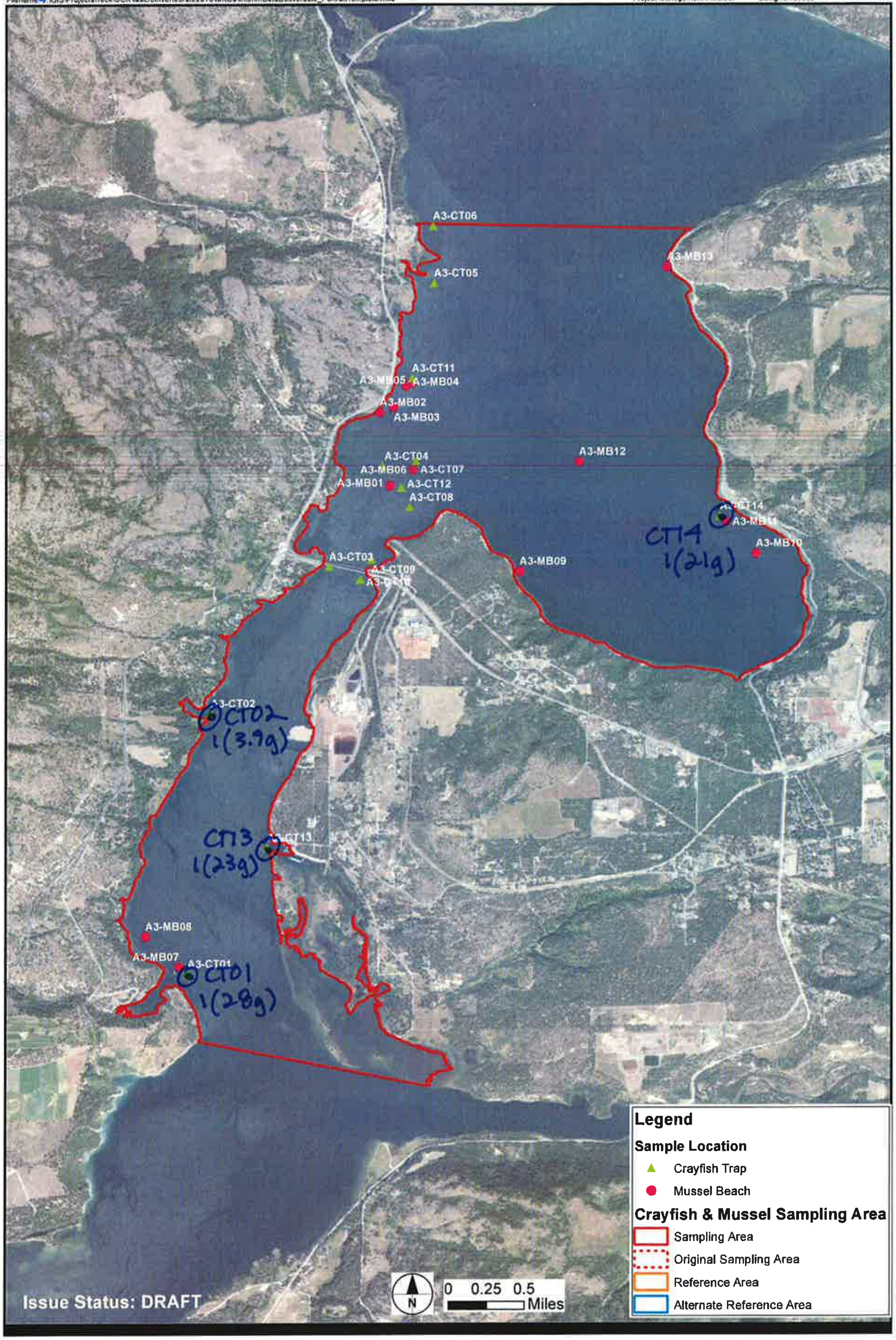

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2016 Macroinvertebrate Tissue Study
Upper Columbia River, Washington
Project No.: 60492237 Date: 2016-06-03

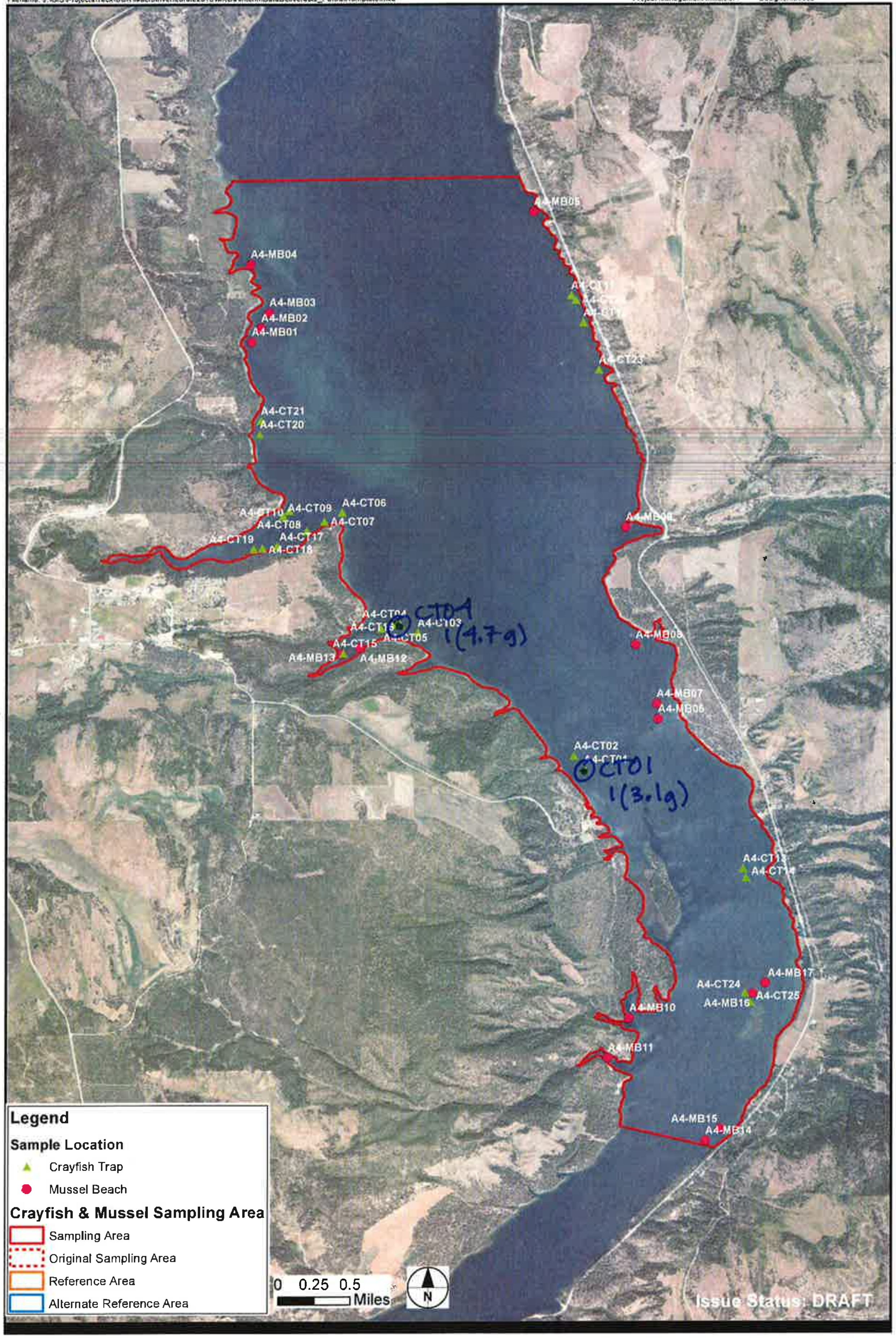
AREA 3

AECOM

Figure:3

A4 - Crayfish # crayfish (weight) 8

Filename: J:\GIS\Projects\Teck\UCR\Macroinvertebrate2016\MXDs\InterimDataDeliverable_PortraitTemplate.mxd Project Management Initials:JP



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Upper Columbia River, Washington
Project No.: 60492237 Date: 2016-06-03

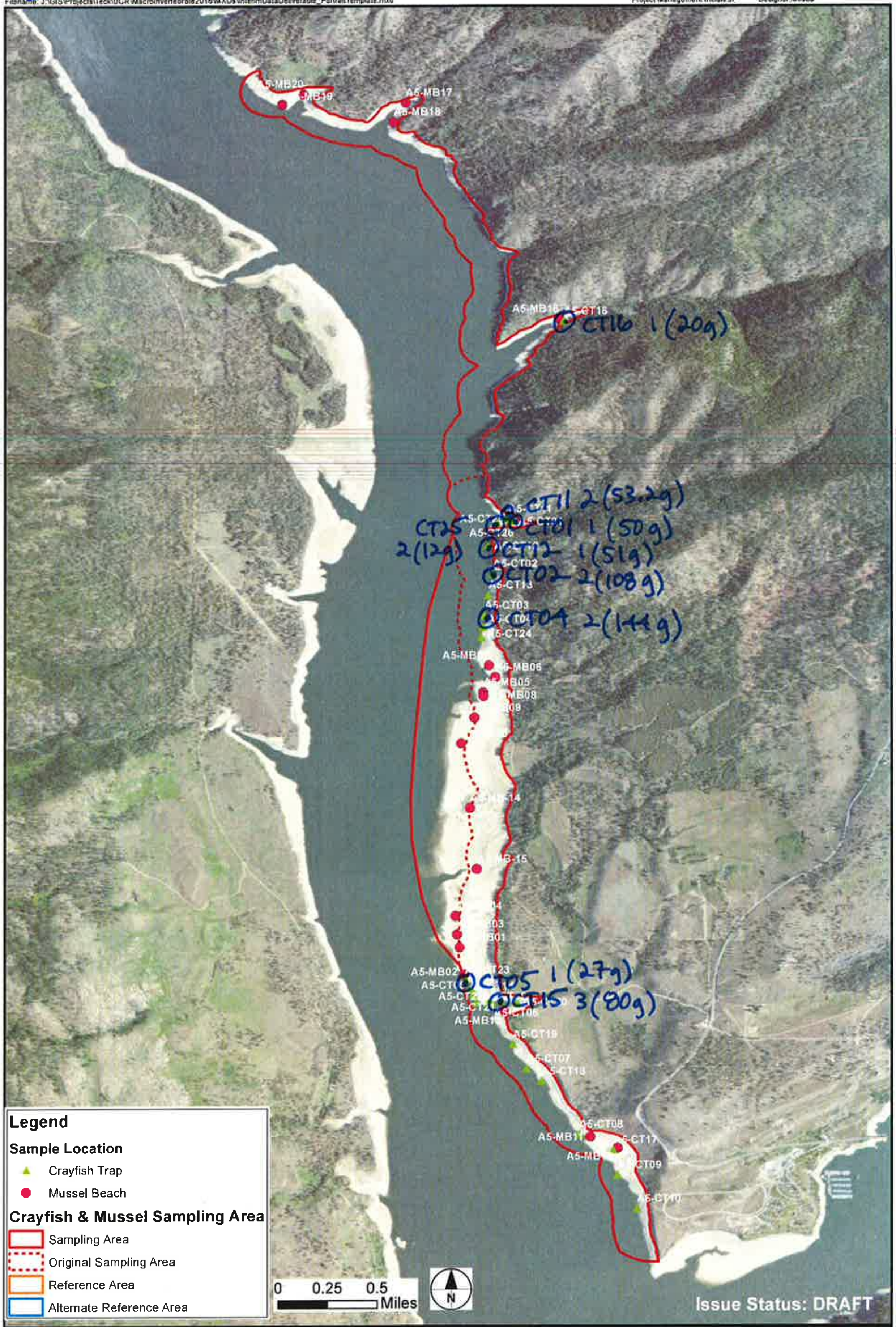
AREA 4

AECOM

Figure:4

A5 - Crayfish #crayfish (weight) 9

Filename: J:\GIS\Projects\Teck\UCR\Macroinvertebrate2016\MXDs\InterimDataDeliverable_PortraitTemplate.mxd Project Management Initials:JP Designer:MIsea



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Upper Columbia River, Washington
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AREA 5

Figure:5

A6 - Crayfish #crayfish (weight)

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AECOM Figure: 6

AREA 6

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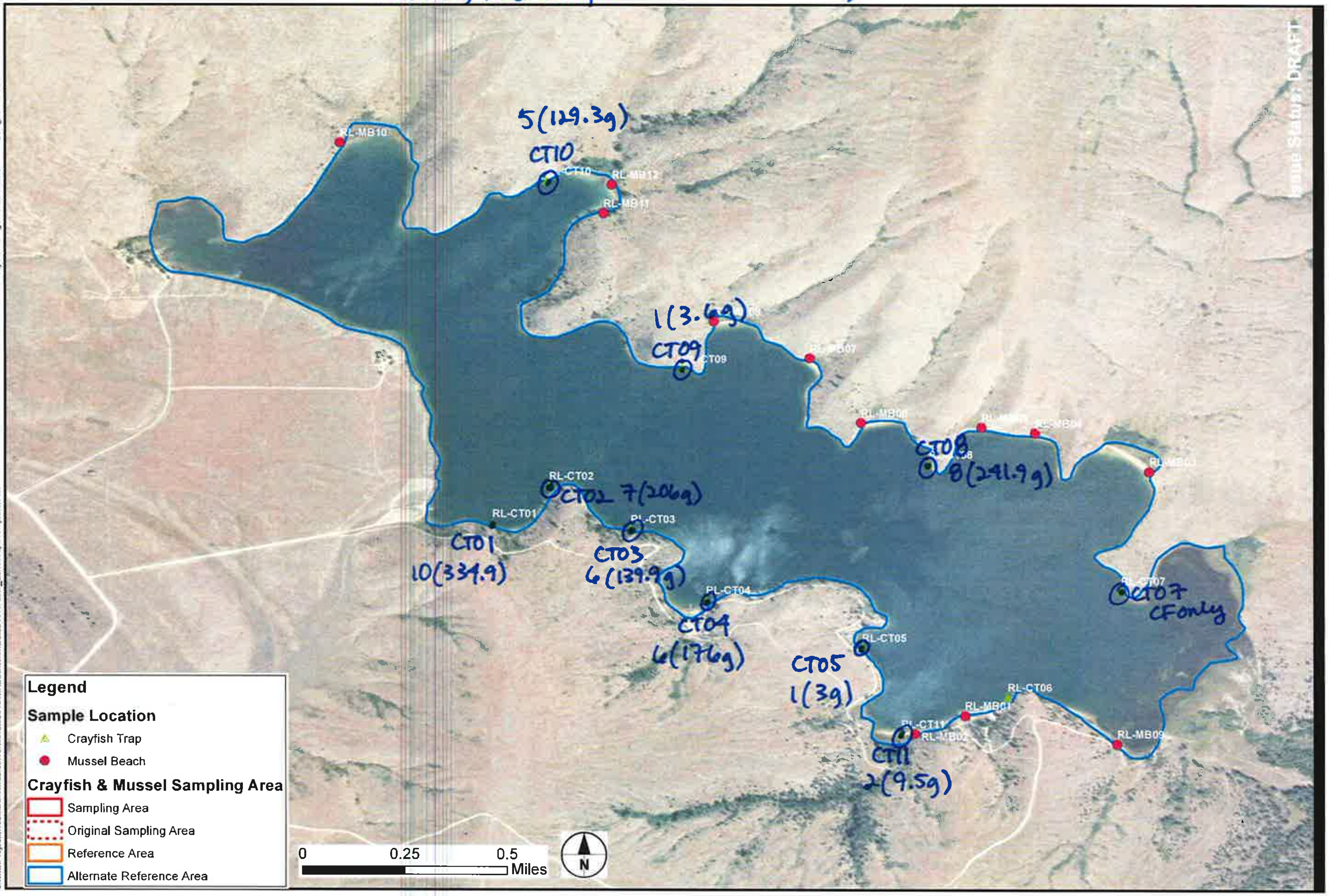
2016 Macroinvertebrate Tissue Study
Upper Columbia River, Washington
Project No.: 60492237 Date: 2016-06-03

RL - Crayfish

crayfish (weight)
↓
excluding those caught with catfood (CF)



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AECOM

Figure: 7

BUFFALO LAKE ALTERNATE REFERENCE SAMPLE AREA

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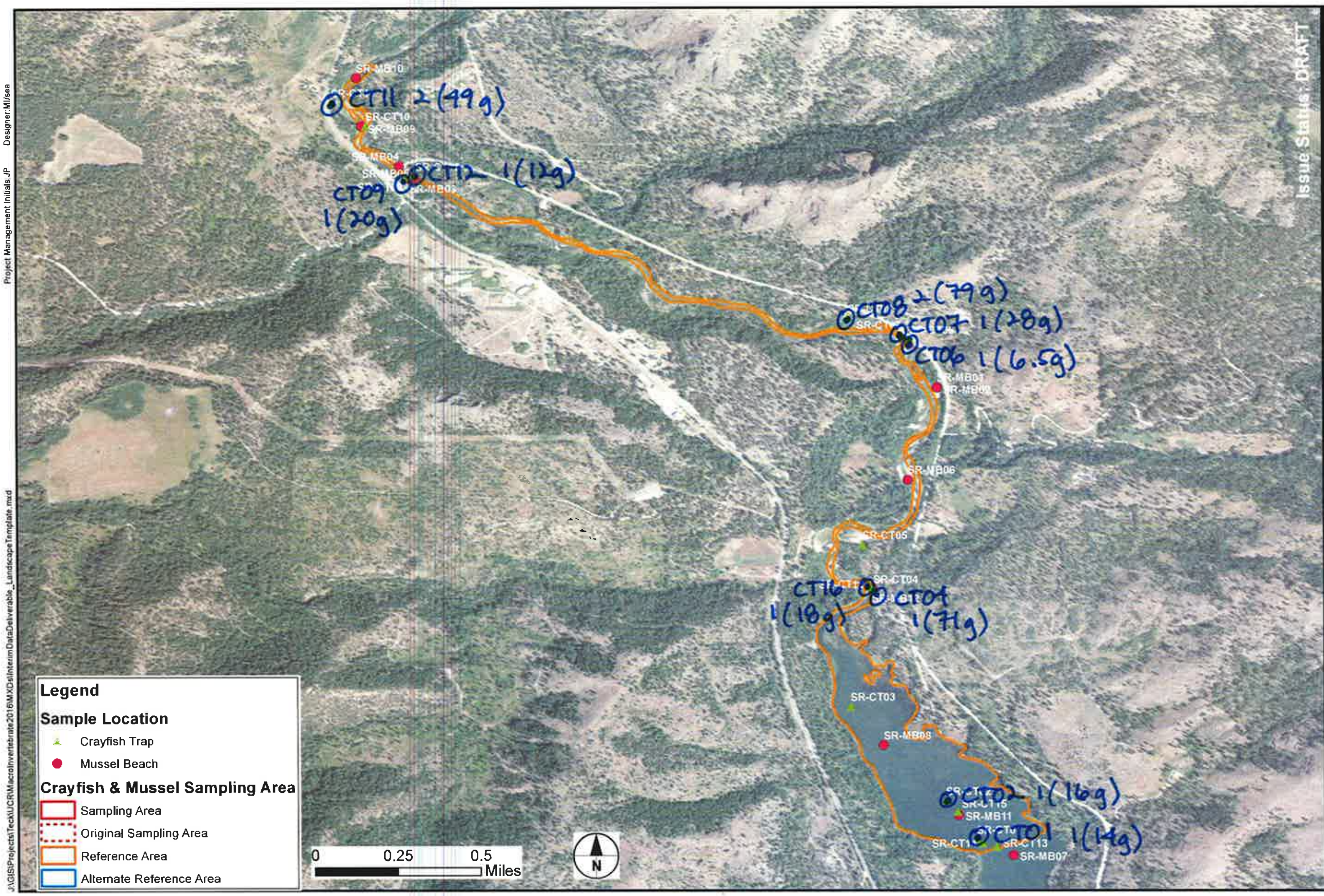
2016 Macroinvertebrate Tissue Study
Upper Columbia River, Washington
Project No.: 60492237 Date: 2016-06-03

SR - Crayfish #crayfish (weight)



AECOM

Figure: 8

SANPOIL RIVER

Teck American Incorporated
2016 Macroinvertebrate Tissue Study
Upper Columbia River, Washington
Project No.: 60492237 Date: 2016-06-03

Section 2:
EPA's interim compositing plan submitted
7/22/16

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10

1200 6th Avenue, Suite 900 MS ECL-122
Seattle, Washington 98101

July 22, 2016

Kris McCaig
Project Manager
Teck American Incorporated
501 North Riverpoint Boulevard, Suite 300
Spokane, Washington 99202

VIA ELECTRONIC MAIL ONLY

Re: Final Benthic Macroinvertebrate Tissue Study Interim Compositing Plan

Dear Ms. McCaig,

Enclosed are EPA's comments on the Upper Columbia River Final Benthic Macroinvertebrate Tissue Study Interim Compositing Plan. Included with this letter is a document summarizing our recommendations as well as spreadsheets illustrating our current preferred compositing schemes and expectations for additional sampling to supplement these existing samples in areas where targets were not met. As previously discussed, we will collectively work to finalize the specific compositing schemes after the late summer/fall round of sampling. EPA recognizes that the delay in processing of tissue samples collected in the first sampling round may exceed the holding time specified in the QAPP for this effort. Our QA technical staff have indicated that the specified holding time of six months for metals can be exceeded, without compromising the sample quality, provided that the samples are kept frozen at temperatures at or below -20° C. We look forward to working with TAI to develop an addendum to the QAPP in order to facilitate the upcoming sampling event.

In accordance with Paragraph 9 of the Settlement Agreement, TAI would typically amend and submit to EPA a revised document which is responsive to the directions in all EPA comments within thirty (30) days of receiving EPA's comments. However, given that we are mutually working toward the additional sampling efforts, we highly encourage TAI to submit a draft benthic invertebrate tissue sampling QAPP addendum within 30 days. A revised benthic macroinvertebrate compositing plan can be developed based on EPAs comment after additional sampling is completed.

Please direct any questions to me at bott.dustan@epa.gov, (206) 553-5502.

Sincerely,

Dustan Bott

Dustan Bott
Project Manager

Enclosure (2)

cc: Dan Audet, U.S. Department of Interior
Patti Bailey, Confederated Tribes of the Colville Reservation
Randy Connolly, Spokane Tribe of Indians
John Roland, Washington Department of Ecology

EPA recommends collecting additional organisms from the UCR prior to finalizing the compositing plan for tissues. The following tables summarize the number of samples that EPA recommends could be analyzed with organisms collected in spring (2016) which is the basis for developing a level-of-effort and target sampling numbers for fall (2016) sampling efforts.

Table 1. EPAs Recommended UCR (Spring 2016) Mussel Composites Samples

Area	Mussel Composites	
	# of samples	**EPA Comment**
1	3	Additional mussel sampling expected in this area, including at DMEB. Target 3 mussel samples.
2	6	No additional sampling required
3	4	Additional mussel sampling expected for 2 more samples + 2 mussels to supplement discrete samples.
4	0	TAI is expected to collect sufficient mass for 6 samples.
5	0	***The potential for additional mussel sampling in Area 5 is pending the discussion of sampling feasibility and location recommendations by STI.
6	6*	TAI is expected to collect sufficient mass for 4 more mussel samples + 15 g to supplement current samples with insufficient mass for all analyses. *Corbicula* collected in spring could be analyzed (metals only) if insufficient mussels are collected during fall sampling.
Buffalo Lake	0	No additional sampling required.
Sanpoil Reference	3	Additional mussel sampling is expected in the riverine portion of this area for 3 samples + 80 g to supplement current samples with insufficient mass for complete analyses.

Table 2. EPAs Recommended UCR (Spring 2016) Crayfish Composites Samples

Area	Crayfish Composites	
	# of samples	**EPA Comment**
1	0	Additional crayfish collection is expected targeting 6 composite samples.
2	4	Additional crayfish collection is expected targeting 4 composite samples.
3	4	Additional crayfish collection is expected targeting: - 2 composite samples and - 4 crayfish to supplement discrete samples from spring sampling.
4	1	Additional crayfish collection is expected targeting 5 composite samples.
5	6	No additional sampling required
6	6	No additional sampling required
Buffalo Lake	6	No additional sampling required
Sanpoil Reference	6	Additional crayfish collection is expected to target 93 g to supplement current samples with insufficient mass for all analyses.

Benthic Macroinvertebrate Tissue Interim Compositing Plan – 7/22/16

1. EPA recommends additional/alternative sample composites that differ from TAIs proposed compositing plan in some cases. Details are available in the accompanying XL worksheets.
2. EPA expects TAI to plan additional trap-nights to collect crayfish were the target sample number was not met in spring 2016 sampling.
3. Additional mussel sampling efforts are also expected where target sample number was not met in spring 2016 sampling.
4. Fall 2016 sampling will also target additional mass to supplement samples recommended collected in the spring where there was insufficient mass for complete analyses or where single organism samples are recommended.
5. Alternative mussel sampling approaches (e.g., divers, snorkel, and/or reconnaissance with a remotely operated vehicle) are also expected. An exception is the Buffalo Lake reference area where mussels were not present and EPA would be comfortable moving forward with the BERA and HHHRA with samples currently available.
6. Additional information from the STI on specific locations where mussels are expected to occur in Area 5 is currently under discussion.
7. EPA's goals in developing the recommended composting plan included analyzing all parameters before considering samples for QA/ QC analyses.
8. EPA did not recalculate the number of field splits / EPA splits / field replicates but these could be determined by TAI from the available tissue in the recommended sample configuration. There are ample opportunities for the target percentages of splits from mussel and crayfish samples with sufficient mass, and in a range of areas.
9. EPA would like to clarify that field replicates are not required and were only expected (potentially) as additional samples of similar tissues from the same beach. Replicates are not needed if multiple samples are already proposed from tissues collected at the same beach – in which case the samples can be used to infer variability among organisms at the same location.
10. EPAs sample compositing approach attempted to balance the following goals, where possible, while recognizing that these goals were not required or intended to be satisfied by the sampling plan described in the QAPP.
    - Organisms that were dead when collected will not be analyzed (consistent with TAIs proposed compositing plan).
    - Organisms that were in the delayed cooler where samples had thawed upon receipt at the lab may be analyzed, if needed, but should be included as separate samples.
    - Single-organism samples are acceptable, if needed, and if additional organisms from fall sampling efforts are not available to supplement the recommended samples from spring collections.
    - Clams (*Corbicula*) from Area 6 may be analyzed as separate samples from the mussels. However, additional sampling efforts in the fall should attempt to collect additional mussels for analyses before analysis of clams is finalized.
    - If possible, composite samples shall be comprised of organisms or the same species, from the same or nearby area(s), and of similar size classes.
    - Composites samples from the Sanpoil River reference area north and south (potentially influenced by the reservoir) should be analyzed separately.

Mussel Composite Worksheet

1	TAL metals and mercury	2	
2	Total mercury	1.5	3.5
3	MeHg	1.5	5
4	Inorganic As	3	8
5	PCBs	10	18
6	Dioxins/furans	10	28

Shaded Orange = EPA composite sample recommendation

Shaded yellow = mussels in delayed cooler

Shaded blue = clams also collected

	Target sample Weights (g)									Options							
Sampling Are	Original Sample (Type 1)	Original With EPA Split (Type 1a)	Original With Field Split (Type 1b)	Field Replicate (Type 2)	Beach	# Live Mussels	Mussel Species	Total Live Weight	Live Weight for Analysis	Option #	Mussels per sample	# samples	Enough for EPA Split?	Enough for Field Split?	Enough for Field Replicate?	Analytes	EPA Comments
A1	4.5	7	9	4.5	MB05	12	A	181	90.5	1	2	6	yes	yes	yes	all (1 and 2)	
A1							A			1a	6	2	yes	yes	yes	all (1 and 2)	
A1	4.5	7	9	4.5	MB05	12	A	181	90.5	EPA preferred	2-7	3	yes	yes	yes	all (1 and 2)	grouped by size
A2	30	32.5	60	30	MB01	1	A	2	1		not enough mass for any analyses						
A2					MB04	16	A	47.6	23.8	1	7-8	3	yes	no	yes	all	
A2					MB05	7	A	236	118	1a	23	1	yes	yes	yes	all	
A2					MB06	30	A	1047	523.5	1	10	3	yes	yes	yes	all	
A2										1a	15	2	yes	yes	yes		
A2					MB04	16	A	47.6	23.8	EPA preferred	17	1	no	no	no	all	
A2					MB05	1	A	23	11.5								The MB05 mussel included in thi
A2					MB05	7	A	223	111.5	EPA preferred	2	2	yes	yes	n/a	all	
A2					MB06	30	A	1047	523.5	EPA preferred	10	3	yes	yes	n/a	all	these samples agree with TAI The individual organisms within each sample were grouped together by size. TAI's groupings were based on location.
A3	4.5	7	9	4.5	MB01	4	A	81	40.5	1	1 and 3	2	yes	yes	~~no~~ yes	all (1 and 2)	EPA Agrees
A3										1a	4	1	yes	yes	no	all (1 and 2)	
A3					MB04	1	A	3.5	1.75	1	1 and 3	2	yes	~~no~~ yes	no	all (1 and 2)	EPA Agrees
A3					MB06	3	A	19.3	9.65								
A3					MB12	0	A				only dead collected, and not enough mass						
A3					MB13	1	A	4	2		one live and one dead collected, and not enough mass						
A4	4.5	7	9	4.5	MB07	0	A				only dead collected						
A4					MB10	0	A				only dead collected						
A4					MB13	0	A				only dead collected						
A5	30	32.5	60	30	MB08	0	A				only dead collected, and only enough mass for metals						
A6	30	32.5	60	30	MB01	19	A	36.3	18.15	1	19	1	no	no	no	1-5 (no D/F)	
A6					MB03	7	A	19	9.5	1	7	1	no	no	no	1-4 (no PCBs or D/F)	
A6					MB04	0	A				only dead collected, and not enough mass						
A6					MB05	4	A	7.5	3.75	1	4	1	no	no	no	1 and 2	
A6					MB07	10	A	25.7	12.85		only dead collected, and not enough mass						
A6					MB08	7	A	11.6	5.8	1	7	1	no	no	no	1,2,3	
A6					MB09	9	A	18.4	9.2	1	9	1	no	no	no	1-4 (no PCBs or D/F)	
A6					MB10	0					only clams collected						
					MB01	36	A	73.6	36.8	2	36	1	yes	no	no	all	
					MB07												
A6					MB08												
A6					MB03	7	A	19	9.5	2	7	1	no	no	no	1-4 (no PCBs or D/F)	incomplete analysis
A6					MB09	9	A	18.4	9.2	2	9	1	no	no	no	1-4 (no PCBs or D/F)	
A6					MB05	4	A	7.5	3.75	2	4	1	no	no	no	1 and 2	
A6					all beaches	56	A	118.5	59.25	3	28	2	yes	no	no	all	
A6	30	32.5	60	30	MB01	19	A	36.3	18.15	EPA preferred	31	1	yes	no	no	all	
A6					MB07	10	A	25.7	12.85								
A6					MB08	2	A	2.9	1.45								
					MB08	5	A	8.7	4.35	if needed	5	1 (f needed)	no	no	no	1-2 (if neeed)	exclude these 5 mussels in delay
A6					MB03	7	A	19	9.5	EPA preferred	20	1	yes	no	no	1-5 (no D/F)	
A6					MB05	4	A	7.5	3.75								
A6					MB09	9	A	18.4	9.2								
A6					MB03	7	C	9.5	4.75	EPA preferred	12.75	4 (potentially)	yes	if posible	n/a	1 and 2	4 clam samples, if possible, from the 51 clams collected. The total mass is 185g (74-92 g estimated soft tissue weight). 2-3 partial and 1-2 complete
A6					MB05	4	C	3.8	1.9								
A6					MB09	?	C	?	?								
A6					MB10	?	C	?	?								
Sanp	30	32.5	60	30	MB09	7	WP	40.6	20.3	1	7	1	no	no	no	1-5 (no D/F)	
Sanpoil River					MB04	1	WP	10.1	5.05	1	2	1	no	no	no	1-5 (no D/F)	
Sanpoil River					MB03	1	WP	32	16								
Sanpoil River					MB01	4	WP	22.2	11.1	1	4	1	no	no	no	1-4 (no PCBs or D/F)	
Sanpoil River					MB08	3	WP	16.9	8.45	1	4	1	no	no	no	1-4 (no PCBs or D/F)	
Sanpoil River					MB11	1	WP	1.2	0.6								
Sanpoil River					MB09	7	WP	40.6	20.3	2	9	1	yes	no	no	all	EPA Agrees
Sanpoil River					MB04	1	WP	10.1	5.05								
Sanpoil River					MB03	1	WP	32	16								
Sanpoil River					MB01	4	WP	22.2	11.1	2	4	1	no	no	no	1-4 (no PCBs or D/F)	EPA Agrees
Sanpoil River					MB08	3	WP	16.9	8.45	2	4	1	no	no	no	1-4 (no PCBs or D/F)	EPA Agrees
Sanpoil River					MB11	1	WP	1.2	0.6								
Sanpoil River					all beaches	17	WP	123	61.5	3	17	1	yes	yes	no	all	

Compositing proposal for mussels - EPAs recommended

Area	~~Sample~~ Organism ID	Beach	Species	Health	Weight (g)	Delayed Cooler Sample?	Estimated Tissue Weight (g)	TAIs Composite ID	TAIsSample Type	EPA Sample	EPAs Recommended Sample Mass	Analyses
A1	A1-MB05-MU-02	A1-MB05	Anodonta sp.	Live	1	Y	0.5	A1-MU-C001-ST-A	1	1	13	all (1 and 2)
A1	A1-MB05-MU-01	A1-MB05	Anodonta sp.	Live	2	Y	1	A1-MU-C001-ST-A	1	1	13	all (1 and 2)
A1	A1-MB05-MU-03	A1-MB05	Anodonta sp.	Live	2	Y	1	A1-MU-C001-ST-B	2	1	13	all (1 and 2)
A1	A1-MB05-MU-04	A1-MB05	Anodonta sp.	Live	2	Y	1	A1-MU-C001-ST-B	2	1	13	all (1 and 2)
A1	A1-MB05-MU-05	A1-MB05	Anodonta sp.	Live	2	Y	1	A1-MU-C002-ST-SP	1b	1	13	all (1 and 2)
A1	A1-MB05-MU-06	A1-MB05	Anodonta sp.	Live	8	Y	4	A1-MU-C002-ST-SP	1b	1	13	all (1 and 2)
A1	A1-MB05-MU-07	A1-MB05	Anodonta sp.	Live	9	Y	4.5	A1-MU-C002-ST-SP	1b	1	13	all (1 and 2)
A1	A1-MB05-MU-09	A1-MB05	Anodonta sp.	Live	24	Y	12	A1-MU-C002-ST-SP	1b	2	39.5	all (1 and 2)
A1	A1-MB05-MU-08	A1-MB05	Anodonta sp.	Live	25	Y	12.5	A1-MU-C002-ST-SP	1b	2	39.5	all (1 and 2)
A1	A1-MB05-MU-10	A1-MB05	Anodonta sp.	Live	30	Y	15	A1-MU-C002-ST-SP	1b	2	39.5	all (1 and 2)
A1	A1-MB05-MU-11	A1-MB05	Anodonta sp.	Live	36	Y	18	A1-MU-C001-ST-B	2	3	38	all (1 and 2)
A1	A1-MB05-MU-12	A1-MB05	Anodonta sp.	Live	40	Y	20	A1-MU-C001-ST-A	1	3	38	all (1 and 2)
A2	A2-MB04-MU-14	A2-MB04	Anodonta sp.	Live	1.3	N	0.65	A2-MU-C003-ST	1	1	35.3	all
A2	A2-MB04-MU-15	A2-MB04	Anodonta sp.	Live	1.6	N	0.8	A2-MU-C003-ST	1	1	35.3	all
A2	A2-MB04-MU-10	A2-MB04	Anodonta sp.	Live	2.2	N	1.1	A2-MU-C001-ST-A	1	1	35.3	all
A2	A2-MB04-MU-09	A2-MB04	Anodonta sp.	Live	2.3	N	1.15	A2-MU-C001-ST-B	2	1	35.3	all
A2	A2-MB04-MU-11	A2-MB04	Anodonta sp.	Live	2.5	N	1.25	A2-MU-C003-ST	1	1	35.3	all
A2	A2-MB04-MU-13	A2-MB04	Anodonta sp.	Live	2.5	N	1.25	A2-MU-C002-ST	1	1	35.3	all
A2	A2-MB04-MU-04	A2-MB04	Anodonta sp.	Live	2.6	N	1.3	A2-MU-C001-ST-A	1	1	35.3	all
A2	A2-MB04-MU-22	A2-MB04	Anodonta sp.	Live	2.7	N	1.35	A2-MU-C002-ST	1	1	35.3	all
A2	A2-MB04-MU-19	A2-MB04	Anodonta sp.	Live	3.2	N	1.6	A2-MU-C002-ST	1	1	35.3	all
A2	A2-MB04-MU-17	A2-MB04	Anodonta sp.	Live	3.3	N	1.65	A2-MU-C002-ST	1	1	35.3	all
A2	A2-MB04-MU-07	A2-MB04	Anodonta sp.	Live	3.5	N	1.75	A2-MU-C001-ST-B	2	1	35.3	all
A2	A2-MB04-MU-12	A2-MB04	Anodonta sp.	Live	3.5	N	1.75	A2-MU-C002-ST	1	1	35.3	all
A2	A2-MB04-MU-08	A2-MB04	Anodonta sp.	Live	3.9	N	1.95	A2-MU-C001-ST-B	2	1	35.3	all
A2	A2-MB04-MU-21	A2-MB04	Anodonta sp.	Live	4	N	2	A2-MU-C003-ST	1	1	35.3	all
A2	A2-MB04-MU-06	A2-MB04	Anodonta sp.	Live	4.2	N	2.1	A2-MU-C001-ST-A	1	1	35.3	all
A2	A2-MB04-MU-05	A2-MB04	Anodonta sp.	Live	4.3	N	2.15	A2-MU-C001-ST-A	1	1	35.3	all
A2	A2-MB05-MU-05	A2-MB05	Anodonta sp.	Live	23	N	11.5	A2-MU-C001-ST-B	2	1	35.3	all
A2	A2-MB05-MU-04	A2-MB05	Anodonta sp.	Live	40	N	20	A2-MU-C001-ST-B	2	2	65	all
A2	A2-MB05-MU-07	A2-MB05	Anodonta sp.	Live	42	N	21	A2-MU-C003-ST	1	2	65	all
A2	A2-MB05-MU-01	A2-MB05	Anodonta sp.	Live	48	N	24	A2-MU-C002-ST	1	2	65	all
A2	A2-MB05-MU-03	A2-MB05	Anodonta sp.	Live	24	N	12	A2-MU-C001-ST-A	1	3	41.5	all
A2	A2-MB05-MU-06	A2-MB05	Anodonta sp.	Live	26	N	13	A2-MU-C003-ST	1	3	41.5	all
A2	A2-MB05-MU-02	A2-MB05	Anodonta sp.	Live	33	N	16.5	A2-MU-C001-ST-A	1	3	41.5	all
A2	A2-MB06-MU-14	A2-MB06	Anodonta sp.	Live	18	N	9	A2-MU-C005-ST-A	1	4	119	all
A2	A2-MB06-MU-15	A2-MB06	Anodonta sp.	Live	20	N	10	A2-MU-C005-ST-A	1	4	119	all
A2	A2-MB06-MU-25	A2-MB06	Anodonta sp.	Live	20	N	10	A2-MU-C006-ST-A	1	4	119	all
A2	A2-MB06-MU-13	A2-MB06	Anodonta sp.	Live	23	N	11.5	A2-MU-C004-ST-SP	1b	4	119	all
A2	A2-MB06-MU-24	A2-MB06	Anodonta sp.	Live	23	N	11.5	A2-MU-C006-ST-A	1	4	119	all
A2	A2-MB06-MU-11	A2-MB06	Anodonta sp.	Live	25	N	12.5	A2-MU-C004-ST-SP	1b	4	119	all
A2	A2-MB06-MU-07	A2-MB06	Anodonta sp.	Live	27	N	13.5	A2-MU-C004-ST-SP	1b	4	119	all
A2	A2-MB06-MU-12	A2-MB06	Anodonta sp.	Live	27	N	13.5	A2-MU-C004-ST-SP	1b	4	119	all
A2	A2-MB06-MU-27	A2-MB06	Anodonta sp.	Live	27	N	13.5	A2-MU-C006-ST-B	2	4	119	all
A2	A2-MB06-MU-10	A2-MB06	Anodonta sp.	Live	28	N	14	A2-MU-C004-ST-SP	1b	4	119	all
A2	A2-MB06-MU-21	A2-MB06	Anodonta sp.	Live	28	N	14	A2-MU-C005-ST-B	2	5	187	all
A2	A2-MB06-MU-09	A2-MB06	Anodonta sp.	Live	32	N	16	A2-MU-C004-ST-SP	1b	5	187	all
A2	A2-MB06-MU-29	A2-MB06	Anodonta sp.	Live	32	N	16	A2-MU-C006-ST-B	2	5	187	all
A2	A2-MB06-MU-17	A2-MB06	Anodonta sp.	Live	34	N	17	A2-MU-C005-ST-B	2	5	187	all
A2	A2-MB06-MU-18	A2-MB06	Anodonta sp.	Live	40	N	20	A2-MU-C005-ST-A	1	5	187	all
A2	A2-MB06-MU-19	A2-MB06	Anodonta sp.	Live	40	N	20	A2-MU-C006-ST-A	1	5	187	all
A2	A2-MB06-MU-20	A2-MB06	Anodonta sp.	Live	41	N	20.5	A2-MU-C006-ST-A	1	5	187	all
A2	A2-MB06-MU-28	A2-MB06	Anodonta sp.	Live	41	N	20.5	A2-MU-C006-ST-B	2	5	187	all
A2	A2-MB06-MU-08	A2-MB06	Anodonta sp.	Live	42	N	21	A2-MU-C004-ST-SP	1b	5	187	all
A2	A2-MB06-MU-05	A2-MB06	Anodonta sp.	Live	44	N	22	A2-MU-C004-ST-SP	1b	5	187	all
A2	A2-MB06-MU-26	A2-MB06	Anodonta sp.	Live	28	N	14	A2-MU-C006-ST-B	2	6	217.5	all
A2	A2-MB06-MU-16	A2-MB06	Anodonta sp.	Live	29	N	14.5	A2-MU-C005-ST-B	2	6	217.5	all
A2	A2-MB06-MU-23	A2-MB06	Anodonta sp.	Live	29	N	14.5	A2-MU-C005-ST-B	2	6	217.5	all
A2	A2-MB06-MU-02	A2-MB06	Anodonta sp.	Live	43	N	21.5	A2-MS-C005-ST-A	1	6	217.5	all
A2	A2-MB06-MU-06	A2-MB06	Anodonta sp.	Live	47	N	23.5	A2-MU-C004-ST-SP	1b	6	217.5	all
A2	A2-MB06-MU-03	A2-MB06	Anodonta sp.	Live	50	N	25	A2-MS-C005-ST-A	1	6	217.5	all
A2	A2-MB06-MU-04	A2-MB06	Anodonta sp.	Live	50	N	25	A2-~~MS~~MU-C004-ST-S	1b	6	217.5	all
A2	A2-MB06-MU-01	A2-MB06	Anodonta sp.	Live	51	N	25.5	A2-MS-C005-ST-B	2	6	217.5	all
A2	A2-MB06-MU-22	A2-MB06	Anodonta sp.	Live	51	N	25.5	A2-MU-C006-ST-A	1	6	217.5	all
A2	A2-MB06-MU-30	A2-MB06	Anodonta sp.	Live	57	N	28.5	A2-MU-C006-ST-B	2	6	217.5	all
A2	A2-MB01-MU-01	A2-MB01	Anodonta sp.	Live	2	N	1	archive		--	--	archive
~~A2~~	~~A2-MB01-MU-02~~	A2-MB01	~~Anodonta sp.~~	~~Dead~~	~~1~~	~~N~~	~~0.5~~	~~archive~~				
~~A2~~	~~A2-MB04-MU-18~~	A2-MB04	~~Anodonta sp.~~	~~Dead~~	~~1.3~~	~~N~~	~~0.65~~	~~archive~~				
~~A2~~	~~A2-MB04-MU-02~~	A2-MB04	~~Anodonta sp.~~	~~Dead~~	~~1.5~~	~~N~~	~~0.75~~	~~archive~~				
~~A2~~	~~A2-MB04-MU-16~~	A2-MB04	~~Anodonta sp.~~	~~Dead~~	~~1.7~~	~~N~~	~~0.85~~	~~archive~~				
~~A2~~	~~A2-MB04-MU-20~~	A2-MB04	~~Anodonta sp.~~	~~Dead~~	~~1.8~~	~~N~~	~~0.9~~	~~archive~~				
~~A2~~	~~A2-MB01-MU-03~~	A2-MB01	~~Anodonta sp.~~	~~Dead~~	~~2~~	~~N~~	~~1~~	~~archive~~				
~~A2~~	~~A2-MB04-MU-01~~	A2-MB04	~~Anodonta sp.~~	~~Dead~~	~~2.3~~	~~N~~	~~1.15~~	~~archive~~				
~~A2~~	~~A2-MB04-MU-03~~	A2-MB04	~~Anodonta sp.~~	~~Dead~~	~~3.2~~	~~N~~	~~1.6~~	~~archive~~				
A3	A3-MB01-MU-03	A3-MB01	Anodonta sp.	Live	3	N	1.5	A3-MU-C002-ST	1	1	5.5	all (1 and 2)
A3	A3-MB01-MU-01	A3-MB01	Anodonta sp.	Live	4	N	2	A3-MU-C002-ST	1	1	5.5	all (1 and 2)
A3	A3-MB01-MU-04	A3-MB01	Anodonta sp.	Live	4	N	2	A3-MU-C002-ST	1	1	5.5	all (1 and 2)
A3	A3-MB01-MU-02	A3-MB01	Anodonta sp.	Live	70	N	35	A3-MU-C001-ST	1	2	35	all (1 and 2)
A3	A3-MB06-MU-05	A3-MB06	Anodonta sp.	Live	14	N	7	A3-MU-C003-ST	1	3	7	all (1 and 2)
A3	A3-MB06-MU-03	A3-MB06	Anodonta sp.	Live	1.9	N	0.95	A3-MU-C004-ST	1	4	4.4	all (1 and 2)
A3	A3-MB06-MU-04	A3-MB06	Anodonta sp.	Live	3.4	N	1.7	A3-MU-C004-ST	1	4	4.4	all (1 and 2)
A3	A3-MB04-MU-01	A3-MB04	Anodonta sp.	Live	3.5	N	1.75	A3-MU-C004-ST	1	4	4.4	all (1 and 2)
A3	A3-MB13-MU-02	A3-MB13	Anodonta sp.	Live	4	N	2	archive		--	--	archive
~~A3~~	~~A3-MB06-MU-01~~	A3-MB06	~~Anodonta sp.~~	~~Dead~~	~~1~~	~~N~~	~~0.5~~	~~archive~~				
~~A3~~	~~A3-MB06-MU-02~~	A3-MB06	~~Anodonta sp.~~	~~Dead~~	~~1~~	~~N~~	~~0.5~~	~~archive~~				
~~A3~~	~~A3-MB13-MU-01~~	A3-MB13	~~Anodonta sp.~~	~~Dead~~	~~2.1~~	~~N~~	~~1.05~~	~~archive~~				
~~A3~~	~~A3-MB12-MU-01~~	A3-MB12	~~Anodonta sp.~~	~~Dead~~	~~2.4~~	~~N~~	~~1.2~~	~~archive~~				
~~A4~~	~~A4-MB13-MU-02~~	A4-MB13	~~Anodonta sp.~~	~~Dead~~	~~5.8~~	~~N~~	~~2.9~~	~~archive~~				
~~A4~~	~~A4-MB13-MU-01~~	A4-MB13	~~Anodonta sp.~~	~~Dead~~	~~10~~	~~N~~	~~5~~	~~archive~~				
~~A4~~	~~A4-MB07-MU-01~~	A4-MB07	~~Anodonta sp.~~	~~Dead~~	~~11~~	~~N~~	~~5.5~~	~~archive~~				
~~A4~~	~~A4-MB10-MU-01~~	A4-MB10	~~Anodonta sp.~~	~~Dead~~	~~22~~	~~N~~	~~11~~	~~archive~~				
~~A5~~	~~A5-MB08-MU-01~~	A5-MB08	~~Anodonta sp.~~	~~Dead~~	~~4.2~~	~~Y~~	~~2.1~~	~~archive~~				
A6	A6-MB01-MU-06	A6-MB01	Anodonta sp.	Live	1	N	0.5	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB08-MU-05	A6-MB08	Anodonta sp.	Live	1	N	0.5	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-10	A6-MB01	Anodonta sp.	Live	1.1	N	0.55	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-21	A6-MB01	Anodonta sp.	Live	1.2	N	0.6	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB07-MU-10	A6-MB07	Anodonta sp.	Live	1.3	N	0.65	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-13	A6-MB01	Anodonta sp.	Live	1.4	N	0.7	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-08	A6-MB01	Anodonta sp.	Live	1.5	N	0.75	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-14	A6-MB01	Anodonta sp.	Live	1.5	N	0.75	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB07-MU-02	A6-MB07	Anodonta sp.	Live	1.5	N	0.75	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-12	A6-MB01	Anodonta sp.	Live	1.6	N	0.8	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB07-MU-01	A6-MB07	Anodonta sp.	Live	1.6	N	0.8	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-15	A6-MB01	Anodonta sp.	Live	1.7	N	0.85	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-11	A6-MB01	Anodonta sp.	Live	1.8	N	0.9	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-19	A6-MB01	Anodonta sp.	Live	1.8	N	0.9	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB08-MU-04	A6-MB08	Anodonta sp.	Live	1.9	N	0.95	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-02	A6-MB01	Anodonta sp.	Live	2	N	1	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-04	A6-MB01	Anodonta sp.	Live	2	N	1	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-18	A6-MB01	Anodonta sp.	Live	2	N	1	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-17	A6-MB01	Anodonta sp.	Live	2.1	N	1.05	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-09	A6-MB01	Anodonta sp.	Live	2.2	N	1.1	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-23	A6-MB01	Anodonta sp.	Live	2.3	N	1.15	A6-MU-C001-ST	1	1	32.45	all

Area	~~Sample~~ Organism ID	Beach	Species	Health	Weight (g)	Delayed Cooler Sample?	Estimated Tissue Weight (g)	TAIs Composite ID	TAIsSample Type	EPA Sample	EPAs Recommended Sample Mass	Analyses
A6	A6-MB07-MU-03	A6-MB07	Anodonta sp.	Live	2.4	N	1.2	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-20	A6-MB01	Anodonta sp.	Live	2.7	N	1.35	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB07-MU-07	A6-MB07	Anodonta sp.	Live	2.7	N	1.35	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-01	A6-MB01	Anodonta sp.	Live	3	N	1.5	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB07-MU-05	A6-MB07	Anodonta sp.	Live	3	N	1.5	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB07-MU-08	A6-MB07	Anodonta sp.	Live	3.1	N	1.55	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB07-MU-09	A6-MB07	Anodonta sp.	Live	3.2	N	1.6	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB07-MU-04	A6-MB07	Anodonta sp.	Live	3.3	N	1.65	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB01-MU-07	A6-MB01	Anodonta sp.	Live	3.4	N	1.7	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB07-MU-06	A6-MB07	Anodonta sp.	Live	3.6	N	1.8	A6-MU-C001-ST	1	1	32.45	all
A6	A6-MB09-MU-09	A6-MB09	Anodonta sp.	Live	0.5	N	0.25	A6-MU-C003-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB05-MU-03	A6-MB05	Anodonta sp.	Live	0.9	N	0.45	A6-MU-C004-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB09-MU-10	A6-MB09	Anodonta sp.	Live	1	N	0.5	A6-MU-C003-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB03-MU-01	A6-MB03	Anodonta sp.	Live	2	N	1	A6-MU-C002-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB03-MU-06	A6-MB03	Anodonta sp.	Live	2	N	1	A6-MU-C002-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB03-MU-07	A6-MB03	Anodonta sp.	Live	2	N	1	A6-MU-C002-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB05-MU-02	A6-MB05	Anodonta sp.	Live	2	N	1	A6-MU-C004-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB09-MU-01	A6-MB09	Anodonta sp.	Live	2	N	1	A6-MU-C003-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB09-MU-07	A6-MB09	Anodonta sp.	Live	2	N	1	A6-MU-C003-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB09-MU-06	A6-MB09	Anodonta sp.	Live	2.1	N	1.05	A6-MU-C003-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB05-MU-04	A6-MB05	Anodonta sp.	Live	2.2	N	1.1	A6-MU-C004-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB09-MU-04	A6-MB09	Anodonta sp.	Live	2.3	N	1.15	A6-MU-C003-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB05-MU-01	A6-MB05	Anodonta sp.	Live	2.4	N	1.2	A6-MU-C004-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB09-MU-05	A6-MB09	Anodonta sp.	Live	2.5	N	1.25	A6-MU-C003-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB03-MU-02	A6-MB03	Anodonta sp.	Live	3	N	1.5	A6-MU-C002-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB03-MU-03	A6-MB03	Anodonta sp.	Live	3	N	1.5	A6-MU-C002-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB03-MU-04	A6-MB03	Anodonta sp.	Live	3	N	1.5	A6-MU-C002-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB09-MU-02	A6-MB09	Anodonta sp.	Live	3	N	1.5	A6-MU-C003-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB09-MU-03	A6-MB09	Anodonta sp.	Live	3	N	1.5	A6-MU-C003-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB03-MU-05	A6-MB03	Anodonta sp.	Live	4	N	2	A6-MU-C002-ST	1	2	22.45	1-5 (no D/F)
A6	A6-MB08-MU-07	A6-MB08	Anodonta sp.	Live	1.3	Y	0.65	A6-MU-C001-ST	1	if needed	if needed	1-2 (if needed)
A6	A6-MB08-MU-06	A6-MB08	Anodonta sp.	Live	1.4	Y	0.7	A6-MU-C001-ST	1	if needed	if needed	1-2 (if needed)
A6	A6-MB08-MU-01	A6-MB08	Anodonta sp.	Live	2	Y	1	A6-MU-C001-ST	1	if needed	if needed	1-2 (if needed)
A6	A6-MB08-MU-02	A6-MB08	Anodonta sp.	Live	2	Y	1	A6-MU-C001-ST	1	if needed	if needed	1-2 (if needed)
A6	A6-MB08-MU-03	A6-MB08	Anodonta sp.	Live	2	Y	1	A6-MU-C001-ST	1	if needed	if needed	1-2 (if needed)
~~A6~~	~~A6-MB08-MU-12~~	A6-MB08	~~Anodonta sp.~~	~~Dead~~	~~0.6~~	~~N~~	~~0.3~~	~~archive~~				
~~A6~~	~~A6-MB08-MU-09~~	A6-MB08	~~Anodonta sp.~~	~~Dead~~	~~0.7~~	~~N~~	~~0.35~~	~~archive~~				
~~A6~~	~~A6-MB08-MU-14~~	A6-MB08	~~Anodonta sp.~~	~~Dead~~	~~0.8~~	~~N~~	~~0.4~~	~~archive~~				
~~A6~~	~~A6-MB01-MU-03~~	A6-MB01	~~Anodonta sp.~~	~~Dead~~	~~1~~	~~N~~	~~0.5~~	~~archive~~				
~~A6~~	~~A6-MB01-MU-05~~	A6-MB01	~~Anodonta sp.~~	~~Dead~~	~~1~~	~~N~~	~~0.5~~	~~archive~~				
~~A6~~	~~A6-MB08-MU-08~~	A6-MB08	~~Anodonta sp.~~	~~Dead~~	~~1~~	~~Y~~	~~0.5~~	~~archive~~				
~~A6~~	~~A6-MB01-MU-16~~	A6-MB01	~~Anodonta sp.~~	~~Dead~~	~~1.1~~	~~N~~	~~0.55~~	~~archive~~				
~~A6~~	~~A6-MB08-MU-11~~	A6-MB08	~~Anodonta sp.~~	~~Dead~~	~~1.1~~	~~Y~~	~~0.55~~	~~archive~~				
~~A6~~	~~A6-MB09-MU-08~~	A6-MB09	~~Anodonta sp.~~	~~Dead~~	~~1.1~~	~~N~~	~~0.55~~	~~archive~~				
~~A6~~	~~A6-MB01-MU-24~~	A6-MB01	~~Anodonta sp.~~	~~Dead~~	~~1.2~~	~~N~~	~~0.6~~	~~archive~~				
~~A6~~	~~A6-MB08-MU-13~~	A6-MB08	~~Anodonta sp.~~	~~Dead~~	~~1.3~~	~~N~~	~~0.65~~	~~archive~~				
~~A6~~	~~A6-MB01-MU-26~~	A6-MB01	~~Anodonta sp.~~	~~Dead~~	~~1.4~~	~~N~~	~~0.7~~	~~archive~~				
~~A6~~	~~A6-MB05-MU-05~~	A6-MB05	~~Anodonta sp.~~	~~Dead~~	~~1.5~~	~~N~~	~~0.75~~	~~archive~~				
~~A6~~	~~A6-MB07-MU-11~~	A6-MB07	~~Anodonta sp.~~	~~Dead~~	~~1.5~~	~~N~~	~~0.75~~	~~archive~~				
~~A6~~	~~A6-MB01-MU-22~~	A6-MB01	~~Anodonta sp.~~	~~Dead~~	~~1.6~~	~~N~~	~~0.8~~	~~archive~~				
~~A6~~	~~A6-MB05-MU-07~~	A6-MB05	~~Anodonta sp.~~	~~Dead~~	~~1.6~~	~~N~~	~~0.8~~	~~archive~~				
~~A6~~	~~A6-MB05-MU-06~~	A6-MB05	~~Anodonta sp.~~	~~Dead~~	~~1.8~~	~~N~~	~~0.9~~	~~archive~~				
~~A6~~	~~A6-MB01-MU-27~~	A6-MB01	~~Anodonta sp.~~	~~Dead~~	~~1.9~~	~~N~~	~~0.95~~	~~archive~~				
~~A6~~	~~A6-MB08-MU-10~~	A6-MB08	~~Anodonta sp.~~	~~Dead~~	~~1.9~~	~~N~~	~~0.95~~	~~archive~~				
~~A6~~	~~A6-MB01-MU-25~~	A6-MB01	~~Anodonta sp.~~	~~Dead~~	~~2~~	~~N~~	~~1~~	~~archive~~				
~~A6~~	~~A6-MB04-MU-01~~	A6-MB04	~~Anodonta sp.~~	~~dead~~	~~2.1~~	~~N~~	~~1.05~~	~~archive~~				
SR	SR-MB09-MU-01	SR-MB09	Margaritifera falc	Live	1.3	N	0.65	SR-MU-C001-ST	1	1	41.35	all
SR	SR-MB09-MU-02	SR-MB09	Margaritifera falc	Live	1.4	N	0.7	SR-MU-C001-ST	1	1	41.35	all
SR	SR-MB09-MU-04	SR-MB09	Margaritifera falc	Live	2.1	N	1.05	SR-MU-C001-ST	1	1	41.35	all
SR	SR-MB09-MU-03	SR-MB09	Margaritifera falc	Live	2.3	N	1.15	SR-MU-C001-ST	1	1	41.35	all
SR	SR-MB09-MU-05	SR-MB09	Margaritifera falc	Live	8.5	N	4.25	SR-MU-C001-ST	1	1	41.35	all
SR	SR-MB09-MU-06	SR-MB09	Margaritifera falc	Live	10	N	5	SR-MU-C001-ST	1	1	41.35	all
SR	SR-MB04-MU-01	SR-MB04	Margaritifera falc	Live	10.1	N	5.05	SR-MU-C001-ST	1	1	41.35	all
SR	SR-MB09-MU-07	SR-MB09	Margaritifera falc	Live	15	N	7.5	SR-MU-C001-ST	1	1	41.35	all
SR	SR-MB03-MU-01	SR-MB03	Margaritifera falc	Live	32	N	16	SR-MU-C001-ST	1	1	41.35	all
SR	SR-MB01-MU-01	SR-MB01	Margaritifera falc	Live	1.1	N	0.55	SR-MU-C002-ST	1	2	11.1	1-4 (no PCBs or D/F)
SR	SR-MB01-MU-02	SR-MB01	Margaritifera falc	Live	2.5	N	1.25	SR-MU-C002-ST	1	2	11.1	1-4 (no PCBs or D/F)
SR	SR-MB01-MU-03	SR-MB01	Margaritifera falc	Live	8.4	N	4.2	SR-MU-C002-ST	1	2	11.1	1-4 (no PCBs or D/F)
SR	SR-MB01-MU-04	SR-MB01	Margaritifera falc	Live	10.2	N	5.1	SR-MU-C002-ST	1	2	11.1	1-4 (no PCBs or D/F)
SR	SR-MB11-MU-01	SR-MB11	Margaritifera falc	Live	1.2	N	0.6	SR-MU-C003-ST	1	3	9.05	1-4 (no PCBs or D/F)
SR	SR-MB08-MU-01	SR-MB08	Margaritifera falc	Live	4.8	N	2.4	SR-MU-C003-ST	1	3	9.05	1-4 (no PCBs or D/F)
SR	SR-MB08-MU-02	SR-MB08	Margaritifera falc	Live	5.6	N	2.8	SR-MU-C003-ST	1	3	9.05	1-4 (no PCBs or D/F)
SR	SR-MB08-MU-03	SR-MB08	Margaritifera falc	Live	6.5	N	3.25	SR-MU-C003-ST	1	3	9.05	1-4 (no PCBs or D/F)

Summary of crayfish composites

Shaded tan = EPA recommended composites

Shaded yellow = crayfish in delayed cooler

Shaded blue = catfood bait

Shaded purple = did not meet 3.25 in size limit for native crayfish

1	TAL metals	2	
2	Total mercury	1.5	3.5
3	MeHg	1.5	5
4	Inorganic As	3	8
5	PCBs	10	18
6	Dioxins/furans	10	28

	Actual sample Weights						Options							
Sampling Area	Area	Trap	Health	Species	Total Live Weight	Bait Type	Option #	Organisms per sample	# samples	grams (60 needed for analysis at HHRA/BERA sites)	Enough for EPA Split?	Enough for Field Split?	Enough for Field Replicate?	Analytes
A2	A2	A2-CT01	Live	OV	4	C	1	7	1		yes	yes	no	all
A2		A2-CT06	Live	PL	60	C								
A2		A2-CT10	Live	OV	7	C								
A2		A2-CT13	Live	OV	10	NB								
A2		A2-CT13	Live	OV	5	NB								
A2		A2-CT13	Live	OV	39	C								
A2		A2-CT14	Live	PL	54	C								
A2		A2-CT01	Live	OV	4	C	2	4	1		yes	~~yes~~ no	no	all
A2		A2-CT06	Live	PL	60	C								
A2		A2-CT13	Live	OV	10	NB								
A2		A2-CT13	Live	OV	5	NB								
A2		A2-CT10	Live	OV	7	C	2	3	1		yes	~~yes~~ no	no	all
A2		A2-CT13	Live	OV	39	C								
A2		A2-CT14	Live	PL	54	C								
A2	A2	A2-CT01	Live	OV	4	C	EPA Preferred	5	1	65	yes	no	na	all
A2		A2-CT10	Live	OV	7	C								
A2		A2-CT13	Live	OV	10	NB								
A2		A2-CT13	Live	OV	5	NB								
A2		A2-CT13	Live	OV	39	C								
A2		A2-CT06	Live	PL	60	C	EPA Preferred	2	1	114	yes	no	na	all
A2		A2-CT14	Live	PL	54	C								
A3	A3	A3-CT01	Live	OV	28	C	1	2	1		yes	yes	no	all (1 and 2)
A3		A3-CT02	Live	OV	3.9	C								
A3		A3-CT13	Live	OV	23	NB	1	2	1		yes	yes	no	
A3		A3-CT14	Live	OV	21	NB								
A3	A3	A3-CT01	Live	OV	28	C	EPA Preferred	1	1	28	yes	yes	na	all (1 and 2)
A3		A3-CT13	Live	OV	23	NB	EPA Preferred	1	1	23	yes	yes	na	all (1 and 2)
A3		A3-CT14	Live	OV	21	NB	EPA Preferred	1	1	21	yes	yes	na	all (1 and 2)
A3		A3-CT02	Live	OV	3.9	C	EPA Preferred	1	1	3.9	no	no	na	all (1 and 2)
A4	A4	A4-CT01	Live	OV	3.1	C	1	2	1		yes	no	no	all (1 and 2)
A4		A4-CT04	Live	OV	4.7	CF	OK to include even though catfood because not analyzed for PCBs, D/Fs							
A4		A4-CT15	Dead	OV	21	C	exclude - dead							
A4		A4-CT17	Dead	OV	18	S	exclude - dead							
A5	A5	A5-CT15	Live	OV	48	CF	1	3	1	80	yes	no	no	all
A5		A5-CT15	Live	OV	27	CF								
A5		A5-CT15	Live	OV	5	CF								
A5		A5-CT16	Live	OV	20	S	1	3	1	73.2	yes	no	no	all
A5		A5-CT11	Live	OV	1.2	S								
A5		A5-CT11	Live	OV	52	S								
A5		A5-CT01	Live	OV	50	S	1	3	1	62	yes	no	no	all
A5		A5-CT25	Live	OV	11	C								
A5		A5-CT25	Live	OV	1	C								
A5		A5-CT12	Live	OV	51	S	1	2	1	112	yes	yes	no	all
A5		A5-CT02	Live	OV	61	S								
A5		A5-CT02	Live	PL	47	S	1	2	1	122	yes	yes	no	
A5		A5-CT04	Live	PL	75	S								all
A5		A5-CT04	Live	PL	69	S	1	2	1	96	yes	yes	no	
A5		A5-CT05	Live	OV	27	S								
A5	A5	A5-CT25	Live	OV	1	C	EPA Preferred	5	1	60.2	no	no	na	all
A5		A5-CT11	Live	OV	1.2	S								
A5		A5-CT25	Live	OV	11	C								
A5		A5-CT16	Live	OV	20	S								
A5		A5-CT05	Live	OV	27	S								
A5		A5-CT15	Live	OV	5	CF	EPA Preferred	2	1	66	yes	no	na	all
A5		A5-CT02	Live	OV	61	S								
A5		A5-CT02	Live	PL	47	S	EPA Preferred	2	1	122	yes	no	na	all
A5		A5-CT04	Live	PL	75	S								
A5		A5-CT15	Live	OV	27	CF	EPA Preferred	2	1	75	yes	no	na	all
A5		A5-CT15	Live	OV	48	CF								
A5		A5-CT01	Live	OV	50	S	EPA Preferred	2	1	101	yes	no	na	all
A5		A5-CT12	Live	OV	51	S								
A5		A5-CT11	Live	OV	52	S	EPA Preferred	2	1	121	yes	yes	na	all
A5		A5-CT04	Live	PL	69	S								
A6	A6	A6-CT01	Live	OV	43	C	1	3	1		yes	yes	~~yes (if no field split)~~ no	all
A6		A6-CT01	Live	OV	62	S								
A6		A6-CT01	Live	OV	20	S								
A6		A6-CT02	Live	OV	20	C	1	5	1		yes	yes	yes (if no field split)	all
A6		A6-CT02	Live	OV	51	S								
A6		A6-CT02	Live	OV	23	S								
A6		A6-CT02	Live	OV	44	S								
A6		A6-CT02	Live	OV	40	S								
A6		A6-CT04	Live	OV	42	C	1	2	1		yes	no	no	all
A6		A6-CT06	Live	OV	27	C								

	Actual sample Weights						Options							
Sampling Area	Area	Trap	Health	Species	Total Live Weight	Bait Type	Option #	Organisms per sample	# samples	grams (60 needed for analysis at HHRA/BERA sites)	Enough for EPA Split?	Enough for Field Split?	Enough for Field Replicate?	Analytes
A6		A6-CT07	Live	OV	45	C	1	2	1		yes	no	no	
A6		A6-CT07	Live	OV	44	C								
A6		A6-CT12	Live	OV	39	C	1	5	1		yes	yes	yes	all
A6		A6-CT12	Live	OV	9	C								
A6		A6-CT13	Live	OV	39	C/S								
A6		A6-CT13	Live	OV	31	C/S								
A6		A6-CT13	Live	OV	28	C/S								
A6		A6-CT13	Live	OV	25	C/S	1	3	1		yes	no	no	all
A6		A6-CT14	Live	OV	20	C/S								
A6		A6-CT14	Live	OV	24	C/S								
Buffalo Lake	RL	RL-CT01	Live	OV	46	CF	exclude - catfood							
Buffalo Lake		RL-CT01	Live	OV	27	CF	exclude - catfood							
Buffalo Lake		RL-CT01	Live	OV	57	S	1	10	1		yes	yes	yes	all
Buffalo Lake		RL-CT01	Live	OV	42	S								
Buffalo Lake		RL-CT01	Live	OV	41	S								
Buffalo Lake		RL-CT01	Live	OV	38	S								
Buffalo Lake		RL-CT01	Live	OV	46	S								
Buffalo Lake		RL-CT01	Live	OV	36	S								
Buffalo Lake		RL-CT01	Live	OV	18	S								
Buffalo Lake		RL-CT01	Live	OV	28	S								
Buffalo Lake		RL-CT01	Live	OV	23	S								
Buffalo Lake		RL-CT01	Live	OV	5.9	S								
Buffalo Lake		RL-CT02	Live	OV	25	CF	exclude - catfood							
Buffalo Lake		RL-CT02	Live	OV	44	CF	exclude - catfood							
Buffalo Lake		RL-CT02	Live	OV	43	S	1	7	1		yes	yes	yes	all
Buffalo Lake		RL-CT02	Live	OV	45	S								
Buffalo Lake		RL-CT02	Live	OV	44	S								
Buffalo Lake		RL-CT02	Live	OV	24	S								
Buffalo Lake		RL-CT02	Live	OV	26	S								
Buffalo Lake		RL-CT02	Live	OV	21	S								
Buffalo Lake		RL-CT02	Live	OV	3	S								
Buffalo Lake		RL-CT03	Live	OV	27	S	1	6	1		yes	yes	yes (if no field split)	all
Buffalo Lake		RL-CT03	Live	OV	28	S								
Buffalo Lake		RL-CT03	Live	OV	47	S								
Buffalo Lake		RL-CT03	Live	OV	3.8	S								
Buffalo Lake		RL-CT03	Live	OV	4.1	S								
Buffalo Lake		RL-CT03	Live	OV	30	S								
Buffalo Lake		RL-CT04	Live	OV	33	S	1	6	1		yes	yes	yes (if no field split)	all
Buffalo Lake		RL-CT04	Live	OV	11	S								
Buffalo Lake		RL-CT04	Live	OV	40	S								
Buffalo Lake		RL-CT04	Live	OV	48	S								
Buffalo Lake		RL-CT04	Live	OV	25	S								
Buffalo Lake		RL-CT04	Live	OV	19	S								
Buffalo Lake		RL-CT05	Live	OV	3	S	Archive because of small size in only sample from CT05							
Buffalo Lake		RL-CT11	Live	OV	5.9	S	Archive because of small size in onlyone of two samples from CT11							
Buffalo Lake		RL-CT11	Live	OV	3.6	S	Archive because of small size in onlyone of two samples from CT11							
Buffalo Lake		RL-CT07	Live	OV	5.5	CF	exclude - catfood and small sample size							
Buffalo Lake		RL-CT08	Live	OV	26	S	1	8	1		yes	yes	yes	all
Buffalo Lake		RL-CT08	Live	OV	53	S								
Buffalo Lake		RL-CT08	Live	OV	33	S								
Buffalo Lake		RL-CT08	Live	OV	27	S								
Buffalo Lake		RL-CT08	Live	OV	40	S								
Buffalo Lake		RL-CT08	Live	OV	36	S								
Buffalo Lake		RL-CT08	Live	OV	21	S								
Buffalo Lake		RL-CT08	Live	OV	5.9	S								
Buffalo Lake		RL-CT09	Live	OV	11	CF	exclude - catfood and small sample size							
Buffalo Lake		RL-CT09	Live	OV	3.6	S	archive because of small size in only sample from CT09							
Buffalo Lake		RL-CT10	Live	OV	4.1	S	1	5	1		yes	yes	yes (if no field split)	all
Buffalo Lake		RL-CT10	Live	OV	52	S								
Buffalo Lake		RL-CT10	Live	OV	46	S								
Buffalo Lake		RL-CT10	Live	OV	4.2	S								
Buffalo Lake		RL-CT10	Live	OV	23	S								
Sanpoil River	SR	SR-CT11	Live	OV	24	C	1	4	1	81	yes	no	no	all
Sanpoil River		SR-CT11	Live	PL	25	C								
Sanpoil River		SR-CT09	Live	PL	20	S								
Sanpoil River		SR-CT12	Live	PL	12	C								
Sanpoil River		SR-CT08	Live	OV	29	S	1	4	1	113.5	yes	no	no	all
Sanpoil River		SR-CT08	Live	OV	50	S								
Sanpoil River		SR-CT06	Live	OV	6.5	S								
Sanpoil River		SR-CT07	Live	OV	28	S								
Sanpoil River		SR-CT16	Live	OV	18	S	1	4	1	119	yes	yes	yes (if no EPA or field	all
Sanpoil River		SR-CT04	Live	OV	71	S								
Sanpoil River		SR-CT02	Live	OV	16	S								
Sanpoil River		SR-CT01	Live	OV	14	S								

Area	~~Sample~~ Organism ID	Location ID	Species	Health	Weight (g)	Bait	Composite ID	EPA Sample	EPA Sample Mass	EPAs Recommended Analyses
A2	A2-CT01-CR-01	A2-CT01	Orconectes virilis	Live	4	Chicken	A2-CR-C001	1	65	all
A2	A2-CT13-CR-02	A2-CT13	Orconectes virilis	Live	5	No Bait, captured using dip net	A2-CR-C001	1	65	all
A2	A2-CT10-CR-01	A2-CT10	Orconectes virilis	Live	7	Chicken	A2-CR-C002	1	65	all
A2	A2-CT13-CR-01	A2-CT13	Orconectes virilis	Live	10	No Bait, captured using dip net	A2-CR-C001	1	65	all
A2	A2-CT13-CR-03	A2-CT13	Orconectes virilis	Live	39	Chicken	A2-CR-C002	1	65	all
A2	A2-CT06-CR-01	A2-CT06	Pacifastacus leniusculus	Live	60	Chicken	A2-CR-C001	2	114	all
A2	A2-CT14-CR-01	A2-CT14	Pacifastacus leniusculus	Live	54	Chicken	A2-CR-C002	2	114	all
A3	A3-CT01-CR-01	A3-CT01	Orconectes virilis	Live	28	Chicken	A3-CR-C001	1	4	all (1 and 2)
A3	A3-CT02-CR-01	A3-CT02	Orconectes virilis	Live	3.9	Chicken	A3-CR-C001	2	3.9	all (1 and 2)
A3	A3-CT13-CR-01	A3-CT13	Orconectes virilis	Live	23	No Bait, captured using net	A3-CR-C002-SP	3	23	all (1 and 2)
A3	A3-CT14-CR-01	A3-CT14	Orconectes virilis	Live	21	No Bait, captured using grabbers	A3-CR-C002-SP	4	21	all (1 and 2)
A4	A4-CT01-CR-01	A4-CT01	Orconectes virilis	Live	3.1	Chicken	A4-CR-C001	1	7.8	all (1 and2)
A4	A4-CT04-CR-01	A4-CT04	Orconectes virilis	Live	4.7	Cat Food	A4-CR-C001	1	7.8	all (1 and 2)
~~A4~~	~~A4-CT17-CR-01~~	~~A4-CT17~~	~~Orconectes virilis~~	~~Dead~~	~~18~~	~~Salmon~~	~~archive~~			
~~A4~~	~~A4-CT15-CR-01~~	~~A4-CT15~~	~~Orconectes virilis~~	~~Dead~~	~~21~~	~~Chicken~~	~~archive~~			
A5	A5-CT25-CR-02	A5-CT25	Orconectes virilis	Live	1	Chicken	A5-CR-C003	1	60.2	all
A5	A5-CT11-CR-02	A5-CT11	Orconectes virilis	Live	1.2	Salmon	A5-CR-C002	1	60.2	all
A5	A5-CT25-CR-01	A5-CT25	Orconectes virilis	Live	11	Chicken	A5-CR-C003	1	60.2	all
A5	A5-CT16-CR-01	A5-CT16	Orconectes virilis	Live	20	Salmon	A5-CR-C002	1	60.2	all
A5	A5-CT05-CR-01	A5-CT05	Orconectes virilis	Live	27	Salmon	A5-CR-C006	1	60.2	all
A5	A5-CT15-CR-03	A5-CT15	Orconectes virilis	Live	5	Cat Food	A5-CR-C001	2	66	all
A5	A5-CT02-CR-01	A5-CT02	Orconectes virilis	Live	61	Salmon	A5-CR-C004	2	66	all
A5	A5-CT02-CR-02	A5-CT02	Pacifastacus leniusculus	Live	47	Salmon	A5-CR-C005-SP	3	122	all
A5	A5-CT04-CR-01	A5-CT04	Pacifastacus leniusculus	Live	75	Salmon	A5-CR-C005-SP	3	122	all
A5	A5-CT15-CR-02	A5-CT15	Orconectes virilis	Live	27	Cat Food	A5-CR-C001	4	75	all
A5	A5-CT15-CR-01	A5-CT15	Orconectes virilis	Live	48	Cat Food	A5-CR-C001	4	75	all
A5	A5-CT01-CR-01	A5-CT01	Orconectes virilis	Live	50	Salmon	A5-CR-C003	5	101	all
A5	A5-CT12-CR-01	A5-CT12	Orconectes virilis	Live	51	Salmon	A5-CR-C004	5	101	all
A5	A5-CT11-CR-01	A5-CT11	Orconectes virilis	Live	52	Salmon	A5-CR-C002	6	121	all
A5	A5-CT04-CR-02	A5-CT04	Pacifastacus leniusculus	Live	69	Salmon	A5-CR-C006	6	121	all
A6	A6-CT01-CR-03	A6-CT01	Orconectes virilis	Live	20	Salmon	A6-CR-C001-SP	1	125	all
A6	A6-CT01-CR-01	A6-CT01	Orconectes virilis	Live	43	Chicken	A6-CR-C001-SP	1	125	all
A6	A6-CT01-CR-02	A6-CT01	Orconectes virilis	Live	62	Salmon	A6-CR-C001-SP	1	125	all
A6	A6-CT02-CR-01	A6-CT02	Orconectes virilis	Live	20	Chicken	A6-CR-C002-A	2	178	all
A6	A6-CT02-CR-03	A6-CT02	Orconectes virilis	Live	23	Salmon	A6-CR-C002-A	2	178	all
A6	A6-CT02-CR-05	A6-CT02	Orconectes virilis	Live	40	Salmon	A6-CR-C002-B	2	178	all
A6	A6-CT02-CR-04	A6-CT02	Orconectes virilis	Live	44	Salmon	A6-CR-C002-B	2	178	all
A6	A6-CT02-CR-02	A6-CT02	Orconectes virilis	Live	51	Salmon	A6-CR-C002-A	2	178	all
A6	A6-CT06-CR-01	A6-CT06	Orconectes virilis	Live	27	Chicken	A6-CR-C003	3	69	all
A6	A6-CT04-CR-01	A6-CT04	Orconectes virilis	Live	42	Chicken	A6-CR-C003	3	69	all
A6	A6-CT07-CR-02	A6-CT07	Orconectes virilis	Live	44	Chicken	A6-CR-C004	4	89	all
A6	A6-CT07-CR-01	A6-CT07	Orconectes virilis	Live	45	Chicken	A6-CR-C004	4	89	all
A6	A6-CT12-CR-02	A6-CT12	Orconectes virilis	Live	9	Chicken	A6-CR-C005-B	5	171	all
A6	A6-CT13-CR-02	A6-CT13	Orconectes virilis	Live	25	Chicken, Salmon	A6-CR-C006	5	171	all
A6	A6-CT13-CR-03	A6-CT13	Orconectes virilis	Live	28	Chicken, Salmon	A6-CR-C005-B	5	171	all
A6	A6-CT13-CR-04	A6-CT13	Orconectes virilis	Live	31	Chicken, Salmon	A6-CR-C005-A	5	171	all
A6	A6-CT12-CR-01	A6-CT12	Orconectes virilis	Live	39	Chicken	A6-CR-C005-A	5	171	all
A6	A6-CT13-CR-01	A6-CT13	Orconectes virilis	Live	39	Chicken, Salmon	A6-CR-C005-B	5	171	all
A6	A6-CT14-CR-01	A6-CT14	Orconectes virilis	Live	20	Chicken, Salmon	A6-CR-C006	6	44	all
A6	A6-CT14-CR-02	A6-CT14	Orconectes virilis	Live	24	Chicken, Salmon	A6-CR-C006	6	44	all
RL	RL-CT01-CR-12	RL-CT01	Orconectes virilis	Live	5.9	Salmon	RL-CR-C001-A	1	334.9	all
RL	RL-CT01-CR-09	RL-CT01	Orconectes virilis	Live	18	Salmon	RL-CR-C001-B	1	334.9	all
RL	RL-CT01-CR-11	RL-CT01	Orconectes virilis	Live	23	Salmon	RL-CR-C001-A	1	334.9	all
RL	RL-CT01-CR-10	RL-CT01	Orconectes virilis	Live	28	Salmon	RL-CR-C001-B	1	334.9	all
RL	RL-CT01-CR-08	RL-CT01	Orconectes virilis	Live	36	Salmon	RL-CR-C001-B	1	334.9	all
RL	RL-CT01-CR-06	RL-CT01	Orconectes virilis	Live	38	Salmon	RL-CR-C001-B	1	334.9	all
RL	RL-CT01-CR-05	RL-CT01	Orconectes virilis	Live	41	Salmon	RL-CR-C001-A	1	334.9	all
RL	RL-CT01-CR-04	RL-CT01	Orconectes virilis	Live	42	Salmon	RL-CR-C001-A	1	334.9	all
RL	RL-CT01-CR-07	RL-CT01	Orconectes virilis	Live	46	Salmon	RL-CR-C001-B	1	334.9	all
RL	RL-CT01-CR-03	RL-CT01	Orconectes virilis	Live	57	Salmon	RL-CR-C001-A	1	334.9	all
RL	RL-CT02-CR-09	RL-CT02	Orconectes virilis	Live	3	Salmon	RL-CR-C002-A	2	206	all
RL	RL-CT02-CR-08	RL-CT02	Orconectes virilis	Live	21	Salmon	RL-CR-C002-A	2	206	all
RL	RL-CT02-CR-06	RL-CT02	Orconectes virilis	Live	24	Salmon	RL-CR-C002-B	2	206	all
RL	RL-CT02-CR-07	RL-CT02	Orconectes virilis	Live	26	Salmon	RL-CR-C002-A	2	206	all
RL	RL-CT02-CR-03	RL-CT02	Orconectes virilis	Live	43	Salmon	RL-CR-C002-A	2	206	all
RL	RL-CT02-CR-05	RL-CT02	Orconectes virilis	Live	44	Salmon	RL-CR-C002-B	2	206	all
RL	RL-CT02-CR-04	RL-CT02	Orconectes virilis	Live	45	Salmon	RL-CR-C002-B	2	206	all
RL	RL-CT03-CR-04	RL-CT03	Orconectes virilis	Live	3.8	Salmon	RL-CR-C003-B	3	139.9	all
RL	RL-CT03-CR-05	RL-CT03	Orconectes virilis	Live	4.1	Salmon	RL-CR-C003-A	3	139.9	all
RL	RL-CT03-CR-01	RL-CT03	Orconectes virilis	Live	27	Salmon	RL-CR-C003-A	3	139.9	all
RL	RL-CT03-CR-02	RL-CT03	Orconectes virilis	Live	28	Salmon	RL-CR-C003-B	3	139.9	all
RL	RL-CT03-CR-06	RL-CT03	Orconectes virilis	Live	30	Salmon	RL-CR-C003-A	3	139.9	all
RL	RL-CT03-CR-03	RL-CT03	Orconectes virilis	Live	47	Salmon	RL-CR-C003-B	3	139.9	all
RL	RL-CT04-CR-02	RL-CT04	Orconectes virilis	Live	11	Salmon	RL-CR-C004	4	176	all
RL	RL-CT04-CR-06	RL-CT04	Orconectes virilis	Live	19	Salmon	RL-CR-C004	4	176	all
RL	RL-CT04-CR-05	RL-CT04	Orconectes virilis	Live	25	Salmon	RL-CR-C004	4	176	all
RL	RL-CT04-CR-01	RL-CT04	Orconectes virilis	Live	33	Salmon	RL-CR-C004	4	176	all
RL	RL-CT04-CR-03	RL-CT04	Orconectes virilis	Live	40	Salmon	RL-CR-C004	4	176	all
RL	RL-CT04-CR-04	RL-CT04	Orconectes virilis	Live	48	Salmon	RL-CR-C004	4	176	all
RL	RL-CT08-CR-08	RL-CT08	Orconectes virilis	Live	5.9	Salmon	RL-CR-C005	5	241.9	all
RL	RL-CT08-CR-07	RL-CT08	Orconectes virilis	Live	21	Salmon	RL-CR-C005	5	241.9	all
RL	RL-CT08-CR-01	RL-CT08	Orconectes virilis	Live	26	Salmon	RL-CR-C005	5	241.9	all
RL	RL-CT08-CR-04	RL-CT08	Orconectes virilis	Live	27	Salmon	RL-CR-C005	5	241.9	all
RL	RL-CT08-CR-03	RL-CT08	Orconectes virilis	Live	33	Salmon	RL-CR-C005	5	241.9	all
RL	RL-CT08-CR-06	RL-CT08	Orconectes virilis	Live	36	Salmon	RL-CR-C005	5	241.9	all
RL	RL-CT08-CR-05	RL-CT08	Orconectes virilis	Live	40	Salmon	RL-CR-C005	5	241.9	all
RL	RL-CT08-CR-02	RL-CT08	Orconectes virilis	Live	53	Salmon	RL-CR-C005	5	241.9	all
RL	RL-CT10-CR-01	RL-CT10	Orconectes virilis	Live	4.1	Salmon	RL-CR-C006	6	129.3	all
RL	RL-CT10-CR-04	RL-CT10	Orconectes virilis	Live	4.2	Salmon	RL-CR-C006	6	129.3	all
RL	RL-CT10-CR-05	RL-CT10	Orconectes virilis	Live	23	Salmon	RL-CR-C006	6	129.3	all
RL	RL-CT10-CR-03	RL-CT10	Orconectes virilis	Live	46	Salmon	RL-CR-C006	6	129.3	all
RL	RL-CT10-CR-02	RL-CT10	Orconectes virilis	Live	52	Salmon	RL-CR-C006	6	129.3	all
RL	RL-CT05-CR-01	RL-CT05	Orconectes virilis	Live	3	Salmon	archive	--	--	--
RL	RL-CT09-CR-02	RL-CT09	Orconectes virilis	Live	3.6	Salmon	archive	--	--	--
RL	RL-CT11-CR-02	RL-CT11	Orconectes virilis	Live	3.6	Salmon	archive	--	--	--
RL	RL-CT07-CR-01	RL-CT07	Orconectes virilis	Live	5.5	Cat Food	archive	--	--	--
RL	RL-CT11-CR-01	RL-CT11	Orconectes virilis	Live	5.9	Salmon	archive	--	--	--
RL	RL-CT09-CR-01	RL-CT09	Orconectes virilis	Live	11	Cat Food	archive	--	--	--
RL	RL-CT02-CR-01	RL-CT02	Orconectes virilis	Live	25	Cat Food	archive	--	--	--
RL	RL-CT01-CR-02	RL-CT01	Orconectes virilis	Live	27	Cat Food	archive	--	--	--
RL	RL-CT02-CR-02	RL-CT02	Orconectes virilis	Live	44	Cat Food	archive	--	--	--
RL	RL-CT01-CR-01	RL-CT01	Orconectes virilis	Live	46	Cat Food	archive	--	--	--
SR	SR-CT01-CR-01	SR-CT01	Orconectes virilis	Live	14	Salmon	SR-CR-C003	1	30	1-4
SR	SR-CT02-CR-01	SR-CT02	Orconectes virilis	Live	16	Salmon	SR-CR-C003	1	30	1-4
SR	SR-CT16-CR-01	SR-CT16	Orconectes virilis	Live	18	Salmon	SR-CR-C003	2	89	all

Area	~~Sample~~ Organism ID	Location ID	Species	Health	Weight (g)	Bait	Composite ID	EPA Sample	EPA Sample Mass	EPAs Recommended Analyses
SR	SR-CT04-CR-01	SR-CT04	Orconectes virilis	Live	71	Salmon	SR-CR-C003	2	89	all
SR	SR-CT06-CR-01	SR-CT06	Orconectes virilis	Live	6.5	Salmon	SR-CR-C002	3	63..5	all
SR	SR-CT07-CR-01	SR-CT07	Orconectes virilis	Live	28	Salmon	SR-CR-C002	3	63..5	all
SR	SR-CT08-CR-01	SR-CT08	Orconectes virilis	Live	29	Salmon	SR-CR-C002	3	63..5	all
SR	SR-CT08-CR-02	SR-CT08	Orconectes virilis	Live	50	Salmon	SR-CR-C002	4	74	all
SR	SR-CT11-CR-01	SR-CT11	Orconectes virilis	Live	24	Chicken	SR-CR-C001	4	74	all
SR	SR-CT12-CR-01	SR-CT12	Pacifastacus leniusculus	Live	12	Chicken	SR-CR-C001	5	32	1-4
SR	SR-CT09-CR-01	SR-CT09	Pacifastacus leniusculus	Live	20	Salmon	SR-CR-C001	5	32	1-4
SR	SR-CT11-CR-02	SR-CT11	Pacifastacus leniusculus	Live	25	Chicken	SR-CR-C001	6	25	1-4

Section 3:

TAI's draft final compositing plan submitted

10/27/16

Kessel Cristy SPOK

From: McCaig Kris SPOK
Sent: Thursday, October 27, 2016 5:39 PM
To: Dustan Bott (Bott.Dustan@epa.gov)
Cc: John Toll; Berit Bergquist (BeritB@windwardenv.com); Kate McPeek; Nancy Judd (NancyJ@windwardenv.com); Jennifer Pretare (Jennifer.Pretare@aecom.com); Kessel Cristy SPOK; Enos Dave SPOK; Dina Johnson (DLJohnson@ramboll.com)
Subject: FW: Draft Final BMI Compositing Workbook and Maps
Attachments: Draft Final BMI Compositing Spreadsheets 10-26-16.xlsx; Draft Final BMI Compositing Figures 10-26-16.pdf

Hi Dustan,

Please see the attached files and the notes below from Berit for review. If it would be helpful for us to give an overview to you and others that will be reviewing the plan we would be happy to have a call. Possible dates/times next week for an hour meeting are:

Tuesday 11/1 between 9:00 and 11:00 a.m.
Wednesday 11/2 from 11:00 a.m. to 12:00 p.m.
Thursday 11/3 between 1:00 and 3:00 p.m.

We look forward to working with you to finalize the plan and getting the labs started on processing and anlysis.

Thanks,

Kris

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From: Berit Bergquist [mailto:BeritB@windwardenv.com]
Sent: Wednesday, October 26, 2016 4:13 PM
To: McCaig Kris SPOK <Kris.McCaig@teck.com>
Cc: Pretare, Jennifer <jennifer.pretare@aecom.com>; Kate McPeek <katem@windwardenv.com>; Nancy Judd <NancyJ@windwardenv.com>; John Toll <JohnT@windwardenv.com>; Kessel Cristy SPOK <Cristy.Kessel@teck.com>
Subject: UCR: Draft Final BMI Compositing Workbook and Maps

Hi Kris,

Attached is a draft version of the final BMI compositing Excel workbook ready to send to EPA. Also attached are maps showing the locations where live organisms were collected in both spring and fall. On a subset of the maps, the locations have been color-coded to facilitate understanding of compositing among different locations. Here are a few notes about the Excel workbook and maps:

- The workbook includes: 1) an "Overall Summary" spreadsheet with the total number of composites per area, 2) "Crayfish Composite Summary" and "Mussel Composite Summary" spreadsheets which summarize the numbers of organisms per composite, tissue mass available for analysis for each composite, and potential and/or designated QC samples, and 3) “Crayfish Composites” and “Mussel Composites” spreadsheets with organism-specific information ordered by proposed composite number. Also included are spreadsheets with raw field data for crayfish, mussels, and clams.

- Codes have not yet been assigned to the composite IDs to identify QC samples; this will be completed once the plan and selected QC samples have been agreed upon.
- We have indicated where EPA splits are possible in the “Crayfish Composite Summary” and “Mussel Composite Summary” spreadsheets, but for now we have left the selection of those samples up to EPA.
- The maps include only those locations where live organisms were collected, because no dead organisms are proposed for chemical analysis. The only exception is location (A1-CT61), which is included on Figure 1 because one half-dead crayfish was collected there. We are not proposing that this crayfish be analyzed, but the location is presented on the map for EPA’s review of the proposal to exclude this organism.

Please let me know if you have any questions.

Berit

Berit Bergquist
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Crayfish Compositing Summary

Area	Composite Number	# Individuals			Species		Tissue Mass Available for Analyses (g)			Minimum Tissue Mass Required for Analyses (g)	QAPP Tissue Requirement Met?	EPA Split Possible (2.5 g)?	Field Split Possible (2x required)?	Adequate Field Replicate?	Notes
		Spring	Fall	Total	Spring	Fall	Spring	Fall	Total						
A1	1	0	0	0	na	na	0	0	0	4.5	no	no	no	no	
A1	2	0	0	0	na	na	0	0	0	4.5	no	no	no	no	
A1	3	0	0	0	na	na	0	0	0	4.5	no	no	no	no	
A1	4	0	0	0	na	na	0	0	0	4.5	no	no	no	no	
A1	5	0	0	0	na	na	0	0	0	4.5	no	no	no	no	
A1	6	0	0	0	na	na	0	0	0	4.5	no	no	no	no	
A2	1	5	0	5	Northern	na	65	0	65	60	yes	yes	no	no	
A2	2	2	3	5	Signal	Signal	114	115	229	60	yes	yes	yes	no	
A2	3	0	5	5	na	Northern	0	182	182	60	yes	yes	yes	no	designated field split
A2	4	0	5	5	na	Northern	0	178	178	60	yes	yes	yes	no	
A2	5	0	5	5	na	Northern	0	158	158	60	yes	yes	yes	no	
A2	6	0	5	5	na	Northern	0	141	141	60	yes	yes	yes	no	
A3	1	1	4	5	Northern	Northern	28	69	97	4.5	yes	yes	yes	no	
A3	2	1	4	5	Northern	Northern	3.9	82	85.9	4.5	yes	yes	yes	no	
A3	3	1	3	4	Northern	Northern	23	31	54	4.5	yes	yes	yes	no	
A3	4	1	4	5	Northern	Northern	21	118	139	4.5	yes	yes	yes	no	
A3	5	0	4	4	na	Northern	0	47	47	4.5	yes	yes	yes	no	
A3	6	0	4	4	na	Northern	0	72	72	4.5	yes	yes	yes	no	
A4	1	1	3	4	Northern	Northern	3.1	272	275.1	4.5	yes	yes	yes	no	
A4	2	0	5	5	na	Northern	0	128	128	4.5	yes	yes	yes	no	
A4	3	0	5	5	na	Northern	0	311	311	4.5	yes	yes	yes	no	
A4	4	0	5	5	na	Northern	0	154	154	4.5	yes	yes	yes	yes	designated field replicate with composite #5
A4	5	0	5	5	na	Northern	0	162	162	4.5	yes	yes	yes	yes	designated field replicate with composite #4
A4	6	0	5	5	na	Northern	0	470	470	4.5	yes	yes	yes	no	designated field split
A5	1	5	0	5	Northern	na	60.2	0	60.2	60	yes	no	no	no	
A5	2	2	0	2	Northern	na	66	0	66	60	yes	yes	no	no	
A5	3	2	0	2	Signal	na	122	0	122	60	yes	yes	yes	no	
A5	4	2	0	2	Northern	na	75	0	75	60	yes	yes	no	no	
A5	5	2	0	2	Northern	na	101	0	101	60	yes	yes	no	no	
A5	6	2	0	2	Northern, signal	na	121	0	121	60	yes	yes	yes	no	
A6	1	3	0	3	Northern	na	125	0	125	60	yes	yes	yes	no	
A6	2	5	0	5	Northern	na	178	0	178	60	yes	yes	yes	no	
A6	3	2	0	2	Northern	na	69	0	69	60	yes	yes	no	no	
A6	4	2	0	2	Northern	na	89	0	89	60	yes	yes	no	no	
A6	5	5	0	5	Northern	na	146	0	146	60	yes	yes	yes	no	
A6	6	3	0	3	Northern	na	69	0	69	60	yes	yes	no	no	
RL	1	10	0	10	Northern	na	334.9	0	334.9	60	yes	yes	yes	no	
RL	2	7	0	7	Northern	na	206	0	206	60	yes	yes	yes	no	
RL	3	6	0	6	Northern	na	139.9	0	139.9	60	yes	yes	yes	no	
RL	4	6	0	6	Northern	na	176	0	176	60	yes	yes	yes	no	
RL	5	8	0	8	Northern	na	241.9	0	241.9	60	yes	yes	yes	no	designated field split
RL	6	5	0	5	Northern	na	129.3	0	129.3	60	yes	yes	yes	no	
Sanpoil	1	0	3	3	na	Northern	0	74	74	60	yes	yes	no	no	
Sanpoil	2	2	1	3	Northern	Northern	89	23	112	60	yes	yes	no	no	
Sanpoil	3	3	0	3	Northern	na	63.5	0	63.5	60	yes	yes	no	no	
Sanpoil	4	2	0	2	Northern	na	74	0	74	60	yes	yes	no	no	
Sanpoil	5	3	3	6	Signal	Signal	57	47	104	60	yes	yes	no	no	
Sanpoil	6	0	4	4	na	Northern	0	195	195	60	yes	yes	yes	no	

Notes:
na - not applicable
RL - Rebecca Lake

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Crayfish Composites

Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Weight (g)	Bait	Delayed Cooler Sample?	Composite ID	Sample Type	Composite #	Original Composite # (from spring)	Sample Mass	Recommended Analyses	Enough Mass for EPA Split?	Comments
A1	F	A1-CT61-CR-01	A1-CT61	northern crayfish	Live	14.5	None	na	na	na	na	na	14.5	na	na	archive; crayfish was almost dead when captured
A2	S	A2-CT01-CR-01	A2-CT01	northern crayfish	Live	4.0	Chicken	N	A2-CR-C001	1	1	1	65	alll HHRA and BERA analytes	Y	
A2	S	A2-CT10-CR-01	A2-CT10	northern crayfish	Live	7.0	Chicken	N	A2-CR-C001	1	1	1	65	alll HHRA and BERA analytes	Y	
A2	S	A2-CT13-CR-01	A2-CT13	northern crayfish	Live	10.0	No Bait, captured	N	A2-CR-C001	1	1	1	65	alll HHRA and BERA analytes	Y	
A2	S	A2-CT13-CR-02	A2-CT13	northern crayfish	Live	5.0	No Bait, captured	N	A2-CR-C001	1	1	1	65	alll HHRA and BERA analytes	Y	
A2	S	A2-CT13-CR-03	A2-CT13	northern crayfish	Live	39.0	Chicken	N	A2-CR-C001	1	1	1	65	alll HHRA and BERA analytes	Y	
A2	S	A2-CT06-CR-01	A2-CT06	signal crayfish	Live	60.0	Chicken	N	A2-CR-C002	1	2	2	229	alll HHRA and BERA analytes	Y	
A2	S	A2-CT14-CR-01	A2-CT14	signal crayfish	Live	54.0	Chicken	N	A2-CR-C002	1	2	2	229	alll HHRA and BERA analytes	Y	
A2	F	A2-CT45-CR-02	A2-CT45	signal crayfish	Live	40.0	Salmon	na	A2-CR-C002	1	2	na	229	alll HHRA and BERA analytes	Y	
A2	F	A2-CT45-CR-03	A2-CT45	signal crayfish	Live	39.0	Salmon	na	A2-CR-C002	1	2	na	229	alll HHRA and BERA analytes	Y	
A2	F	A2-CT45-CR-04	A2-CT45	signal crayfish	Live	36.0	Salmon	na	A2-CR-C002	1	2	na	229	alll HHRA and BERA analytes	Y	
A2	F	A2-CT31-CR-01	A2-CT31	northern crayfish	Live	20.0	Salmon	na	A2-CR-C003	1b	3	na	182	alll HHRA and BERA analytes	Y	field split
A2	F	A2-CT31-CR-02	A2-CT31	northern crayfish	Live	32.0	Salmon	na	A2-CR-C003	1b	3	na	182	alll HHRA and BERA analytes	Y	field split
A2	F	A2-CT31-CR-03	A2-CT31	northern crayfish	Live	7.0	Salmon	na	A2-CR-C003	1b	3	na	182	alll HHRA and BERA analytes	Y	field split
A2	F	A2-CT58-CR-01	A2-CT58	northern crayfish	Live	89.0	Salmon	na	A2-CR-C003	1b	3	na	182	alll HHRA and BERA analytes	Y	field split
A2	F	A2-CT62-CR-01	A2-CT62	northern crayfish	Live	34.0	Salmon	na	A2-CR-C003	1b	3	na	182	alll HHRA and BERA analytes	Y	field split
A2	F	A2-CT34-CR-01	A2-CT34	northern crayfish	Live	28.0	Salmon	na	A2-CR-C004	1	4	na	178	alll HHRA and BERA analytes	Y	
A2	F	A2-CT35-CR-01	A2-CT35	northern crayfish	Live	39.0	Salmon	na	A2-CR-C004	1	4	na	178	alll HHRA and BERA analytes	Y	
A2	F	A2-CT48-CR-03	A2-CT48	northern crayfish	Live	31.0	Salmon	na	A2-CR-C004	1	4	na	178	alll HHRA and BERA analytes	Y	
A2	F	A2-CT54-CR-01	A2-CT54	northern crayfish	Live	42.0	Salmon	na	A2-CR-C004	1	4	na	178	alll HHRA and BERA analytes	Y	
A2	F	A2-CT54-CR-02	A2-CT54	northern crayfish	Live	38.0	Salmon	na	A2-CR-C004	1	4	na	178	alll HHRA and BERA analytes	Y	
A2	F	A2-CT32-CR-01	A2-CT32	northern crayfish	Live	12.0	Salmon	na	A2-CR-C005	1	5	na	158	alll HHRA and BERA analytes	Y	
A2	F	A2-CT53-CR-01	A2-CT53	northern crayfish	Live	47.0	Salmon	na	A2-CR-C005	1	5	na	158	alll HHRA and BERA analytes	Y	
A2	F	A2-CT55-CR-01	A2-CT55	northern crayfish	Live	42.0	Salmon	na	A2-CR-C005	1	5	na	158	alll HHRA and BERA analytes	Y	
A2	F	A2-CT56-CR-01	A2-CT56	northern crayfish	Live	26.0	Salmon	na	A2-CR-C005	1	5	na	158	alll HHRA and BERA analytes	Y	
A2	F	A2-CT56-CR-02	A2-CT56	northern crayfish	Live	31.0	Salmon	na	A2-CR-C005	1	5	na	158	alll HHRA and BERA analytes	Y	
A2	F	A2-CT40-CR-01	A2-CT40	northern crayfish	Live	11.0	Salmon	na	A2-CR-C006	1	6	na	141	alll HHRA and BERA analytes	Y	
A2	F	A2-CT45-CR-01	A2-CT45	northern crayfish	Live	31.0	Salmon	na	A2-CR-C006	1	6	na	141	alll HHRA and BERA analytes	Y	
A2	F	A2-CT46-CR-01	A2-CT46	northern crayfish	Live	36.0	Salmon	na	A2-CR-C006	1	6	na	141	alll HHRA and BERA analytes	Y	
A2	F	A2-CT48-CR-01	A2-CT48	northern crayfish	Live	34.0	Salmon	na	A2-CR-C006	1	6	na	141	alll HHRA and BERA analytes	Y	
A2	F	A2-CT48-CR-02	A2-CT48	northern crayfish	Live	29.0	Salmon	na	A2-CR-C006	1	6	na	141	alll HHRA and BERA analytes	Y	
A3	S	A3-CT01-CR-01	A3-CT01	northern crayfish	Live	28.0	Chicken	N	A3-CR-C001	1	1	1	97	all BERA analytes	Y	
A3	F	A3-CT53-CR-01	A3-CT53	northern crayfish	Live	3.0	Salmon	na	A3-CR-C001	1	1	na	97	all BERA analytes	Y	
A3	F	A3-CT48-CR-01	A3-CT48	northern crayfish	Live	19.0	Salmon	na	A3-CR-C001	1	1	na	97	all BERA analytes	Y	
A3	F	A3-CT48-CR-02	A3-CT48	northern crayfish	Live	1.0	Salmon	na	A3-CR-C001	1	1	na	97	all BERA analytes	Y	
A3	F	A3-CT52-CR-01	A3-CT52	northern crayfish	Live	46.0	Salmon	na	A3-CR-C001	1	1	na	97	all BERA analytes	Y	
A3	S	A3-CT02-CR-01	A3-CT02	northern crayfish	Live	3.9	Chicken	N	A3-CR-C002	1	2	2	85.9	all BERA analytes	Y	
A3	F	A3-CT50-CR-01	A3-CT50	northern crayfish	Live	20.0	Salmon	na	A3-CR-C002	1	2	na	85.9	all BERA analytes	Y	
A3	F	A3-CT50-CR-02	A3-CT50	northern crayfish	Live	29.0	Salmon	na	A3-CR-C002	1	2	na	85.9	all BERA analytes	Y	
A3	F	A3-CT50-CR-03	A3-CT50	northern crayfish	Live	28.0	Salmon	na	A3-CR-C002	1	2	na	85.9	all BERA analytes	Y	
A3	F	A3-CT49-CR-01	A3-CT49	northern crayfish	Live	5.0	Salmon	na	A3-CR-C002	1	2	na	85.9	all BERA analytes	Y	
A3	S	A3-CT13-CR-01	A3-CT13	northern crayfish	Live	23.0	No Bait, captured	N	A3-CR-C003	1	3	3	54	all BERA analytes	Y	
A3	F	A3-CT58-CR-01	A3-CT58	northern crayfish	Live	15.0	Salmon	na	A3-CR-C003	1	3	na	54	all BERA analytes	Y	
A3	F	A3-CT58-CR-02	A3-CT58	northern crayfish	Live	7.0	Salmon	na	A3-CR-C003	1	3	na	54	all BERA analytes	Y	
A3	F	A3-CT60-CR-01	A3-CT60	northern crayfish	Live	9.0	Salmon	na	A3-CR-C003	1	3	na	54	all BERA analytes	Y	
A3	S	A3-CT14-CR-01	A3-CT14	northern crayfish	Live	21.0	No Bait, captured	N	A3-CR-C004	1	4	4	139	all BERA analytes	Y	
A3	F	A3-CT36-CR-01	A3-CT36	northern crayfish	Live	55.0	Salmon	na	A3-CR-C004	1	4	na	139	all BERA analytes	Y	
A3	F	A3-CT36-CR-02	A3-CT36	northern crayfish	Live	40.0	Salmon	na	A3-CR-C004	1	4	na	139	all BERA analytes	Y	
A3	F	A3-CT37-CR-01	A3-CT37	northern crayfish	Live	4.0	Salmon	na	A3-CR-C004	1	4	na	139	all BERA analytes	Y	
A3	F	A3-CT39-CR-01	A3-CT39	northern crayfish	Live	19.0	Salmon	na	A3-CR-C004	1	4	na	139	all BERA analytes	Y	
A3	F	A3-CT62-CR-01	A3-CT62	northern crayfish	Live	30.0	Salmon	na	A3-CR-C005	1	5	na	47	all BERA analytes	Y	
A3	F	A3-CT63-CR-01	A3-CT63	northern crayfish	Live	4.0	Salmon	na	A3-CR-C005	1	5	na	47	all BERA analytes	Y	
A3	F	A3-CT45-CR-01	A3-CT45	northern crayfish	Live	8.0	Salmon	na	A3-CR-C005	1	5	na	47	all BERA analytes	Y	
A3	F	A3-CT45-CR-02	A3-CT45	northern crayfish	Live	5.0	Salmon	na	A3-CR-C005	1	5	na	47	all BERA analytes	Y	
A3	F	A3-CT47-CR-01	A3-CT47	northern crayfish	Live	2.0	Salmon	na	A3-CR-C006	1	6	na	72	all BERA analytes	Y	
A3	F	A3-CT46-CR-01	A3-CT46	northern crayfish	Live	23.0	Salmon	na	A3-CR-C006	1	6	na	72	all BERA analytes	Y	
A3	F	A3-CT46-CR-02	A3-CT46	northern crayfish	Live	24.0	Salmon	na	A3-CR-C006	1	6	na	72	all BERA analytes	Y	
A3	F	A3-CT46-CR-03	A3-CT46	northern crayfish	Live	23.0	Salmon	na	A3-CR-C006	1	6	na	72	all BERA analytes	Y	
A4	S	A4-CT01-CR-01	A4-CT01	northern crayfish	Live	3.1	Chicken	N	A4-CR-C001	1	1	1	275.1	all BERA analytes	Y	
A4	F	A4-CT36-CR-02	A4-CT36	northern crayfish	Live	90.0	Salmon	na	A4-CR-C001	1	1	na	275.1	all BERA analytes	Y	
A4	F	A4-CT36-CR-03	A4-CT36	northern crayfish	Live	91.0	Salmon	na	A4-CR-C001	1	1	na	275.1	all BERA analytes	Y	
A4	F	A4-CT36-CR-04	A4-CT36	northern crayfish	Live	91.0	Salmon	na	A4-CR-C001	1	1	na	275.1	all BERA analytes	Y	
A4	F	A4-CT31-CR-01	A4-CT31	northern crayfish	Live	25.0	Salmon	na	A4-CR-C002	1	2	na	128	all BERA analytes	Y	

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Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Weight (g)	Bait	Delayed Cooler Sample?	Composite ID	Sample Type	Composite #	Original Composite # (from spring)	Sample Mass	Recommended Analyses	Enough Mass for EPA Split?	Comments
A4	F	A4-CT31-CR-02	A4-CT31	northern crayfish	Live	20.0	Salmon	na	A4-CR-C002	1	2	na	128	all BERA analytes	Y	
A4	F	A4-CT31-CR-03	A4-CT31	northern crayfish	Live	35.0	Salmon	na	A4-CR-C002	1	2	na	128	all BERA analytes	Y	
A4	F	A4-CT31-CR-04	A4-CT31	northern crayfish	Live	23.0	Salmon	na	A4-CR-C002	1	2	na	128	all BERA analytes	Y	
A4	F	A4-CT31-CR-05	A4-CT31	northern crayfish	Live	25.0	Salmon	na	A4-CR-C002	1	2	na	128	all BERA analytes	Y	
A4	F	A4-CT31-CR-06	A4-CT31	northern crayfish	Live	20.0	Salmon	na	A4-CR-C003	1	3	na	311	all BERA analytes	Y	
A4	F	A4-CT31-CR-07	A4-CT31	northern crayfish	Live	25.0	Salmon	na	A4-CR-C003	1	3	na	311	all BERA analytes	Y	
A4	F	A4-CT35-CR-06	A4-CT35	northern crayfish	Live	87.0	Salmon	na	A4-CR-C003	1	3	na	311	all BERA analytes	Y	
A4	F	A4-CT35-CR-07	A4-CT35	northern crayfish	Live	91.0	Salmon	na	A4-CR-C003	1	3	na	311	all BERA analytes	Y	
A4	F	A4-CT36-CR-01	A4-CT36	northern crayfish	Live	88.0	Salmon	na	A4-CR-C003	1	3	na	311	all BERA analytes	Y	
A4	F	A4-CT34-CR-01	A4-CT34	northern crayfish	Live	26.0	Salmon	na	A4-CR-C004	2	4	na	154	all BERA analytes	Y	field rep of A4-CR-C005
A4	F	A4-CT34-CR-02	A4-CT34	northern crayfish	Live	27.0	Salmon	na	A4-CR-C004	2	4	na	154	all BERA analytes	Y	field rep of A4-CR-C005
A4	F	A4-CT34-CR-09	A4-CT34	northern crayfish	Live	47.0	Salmon	na	A4-CR-C004	2	4	na	154	all BERA analytes	Y	field rep of A4-CR-C005
A4	F	A4-CT34-CR-03	A4-CT34	northern crayfish	Live	24.0	Salmon	na	A4-CR-C004	2	4	na	154	all BERA analytes	Y	field rep of A4-CR-C005
A4	F	A4-CT34-CR-06	A4-CT34	northern crayfish	Live	30.0	Salmon	na	A4-CR-C004	2	4	na	154	all BERA analytes	Y	field rep of A4-CR-C005
A4	F	A4-CT34-CR-04	A4-CT34	northern crayfish	Live	45.0	Salmon	na	A4-CR-C005	2	5	na	162	all BERA analytes	Y	field rep of A4-CR-C004
A4	F	A4-CT34-CR-05	A4-CT34	northern crayfish	Live	25.0	Salmon	na	A4-CR-C005	2	5	na	162	all BERA analytes	Y	field rep of A4-CR-C004
A4	F	A4-CT34-CR-07	A4-CT34	northern crayfish	Live	25.0	Salmon	na	A4-CR-C005	2	5	na	162	all BERA analytes	Y	field rep of A4-CR-C004
A4	F	A4-CT34-CR-08	A4-CT34	northern crayfish	Live	26.0	Salmon	na	A4-CR-C005	2	5	na	162	all BERA analytes	Y	field rep of A4-CR-C004
A4	F	A4-CT34-CR-10	A4-CT34	northern crayfish	Live	41.0	Salmon	na	A4-CR-C005	2	5	na	162	all BERA analytes	Y	field rep of A4-CR-C004
A4	F	A4-CT35-CR-01	A4-CT35	northern crayfish	Live	73.0	Salmon	na	A4-CR-C006	1b	6	na	470	all BERA analytes	Y	field split
A4	F	A4-CT35-CR-02	A4-CT35	northern crayfish	Live	104.0	Salmon	na	A4-CR-C006	1b	6	na	470	all BERA analytes	Y	field split
A4	F	A4-CT35-CR-03	A4-CT35	northern crayfish	Live	105.0	Salmon	na	A4-CR-C006	1b	6	na	470	all BERA analytes	Y	field split
A4	F	A4-CT35-CR-04	A4-CT35	northern crayfish	Live	94.0	Salmon	na	A4-CR-C006	1b	6	na	470	all BERA analytes	Y	field split
A4	F	A4-CT35-CR-05	A4-CT35	northern crayfish	Live	94.0	Salmon	na	A4-CR-C006	1b	6	na	470	all BERA analytes	Y	field split
A4	S	A4-CT04-CR-01	A4-CT04	northern crayfish	Live	4.7	Cat Food	N	na	na	na	1	na	na	na	archive (captured with cat food)
A4	S	A4-CT15-CR-01	A4-CT15	northern crayfish	Dead	21.0	Chicken	N	na	na	na	na	na	na	na	archive
A4	S	A4-CT17-CR-01	A4-CT17	northern crayfish	Dead	18.0	Salmon	N	na	na	na	na	na	na	na	archive
A5	S	A5-CT05-CR-01	A5-CT05	northern crayfish	Live	27.0	Salmon	N	A5-CR-C001	1	1	1	60.2	alll HHRA and BERA analytes	N	
A5	S	A5-CT11-CR-02	A5-CT11	northern crayfish	Live	1.2	Salmon	N	A5-CR-C001	1	1	1	60.2	alll HHRA and BERA analytes	N	
A5	S	A5-CT16-CR-01	A5-CT16	northern crayfish	Live	20.0	Salmon	N	A5-CR-C001	1	1	1	60.2	alll HHRA and BERA analytes	N	
A5	S	A5-CT25-CR-01	A5-CT25	northern crayfish	Live	11.0	Chicken	N	A5-CR-C001	1	1	1	60.2	alll HHRA and BERA analytes	N	
A5	S	A5-CT25-CR-02	A5-CT25	northern crayfish	Live	1.0	Chicken	N	A5-CR-C001	1	1	1	60.2	alll HHRA and BERA analytes	N	
A5	S	A5-CT02-CR-01	A5-CT02	northern crayfish	Live	61.0	Salmon	N	A5-CR-C002	1	2	2	66	alll HHRA and BERA analytes	Y	
A5	S	A5-CT15-CR-03	A5-CT15	northern crayfish	Live	5.0	Cat Food	N	A5-CR-C002	1	2	2	66	alll HHRA and BERA analytes	Y	cat food bait
A5	S	A5-CT02-CR-02	A5-CT02	signal crayfish	Live	47.0	Salmon	N	A5-CR-C003	1	3	3	122	alll HHRA and BERA analytes	Y	
A5	S	A5-CT04-CR-01	A5-CT04	signal crayfish	Live	75.0	Salmon	N	A5-CR-C003	1	3	3	122	alll HHRA and BERA analytes	Y	
A5	S	A5-CT15-CR-01	A5-CT15	northern crayfish	Live	48.0	Cat Food	Y	A5-CR-C004	1	4	4	75	alll HHRA and BERA analytes	Y	cat food bait, delayed cooler
A5	S	A5-CT15-CR-02	A5-CT15	northern crayfish	Live	27.0	Cat Food	Y	A5-CR-C004	1	4	4	75	alll HHRA and BERA analytes	Y	cat food bait, delayed cooler
A5	S	A5-CT01-CR-01	A5-CT01	northern crayfish	Live	50.0	Salmon	Y	A5-CR-C005	1	5	5	101	alll HHRA and BERA analytes	Y	delayed cooler
A5	S	A5-CT12-CR-01	A5-CT12	northern crayfish	Live	51.0	Salmon	Y	A5-CR-C005	1	5	5	101	alll HHRA and BERA analytes	Y	delayed cooler
A5	S	A5-CT04-CR-02	A5-CT04	signal crayfish	Live	69.0	Salmon	Y	A5-CR-C006	1	6	6	121	alll HHRA and BERA analytes	Y	delayed cooler
A5	S	A5-CT11-CR-01	A5-CT11	northern crayfish	Live	52.0	Salmon	Y	A5-CR-C006	1	6	6	121	alll HHRA and BERA analytes	Y	delayed cooler
A6	S	A6-CT01-CR-01	A6-CT01	northern crayfish	Live	43.0	Chicken	N	A6-CR-C001	1	1	1	125	alll HHRA and BERA analytes	Y	
A6	S	A6-CT01-CR-02	A6-CT01	northern crayfish	Live	62.0	Salmon	N	A6-CR-C001	1	1	1	125	alll HHRA and BERA analytes	Y	
A6	S	A6-CT01-CR-03	A6-CT01	northern crayfish	Live	20.0	Salmon	N	A6-CR-C001	1	1	1	125	alll HHRA and BERA analytes	Y	
A6	S	A6-CT02-CR-01	A6-CT02	northern crayfish	Live	20.0	Chicken	N	A6-CR-C002	1	2	2	178	alll HHRA and BERA analytes	Y	
A6	S	A6-CT02-CR-02	A6-CT02	northern crayfish	Live	51.0	Salmon	N	A6-CR-C002	1	2	2	178	alll HHRA and BERA analytes	Y	
A6	S	A6-CT02-CR-03	A6-CT02	northern crayfish	Live	23.0	Salmon	N	A6-CR-C002	1	2	2	178	alll HHRA and BERA analytes	Y	
A6	S	A6-CT02-CR-04	A6-CT02	northern crayfish	Live	44.0	Salmon	N	A6-CR-C002	1	2	2	178	alll HHRA and BERA analytes	Y	
A6	S	A6-CT02-CR-05	A6-CT02	northern crayfish	Live	40.0	Salmon	N	A6-CR-C002	1	2	2	178	alll HHRA and BERA analytes	Y	
A6	S	A6-CT04-CR-01	A6-CT04	northern crayfish	Live	42.0	Chicken	N	A6-CR-C003	1	3	3	69	alll HHRA and BERA analytes	Y	
A6	S	A6-CT06-CR-01	A6-CT06	northern crayfish	Live	27.0	Chicken	N	A6-CR-C003	1	3	3	69	alll HHRA and BERA analytes	Y	
A6	S	A6-CT07-CR-01	A6-CT07	northern crayfish	Live	45.0	Chicken	N	A6-CR-C004	1	4	4	89	alll HHRA and BERA analytes	Y	
A6	S	A6-CT07-CR-02	A6-CT07	northern crayfish	Live	44.0	Chicken	N	A6-CR-C004	1	4	4	89	alll HHRA and BERA analytes	Y	
A6	S	A6-CT12-CR-01	A6-CT12	northern crayfish	Live	39.0	Chicken	N	A6-CR-C005	1	5	5	146	alll HHRA and BERA analytes	Y	
A6	S	A6-CT12-CR-02	A6-CT12	northern crayfish	Live	9.0	Chicken	N	A6-CR-C005	1	5	5	146	alll HHRA and BERA analytes	Y	
A6	S	A6-CT13-CR-01	A6-CT13	northern crayfish	Live	39.0	Chicken, Salmon	N	A6-CR-C005	1	5	5	146	alll HHRA and BERA analytes	Y	
A6	S	A6-CT13-CR-03	A6-CT13	northern crayfish	Live	28.0	Chicken, Salmon	N	A6-CR-C005	1	5	5	146	alll HHRA and BERA analytes	Y	
A6	S	A6-CT13-CR-04	A6-CT13	northern crayfish	Live	31.0	Chicken, Salmon	N	A6-CR-C005	1	5	5	146	alll HHRA and BERA analytes	Y	
A6	S	A6-CT13-CR-02	A6-CT13	northern crayfish	Live	25.0	Chicken, Salmon	N	A6-CR-C006	1	6	6	69	alll HHRA and BERA analytes	Y	
A6	S	A6-CT14-CR-01	A6-CT14	northern crayfish	Live	20.0	Chicken, Salmon	N	A6-CR-C006	1	6	6	69	alll HHRA and BERA analytes	Y	
A6	S	A6-CT14-CR-02	A6-CT14	northern crayfish	Live	24.0	Chicken, Salmon	N	A6-CR-C006	1	6	6	69	alll HHRA and BERA analytes	Y	
RL	S	RL-CT01-CR-01	RL-CT01	northern crayfish	Live	46.0	Cat Food	N	na	na	na	na	na	na	na	archive
RL	S	RL-CT01-CR-02	RL-CT01	northern crayfish	Live	27.0	Cat Food	N	na	na	na	na	na	na	na	archive

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Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Weight (g)	Bait	Delayed Cooler Sample?	Composite ID	Sample Type	Composite #	Original Composite # (from spring)	Sample Mass	Recommended Analyses	Enough Mass for EPA Split?	Comments
RL	S	RL-CT02-CR-01	RL-CT02	northern crayfish	Live	25.0	Cat Food	N	na	na	na	na	na	na	na	archive
RL	S	RL-CT02-CR-02	RL-CT02	northern crayfish	Live	44.0	Cat Food	N	na	na	na	na	na	na	na	archive
RL	S	RL-CT05-CR-01	RL-CT05	northern crayfish	Live	3.0	Salmon	N	na	na	na	na	na	na	na	archive
RL	S	RL-CT07-CR-01	RL-CT07	northern crayfish	Live	5.5	Cat Food	N	na	na	na	na	na	na	na	archive
RL	S	RL-CT09-CR-01	RL-CT09	northern crayfish	Live	11.0	Cat Food	N	na	na	na	na	na	na	na	archive
RL	S	RL-CT09-CR-02	RL-CT09	northern crayfish	Live	3.6	Salmon	N	na	na	na	na	na	na	na	archive
RL	S	RL-CT11-CR-01	RL-CT11	northern crayfish	Live	5.9	Salmon	N	na	na	na	na	na	na	na	archive
RL	S	RL-CT11-CR-02	RL-CT11	northern crayfish	Live	3.6	Salmon	N	na	na	na	na	na	na	na	archive
RL	S	RL-CT01-CR-03	RL-CT01	northern crayfish	Live	57.0	Salmon	N	RL-CR-C001	1	1	1	334.9	all HHRA analytes	Y	
RL	S	RL-CT01-CR-04	RL-CT01	northern crayfish	Live	42.0	Salmon	N	RL-CR-C001	1	1	1	334.9	all HHRA analytes	Y	
RL	S	RL-CT01-CR-05	RL-CT01	northern crayfish	Live	41.0	Salmon	N	RL-CR-C001	1	1	1	334.9	all HHRA analytes	Y	
RL	S	RL-CT01-CR-06	RL-CT01	northern crayfish	Live	38.0	Salmon	N	RL-CR-C001	1	1	1	334.9	all HHRA analytes	Y	
RL	S	RL-CT01-CR-07	RL-CT01	northern crayfish	Live	46.0	Salmon	N	RL-CR-C001	1	1	1	334.9	all HHRA analytes	Y	
RL	S	RL-CT01-CR-08	RL-CT01	northern crayfish	Live	36.0	Salmon	N	RL-CR-C001	1	1	1	334.9	all HHRA analytes	Y	
RL	S	RL-CT01-CR-09	RL-CT01	northern crayfish	Live	18.0	Salmon	N	RL-CR-C001	1	1	1	334.9	all HHRA analytes	Y	
RL	S	RL-CT01-CR-10	RL-CT01	northern crayfish	Live	28.0	Salmon	N	RL-CR-C001	1	1	1	334.9	all HHRA analytes	Y	
RL	S	RL-CT01-CR-11	RL-CT01	northern crayfish	Live	23.0	Salmon	N	RL-CR-C001	1	1	1	334.9	all HHRA analytes	Y	
RL	S	RL-CT01-CR-12	RL-CT01	northern crayfish	Live	5.9	Salmon	N	RL-CR-C001	1	1	1	334.9	all HHRA analytes	Y	
RL	S	RL-CT02-CR-03	RL-CT02	northern crayfish	Live	43.0	Salmon	N	RL-CR-C002	1	2	2	206	all HHRA analytes	Y	
RL	S	RL-CT02-CR-04	RL-CT02	northern crayfish	Live	45.0	Salmon	N	RL-CR-C002	1	2	2	206	all HHRA analytes	Y	
RL	S	RL-CT02-CR-05	RL-CT02	northern crayfish	Live	44.0	Salmon	N	RL-CR-C002	1	2	2	206	all HHRA analytes	Y	
RL	S	RL-CT02-CR-06	RL-CT02	northern crayfish	Live	24.0	Salmon	N	RL-CR-C002	1	2	2	206	all HHRA analytes	Y	
RL	S	RL-CT02-CR-07	RL-CT02	northern crayfish	Live	26.0	Salmon	N	RL-CR-C002	1	2	2	206	all HHRA analytes	Y	
RL	S	RL-CT02-CR-08	RL-CT02	northern crayfish	Live	21.0	Salmon	N	RL-CR-C002	1	2	2	206	all HHRA analytes	Y	
RL	S	RL-CT02-CR-09	RL-CT02	northern crayfish	Live	3.0	Salmon	N	RL-CR-C002	1	2	2	206	all HHRA analytes	Y	
RL	S	RL-CT03-CR-01	RL-CT03	northern crayfish	Live	27.0	Salmon	N	RL-CR-C003	1	3	3	139.9	all HHRA analytes	Y	
RL	S	RL-CT03-CR-02	RL-CT03	northern crayfish	Live	28.0	Salmon	N	RL-CR-C003	1	3	3	139.9	all HHRA analytes	Y	
RL	S	RL-CT03-CR-03	RL-CT03	northern crayfish	Live	47.0	Salmon	N	RL-CR-C003	1	3	3	139.9	all HHRA analytes	Y	
RL	S	RL-CT03-CR-04	RL-CT03	northern crayfish	Live	3.8	Salmon	N	RL-CR-C003	1	3	3	139.9	all HHRA analytes	Y	
RL	S	RL-CT03-CR-05	RL-CT03	northern crayfish	Live	4.1	Salmon	N	RL-CR-C003	1	3	3	139.9	all HHRA analytes	Y	
RL	S	RL-CT03-CR-06	RL-CT03	northern crayfish	Live	30.0	Salmon	N	RL-CR-C003	1	3	3	139.9	all HHRA analytes	Y	
RL	S	RL-CT04-CR-01	RL-CT04	northern crayfish	Live	33.0	Salmon	N	RL-CR-C004	1	4	4	176	all HHRA analytes	Y	
RL	S	RL-CT04-CR-02	RL-CT04	northern crayfish	Live	11.0	Salmon	N	RL-CR-C004	1	4	4	176	all HHRA analytes	Y	
RL	S	RL-CT04-CR-03	RL-CT04	northern crayfish	Live	40.0	Salmon	N	RL-CR-C004	1	4	4	176	all HHRA analytes	Y	
RL	S	RL-CT04-CR-04	RL-CT04	northern crayfish	Live	48.0	Salmon	N	RL-CR-C004	1	4	4	176	all HHRA analytes	Y	
RL	S	RL-CT04-CR-05	RL-CT04	northern crayfish	Live	25.0	Salmon	N	RL-CR-C004	1	4	4	176	all HHRA analytes	Y	
RL	S	RL-CT04-CR-06	RL-CT04	northern crayfish	Live	19.0	Salmon	N	RL-CR-C004	1	4	4	176	all HHRA analytes	Y	
RL	S	RL-CT08-CR-01	RL-CT08	northern crayfish	Live	26.0	Salmon	N	RL-CR-C005	1b	5	5	241.9	all HHRA analytes	Y	field split
RL	S	RL-CT08-CR-02	RL-CT08	northern crayfish	Live	53.0	Salmon	N	RL-CR-C005	1b	5	5	241.9	all HHRA analytes	Y	field split
RL	S	RL-CT08-CR-03	RL-CT08	northern crayfish	Live	33.0	Salmon	N	RL-CR-C005	1b	5	5	241.9	all HHRA analytes	Y	field split
RL	S	RL-CT08-CR-04	RL-CT08	northern crayfish	Live	27.0	Salmon	N	RL-CR-C005	1b	5	5	241.9	all HHRA analytes	Y	field split
RL	S	RL-CT08-CR-05	RL-CT08	northern crayfish	Live	40.0	Salmon	N	RL-CR-C005	1b	5	5	241.9	all HHRA analytes	Y	field split
RL	S	RL-CT08-CR-06	RL-CT08	northern crayfish	Live	36.0	Salmon	N	RL-CR-C005	1b	5	5	241.9	all HHRA analytes	Y	field split
RL	S	RL-CT08-CR-07	RL-CT08	northern crayfish	Live	21.0	Salmon	N	RL-CR-C005	1b	5	5	241.9	all HHRA analytes	Y	field split
RL	S	RL-CT08-CR-08	RL-CT08	northern crayfish	Live	5.9	Salmon	N	RL-CR-C005	1b	5	5	241.9	all HHRA analytes	Y	field split
RL	S	RL-CT10-CR-01	RL-CT10	northern crayfish	Live	4.1	Salmon	N	RL-CR-C006	1	6	6	129.3	all HHRA analytes	Y	
RL	S	RL-CT10-CR-02	RL-CT10	northern crayfish	Live	52.0	Salmon	N	RL-CR-C006	1	6	6	129.3	all HHRA analytes	Y	
RL	S	RL-CT10-CR-03	RL-CT10	northern crayfish	Live	46.0	Salmon	N	RL-CR-C006	1	6	6	129.3	all HHRA analytes	Y	
RL	S	RL-CT10-CR-04	RL-CT10	northern crayfish	Live	4.2	Salmon	N	RL-CR-C006	1	6	6	129.3	all HHRA analytes	Y	
RL	S	RL-CT10-CR-05	RL-CT10	northern crayfish	Live	23.0	Salmon	N	RL-CR-C006	1	6	6	129.3	all HHRA analytes	Y	
SR	S	SR-CT01-CR-01	SR-CT01	northern crayfish	Live	14.0	Salmon	N	na	na	na	na	na	na	na	archive
SR	S	SR-CT02-CR-01	SR-CT02	northern crayfish	Live	16.0	Salmon	N	na	na	na	na	na	na	na	archive
SR	F	SR-CT41-CR-02	SR-CT41	northern crayfish	Live	22.0	Salmon	na	SR-CR-C001	1	1	na	74	all HHRA analytes	Y	
SR	F	SR-CT41-CR-01	SR-CT41	northern crayfish	Live	42.0	Salmon	na	SR-CR-C001	1	1	na	74	all HHRA analytes	Y	
SR	F	SR-CT41-CR-03	SR-CT41	northern crayfish	Live	10.0	Salmon	na	SR-CR-C001	1	1	na	74	all HHRA analytes	Y	
SR	F	SR-CT32-CR-01	SR-CT32	northern crayfish	Live	23.0	Salmon	na	SR-CR-C002	1	2	na	112	all HHRA analytes	Y	
SR	S	SR-CT04-CR-01	SR-CT04	northern crayfish	Live	71.0	Salmon	N	SR-CR-C002	1	2	2	112	all HHRA analytes	Y	
SR	S	SR-CT16-CR-01	SR-CT16	northern crayfish	Live	18.0	Salmon	N	SR-CR-C002	1	2	2	112	all HHRA analytes	Y	
SR	S	SR-CT06-CR-01	SR-CT06	northern crayfish	Live	6.5	Salmon	N	SR-CR-C003	1	3	3	63.5	all HHRA analytes	Y	
SR	S	SR-CT07-CR-01	SR-CT07	northern crayfish	Live	28.0	Salmon	N	SR-CR-C003	1	3	3	63.5	all HHRA analytes	Y	
SR	S	SR-CT08-CR-01	SR-CT08	northern crayfish	Live	29.0	Salmon	N	SR-CR-C003	1	3	3	63.5	all HHRA analytes	Y	
SR	S	SR-CT08-CR-02	SR-CT08	northern crayfish	Live	50.0	Salmon	N	SR-CR-C004	1	4	4	74	all HHRA analytes	Y	
SR	S	SR-CT11-CR-01	SR-CT11	northern crayfish	Live	24.0	Chicken	N	SR-CR-C004	1	4	4	74	all HHRA analytes	Y	
SR	S	SR-CT09-CR-01	SR-CT09	signal crayfish	Live	20.0	Salmon	N	SR-CR-C005	1	5	5	104	all HHRA analytes	Y	

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Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Weight (g)	Bait	Delayed Cooler Sample?	Composite ID	Sample Type	Composite #	Original Composite # (from spring)	Sample Mass	Recommended Analyses	Enough Mass for EPA Split?	Comments
SR	S	SR-CT11-CR-02	SR-CT11	signal crayfish	Live	25.0	Chicken	N	SR-CR-C005	1	5	6	104	all HHRA analytes	Y	
SR	S	SR-CT12-CR-01	SR-CT12	signal crayfish	Live	12.0	Chicken	N	SR-CR-C005	1	5	5	104	all HHRA analytes	Y	
SR	F	SR-CT50-CR-01	SR-CT50	signal crayfish	Live	18.0	Salmon	na	SR-CR-C005	1	5	na	104	all HHRA analytes	Y	
SR	F	SR-CT62-CR-01	SR-CT62	signal crayfish	Live	29.0	Salmon	na	SR-CR-C005	1	5	na	104	all HHRA analytes	Y	
SR	F	SR-CT55-CR-01	SR-CT55	signal crayfish	Live	18.0	Salmon	na	SR-CR-C005	1	5	na	104	all HHRA analytes	Y	
SR	F	SR-CT44-CR-01	SR-CT44	northern crayfish	Live	53.0	Salmon	na	SR-CR-C006	1	6	na	195	all HHRA analytes	Y	
SR	F	SR-CT47-CR-01	SR-CT47	northern crayfish	Live	46.0	Salmon	na	SR-CR-C006	1	6	na	195	all HHRA analytes	Y	
SR	F	SR-CT51-CR-01	SR-CT51	northern crayfish	Live	56.0	Salmon	na	SR-CR-C006	1	6	na	195	all HHRA analytes	Y	
SR	F	SR-CT51-CR-02	SR-CT51	northern crayfish	Live	40.0	Salmon	na	SR-CR-C006	1	6	na	195	all HHRA analytes	Y	

Notes:
BERA - baseline ecological risk assessment
F - fall
HHRA - human health risk assessment
na - not applicable
RL - Rebecca Lake
S - spring
SR - Sanpoil River

Mussel Compositing Summary

Area	Composite Number	# Individuals			Species		Tissue Mass Available for Analyses (g)			Tissue Mass Required for Analyses (g)	QAPP Tissue Requirement Met?	EPA Split Possible (2.5 g)?	Field Split Possible (2x required)?	Adequate Field Replicate?	Notes
		Spring	Fall	Total	Spring	Fall	Spring	Fall	Total						
A1	1	7	0	7	Anodonta	na	13	0	13	4.5	yes	yes	yes	no	Composites 1 and 2 were collected at the same location, however, they should not be used as field reps due to size differences of the organisms. These samples were also in the delayed cooler.
A1	2	5	0	5	Anodonta	na	77.5	0	77.5	4.5	yes	yes	yes	no	Composites 1 and 2 were collected at the same location, however, they should not be used as field reps due to size differences of the organisms. These samples were also in the delayed cooler.
A1	3	0	5	5	na	Anodonta	0	70.5	71	4.5	yes	yes	yes	yes	designated field replicate with composite #5
A1	4	0	5	5	na	Anodonta	0	77.5	77.5	4.5	yes	yes	yes	yes	designated field replicate with composite #6
A1	5	0	5	5	na	Anodonta	0	71.5	71.5	4.5	yes	yes	yes	yes	designated field replicate with composite #3
A1	6	0	5	5	na	Anodonta	0	77	77	4.5	yes	yes	yes	yes	designated field replicate with composite #4
A2	1	17	0	17	Anodonta	na	35.3	0	35.3	30	yes	yes	no	no	
A2	2	3	0	3	Anodonta	na	65	0	65	30	yes	yes	yes	yes	designated field replicate with composite #3
A2	3	3	0	3	Anodonta	na	41.5	0	41.5	30	yes	yes	no	yes	designated field replicate with composite #2
A2	4	10	0	10	Anodonta	na	119	0	119	30	yes	yes	yes	yes	designated field split
A2	5	10	0	10	Anodonta	na	187	0	187	30	yes	yes	yes	yes	designated field replicate with composite #6
A2	6	10	0	10	Anodonta	na	217.5	0	217.5	30	yes	yes	yes	yes	designated field replicate with composite #5
A3	1	5	0	5	Anodonta	na	42.25	0	42.25	4.5	yes	yes	yes	no	
A3	2	3	2	5	Anodonta	Anodonta	9.65	16.5	26.15	4.5	yes	yes	yes	no	
A3	3	0	5	5	na	Anodonta	0	66	66	4.5	yes	yes	yes	yes	designated field replicate with composite #4
A3	4	0	5	5	na	Anodonta	0	67	67	4.5	yes	yes	yes	yes	designated field replicate with composite #3
A3	5	0	5	5	na	Anodonta	0	65.5	65.5	4.5	yes	yes	yes	yes	designated field replicate with composite #6
A3	6	0	5	5	na	Anodonta	0	62	62	4.5	yes	yes	yes	yes	designated field replicate with composite #5
A4	1	0	5	5	na	Anodonta	0	106	106	4.5	yes	yes	yes	yes	designated field replicate with composite #2
A4	2	0	5	5	na	Anodonta	0	113	113	4.5	yes	yes	yes	yes	designated field replicate with composite #1
A4	3	0	5	5	na	Anodonta	0	101	101	4.5	yes	yes	yes	yes	
A4	4	0	5	5	na	Anodonta	0	85.5	85.5	4.5	yes	yes	yes	yes	designated field replicate with composite #5
A4	5	0	5	5	na	Anodonta	0	86.5	86.5	4.5	yes	yes	yes	yes	designated field replicate with composite #4
A4	6	0	5	5	na	Anodonta	0	91.5	91.5	4.5	yes	yes	yes	yes	
A5	1	0	6	6	na	Anodonta	0	65	65	30	yes	yes	yes	yes	designated field split
A5	2	0	6	6	na	Anodonta	0	65	65	30	yes	yes	yes	yes	field replicate with composite #3
A5	3	0	6	6	na	Anodonta	0	64.5	64.5	30	yes	yes	yes	yes	field replicate with composite #2
A5	4	0	6	6	na	Anodonta	0	95	95	30	yes	yes	yes	yes	designated field split
A5	5	0	6	6	na	Anodonta	0	50	50	30	yes	yes	no	yes	
A5	6	0	6	6	na	Anodonta	0	47.5	47.5	30	yes	yes	no	yes	
A6	1	31	0	31	Anodonta	na	32.45	0	32.45	30	yes	no	no	no	
A6	2	20	2	22	Anodonta	Anodonta	22.45	19.5	41.95	30	yes	yes	no	no	
A6	3	0	5	5	na	Anodonta	0	42	42	30	yes	yes	no	yes	
A6	4	0	6	6	na	Anodonta	0	45	45	30	yes	yes	no	yes	designated field replicate with composite #6
A6	5	0	6	6	na	Anodonta	0	43.5	43.5	30	yes	yes	no	yes	
A6	6	0	6	6	na	Anodonta	0	45.5	45.5	30	yes	yes	no	yes	designated field replicate with composite #4
Sanpoil	1	9	0	9	M. falcata	na	41.35	0	41.35	30	yes	yes	no	no	
Sanpoil	2	4	2	6	M. falcata	M. falcata	11.1	26.5	37.6	30	yes	yes	no	no	
Sanpoil	3	0	4	4	na	M. falcata	0	62.5	62.50	30	yes	yes	yes	yes	designated field replicate with composite #4
Sanpoil	4	0	4	4	na	M. falcata	0	55.5	55.5	30	yes	yes	no	yes	designated field replicate with composite #3
Sanpoil	5	0	5	5	na	M. falcata	0	61.75	61.75	30	yes	yes	yes	yes	
Sanpoil	6	0	8	8	na	M. falcata	0	38.75	38.75	30	yes	yes	no	no	

Notes:

na - not applicable

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Spring 2016

Mussel Composites

Area	Spring or Fall? (S/F)	Organism ID	Sample Time	Species	Health	Delayed Cooler Sample?	Estimated Tissue Weight (g)	Composite ID	Sample Type	Composite #	Original Composite # (from spring)	Sample Mass	Recommended Analyses	Enough Mass for EPA Split?	Comments
A1	S	A1-MB05-MU-01	09:28	Anodonta sp.	Live	Y	1	A1-MU-C001	1	1	1	13	all BERA analytes	Y	delayed cooler
A1	S	A1-MB05-MU-02	09:33	Anodonta sp.	Live	Y	0.5	A1-MU-C001	1	1	1	13	all BERA analytes	Y	delayed cooler
A1	S	A1-MB05-MU-03	09:40	Anodonta sp.	Live	Y	1	A1-MU-C001	1	1	1	13	all BERA analytes	Y	delayed cooler
A1	S	A1-MB05-MU-04	09:45	Anodonta sp.	Live	Y	1	A1-MU-C001	1	1	1	13	all BERA analytes	Y	delayed cooler
A1	S	A1-MB05-MU-05	09:48	Anodonta sp.	Live	Y	1	A1-MU-C001	1	1	1	13	all BERA analytes	Y	delayed cooler
A1	S	A1-MB05-MU-06	09:53	Anodonta sp.	Live	Y	4	A1-MU-C001	1	1	1	13	all BERA analytes	Y	delayed cooler
A1	S	A1-MB05-MU-07	09:56	Anodonta sp.	Live	Y	4.5	A1-MU-C001	1	1	1	13	all BERA analytes	Y	delayed cooler
A1	S	A1-MB05-MU-08	10:00	Anodonta sp.	Live	Y	12.5	A1-MU-C002	1	2	2	77.5	all BERA analytes	Y	delayed cooler
A1	S	A1-MB05-MU-09	10:03	Anodonta sp.	Live	Y	12	A1-MU-C002	1	2	2	77.5	all BERA analytes	Y	delayed cooler
A1	S	A1-MB05-MU-10	10:08	Anodonta sp.	Live	Y	15	A1-MU-C002	1	2	2	77.5	all BERA analytes	Y	delayed cooler
A1	S	A1-MB05-MU-11	10:15	Anodonta sp.	Live	Y	18	A1-MU-C002	1	2	3	77.5	all BERA analytes	Y	delayed cooler
A1	S	A1-MB05-MU-12	10:19	Anodonta sp.	Live	Y	20	A1-MU-C002	1	2	3	77.5	all BERA analytes	Y	delayed cooler
A1	F	A1-MB43-MU-01	11:49	Anodonta	Live	na	18.5	A1-MU-C003	2	3	na	70.5	all BERA analytes	Y	field rep of A1-MU-C005
A1	F	A1-MB43-MU-02	11:53	Anodonta	Live	na	19.5	A1-MU-C003	2	3	na	70.5	all BERA analytes	Y	field rep of A1-MU-C005
A1	F	A1-MB43-MU-03	12:02	Anodonta	Live	na	17	A1-MU-C003	2	3	na	70.5	all BERA analytes	Y	field rep of A1-MU-C005
A1	F	A1-MB43-MU-18	12:48	Anodonta	Live	na	8.5	A1-MU-C003	2	3	na	70.5	all BERA analytes	Y	field rep of A1-MU-C005
A1	F	A1-MB43-MU-20	12:53	Anodonta	Live	na	7	A1-MU-C003	2	3	na	70.5	all BERA analytes	Y	field rep of A1-MU-C005
A1	F	A1-MB43-MU-04	12:05	Anodonta	Live	na	21	A1-MU-C004	2	4	na	77.5	all BERA analytes	Y	field rep of A1-MU-C006
A1	F	A1-MB43-MU-06	12:10	Anodonta	Live	na	16.5	A1-MU-C004	2	4	na	77.5	all BERA analytes	Y	field rep of A1-MU-C006
A1	F	A1-MB43-MU-07	12:13	Anodonta	Live	na	18.5	A1-MU-C004	2	4	na	77.5	all BERA analytes	Y	field rep of A1-MU-C006
A1	F	A1-MB43-MU-09	12:19	Anodonta	Live	na	14	A1-MU-C004	2	4	na	77.5	all BERA analytes	Y	field rep of A1-MU-C006
A1	F	A1-MB43-MU-15	12:40	Anodonta	Live	na	7.5	A1-MU-C004	2	4	na	77.5	all BERA analytes	Y	field rep of A1-MU-C006
A1	F	A1-MB43-MU-10	12:23	Anodonta	Live	na	15	A1-MU-C005	2	5	na	71.5	all BERA analytes	Y	field rep of A1-MU-C003
A1	F	A1-MB43-MU-11	12:26	Anodonta	Live	na	21	A1-MU-C005	2	5	na	71.5	all BERA analytes	Y	field rep of A1-MU-C003
A1	F	A1-MB43-MU-12	12:30	Anodonta	Live	na	16.5	A1-MU-C005	2	5	na	71.5	all BERA analytes	Y	field rep of A1-MU-C003
A1	F	A1-MB43-MU-13	12:34	Anodonta	Live	na	12	A1-MU-C005	2	5	na	71.5	all BERA analytes	Y	field rep of A1-MU-C003
A1	F	A1-MB43-MU-19	12:50	Anodonta	Live	na	7	A1-MU-C005	2	5	na	71.5	all BERA analytes	Y	field rep of A1-MU-C003
A1	F	A1-MB43-MU-05	12:07	Anodonta	Live	na	16.5	A1-MU-C006	2	6	na	77	all BERA analytes	Y	field rep of A1-MU-C004
A1	F	A1-MB43-MU-08	12:16	Anodonta	Live	na	18	A1-MU-C006	2	6	na	77	all BERA analytes	Y	field rep of A1-MU-C004
A1	F	A1-MB43-MU-14	12:37	Anodonta	Live	na	15	A1-MU-C006	2	6	na	77	all BERA analytes	Y	field rep of A1-MU-C004
A1	F	A1-MB43-MU-16	12:42	Anodonta	Live	na	13.5	A1-MU-C006	2	6	na	77	all BERA analytes	Y	field rep of A1-MU-C004
A1	F	A1-MB43-MU-17	12:45	Anodonta	Live	na	14	A1-MU-C006	2	6	na	77	all BERA analytes	Y	field rep of A1-MU-C004
A2	S	A2-MB04-MU-04	14:05	Anodonta sp.	Live	N	1.3	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-05	14:08	Anodonta sp.	Live	N	2.15	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-06	14:13	Anodonta sp.	Live	N	2.1	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-07	14:18	Anodonta sp.	Live	N	1.75	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-08	14:21	Anodonta sp.	Live	N	1.95	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-09	14:26	Anodonta sp.	Live	N	1.15	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-10	14:31	Anodonta sp.	Live	N	1.1	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-11	14:34	Anodonta sp.	Live	N	1.25	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-12	14:41	Anodonta sp.	Live	N	1.75	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-13	14:46	Anodonta sp.	Live	N	1.25	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-14	14:49	Anodonta sp.	Live	N	0.65	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-15	14:54	Anodonta sp.	Live	N	0.8	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-17	15:17	Anodonta sp.	Live	N	1.65	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-19	15:24	Anodonta sp.	Live	N	1.6	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-21	15:31	Anodonta sp.	Live	N	2	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB04-MU-22	15:34	Anodonta sp.	Live	N	1.35	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB05-MU-05	16:10	Anodonta sp.	Live	N	11.5	A2-MU-C001	1	1	1	35.3	all HHRA and BERA analytes	Y	
A2	S	A2-MB05-MU-01	15:49	Anodonta sp.	Live	N	24	A2-MU-C002	2	2	2	65	all HHRA and BERA analytes	Y	field rep of A2-MU-C003
A2	S	A2-MB05-MU-04	16:06	Anodonta sp.	Live	N	20	A2-MU-C002	2	2	2	65	all HHRA and BERA analytes	Y	field rep of A2-MU-C003
A2	S	A2-MB05-MU-07	16:17	Anodonta sp.	Live	N	21	A2-MU-C002	2	2	2	65	all HHRA and BERA analytes	Y	field rep of A2-MU-C003

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A2	S	A2-MB05-MU-02	15:54	Anodonta sp.	Live	N	16.5	A2-MU-C003	2	3	3	41.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C002
A2	S	A2-MB05-MU-03	15:58	Anodonta sp.	Live	N	12	A2-MU-C003	2	3	3	41.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C002
A2	S	A2-MB05-MU-06	16:15	Anodonta sp.	Live	N	13	A2-MU-C003	2	3	3	41.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C002
A2	S	A2-MB06-MU-07	12:00	Anodonta sp.	Live	N	13.5	A2-MU-C004	1b	4	4	119	all HHRA and BERA analytes	Y	field split
A2	S	A2-MB06-MU-10	12:15	Anodonta sp.	Live	N	14	A2-MU-C004	1b	4	4	119	all HHRA and BERA analytes	Y	field split
A2	S	A2-MB06-MU-11	12:45	Anodonta sp.	Live	N	12.5	A2-MU-C004	1b	4	4	119	all HHRA and BERA analytes	Y	field split
A2	S	A2-MB06-MU-12	12:50	Anodonta sp.	Live	N	13.5	A2-MU-C004	1b	4	4	119	all HHRA and BERA analytes	Y	field split
A2	S	A2-MB06-MU-13	12:54	Anodonta sp.	Live	N	11.5	A2-MU-C004	1b	4	4	119	all HHRA and BERA analytes	Y	field split
A2	S	A2-MB06-MU-14	13:00	Anodonta sp.	Live	N	9	A2-MU-C004	1b	4	4	119	all HHRA and BERA analytes	Y	field split
A2	S	A2-MB06-MU-15	13:05	Anodonta sp.	Live	N	10	A2-MU-C004	1b	4	4	119	all HHRA and BERA analytes	Y	field split
A2	S	A2-MB06-MU-24	13:56	Anodonta sp.	Live	N	11.5	A2-MU-C004	1b	4	4	119	all HHRA and BERA analytes	Y	field split
A2	S	A2-MB06-MU-25	14:00	Anodonta sp.	Live	N	10	A2-MU-C004	1b	4	4	119	all HHRA and BERA analytes	Y	field split
A2	S	A2-MB06-MU-27	14:10	Anodonta sp.	Live	N	13.5	A2-MU-C004	1b	4	4	119	all HHRA and BERA analytes	Y	field split
A2	S	A2-MB06-MU-05	11:51	Anodonta sp.	Live	N	22	A2-MU-C005	2	5	5	187	all HHRA and BERA analytes	Y	field rep of A2-MU-C006
A2	S	A2-MB06-MU-08	12:05	Anodonta sp.	Live	N	21	A2-MU-C005	2	5	5	187	all HHRA and BERA analytes	Y	field rep of A2-MU-C006
A2	S	A2-MB06-MU-09	12:09	Anodonta sp.	Live	N	16	A2-MU-C005	2	5	5	187	all HHRA and BERA analytes	Y	field rep of A2-MU-C006
A2	S	A2-MB06-MU-17	13:15	Anodonta sp.	Live	N	17	A2-MU-C005	2	5	5	187	all HHRA and BERA analytes	Y	field rep of A2-MU-C006
A2	S	A2-MB06-MU-18	13:20	Anodonta sp.	Live	N	20	A2-MU-C005	2	5	5	187	all HHRA and BERA analytes	Y	field rep of A2-MU-C006
A2	S	A2-MB06-MU-19	13:26	Anodonta sp.	Live	N	20	A2-MU-C005	2	5	5	187	all HHRA and BERA analytes	Y	field rep of A2-MU-C006
A2	S	A2-MB06-MU-20	13:36	Anodonta sp.	Live	N	20.5	A2-MU-C005	2	5	5	187	all HHRA and BERA analytes	Y	field rep of A2-MU-C006
A2	S	A2-MB06-MU-21	13:41	Anodonta sp.	Live	N	14	A2-MU-C005	2	5	5	187	all HHRA and BERA analytes	Y	field rep of A2-MU-C006
A2	S	A2-MB06-MU-28	14:16	Anodonta sp.	Live	N	20.5	A2-MU-C005	2	5	5	187	all HHRA and BERA analytes	Y	field rep of A2-MU-C006
A2	S	A2-MB06-MU-29	14:21	Anodonta sp.	Live	N	16	A2-MU-C005	2	5	5	187	all HHRA and BERA analytes	Y	field rep of A2-MU-C006
A2	S	A2-MB06-MU-01	11:12	Anodonta sp.	Live	N	25.5	A2-MU-C006	2	6	6	217.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C005
A2	S	A2-MB06-MU-02	11:32	Anodonta sp.	Live	N	21.5	A2-MU-C006	2	6	6	217.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C005
A2	S	A2-MB06-MU-03	11:42	Anodonta sp.	Live	N	25	A2-MU-C006	2	6	6	217.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C005
A2	S	A2-MB06-MU-04	11:46	Anodonta sp.	Live	N	25	A2-MU-C006	2	6	6	217.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C005
A2	S	A2-MB06-MU-06	11:55	Anodonta sp.	Live	N	23.5	A2-MU-C006	2	6	6	217.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C005
A2	S	A2-MB06-MU-16	13:10	Anodonta sp.	Live	N	14.5	A2-MU-C006	2	6	6	217.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C005
A2	S	A2-MB06-MU-22	13:46	Anodonta sp.	Live	N	25.5	A2-MU-C006	2	6	6	217.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C005
A2	S	A2-MB06-MU-23	13:51	Anodonta sp.	Live	N	14.5	A2-MU-C006	2	6	6	217.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C005
A2	S	A2-MB06-MU-26	14:06	Anodonta sp.	Live	N	14	A2-MU-C006	2	6	6	217.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C005
A2	S	A2-MB06-MU-30	14:26	Anodonta sp.	Live	N	28.5	A2-MU-C006	2	6	6	217.5	all HHRA and BERA analytes	Y	field rep of A2-MU-C005
A2	S	A2-MB01-MU-01	12:42	Anodonta sp.	Live	N	1	na	na	na	na	na	na	na	archive
A2	S	A2-MB01-MU-02	12:54	Anodonta sp.	Dead	N	0.5	na	na	na	na	na	na	na	archive
A2	S	A2-MB01-MU-03	13:05	Anodonta sp.	Dead	N	1	na	na	na	na	na	na	na	archive
A2	S	A2-MB04-MU-01	13:46	Anodonta sp.	Dead	N	1.15	na	na	na	na	na	na	na	archive
A2	S	A2-MB04-MU-02	13:54	Anodonta sp.	Dead	N	0.75	na	na	na	na	na	na	na	archive
A2	S	A2-MB04-MU-03	14:00	Anodonta sp.	Dead	N	1.6	na	na	na	na	na	na	na	archive
A2	S	A2-MB04-MU-16	15:13	Anodonta sp.	Dead	N	0.85	na	na	na	na	na	na	na	archive
A2	S	A2-MB04-MU-18	15:20	Anodonta sp.	Dead	N	0.65	na	na	na	na	na	na	na	archive
A2	S	A2-MB04-MU-20	15:28	Anodonta sp.	Dead	N	0.9	na	na	na	na	na	na	na	archive
A3	S	A3-MB01-MU-01	12:45	Anodonta sp.	Live	N	2	A3-MU-C001	1	1	1	42.25	all BERA analytes	Y	
A3	S	A3-MB01-MU-03	13:10	Anodonta sp.	Live	N	1.5	A3-MU-C001	1	1	1	42.25	all BERA analytes	Y	
A3	S	A3-MB01-MU-04	13:23	Anodonta sp.	Live	N	2	A3-MU-C001	1	1	1	42.25	all BERA analytes	Y	
A3	S	A3-MB01-MU-02	13:00	Anodonta sp.	Live	N	35	A3-MU-C001	1	1	2	42.25	all BERA analytes	Y	
A3	S	A3-MB04-MU-01	15:07	Anodonta sp.	Live	N	1.75	A3-MU-C001	1	1	4	42.25	all BERA analytes	Y	
A3	S	A3-MB06-MU-05	15:32	Anodonta sp.	Live	N	7	A3-MU-C002	1	2	3	26.15	all BERA analytes	Y	
A3	S	A3-MB06-MU-03	15:26	Anodonta sp.	Live	N	0.95	A3-MU-C002	1	2	4	26.15	all BERA analytes	Y	
A3	S	A3-MB06-MU-04	15:30	Anodonta sp.	Live	N	1.7	A3-MU-C002	1	2	4	26.15	all BERA analytes	Y	
A3	F	A3-MB14-MU-01	11:07	Anodonta	Live	na	7	A3-MU-C002	1	2	na	26.15	all BERA analytes	Y	
A3	F	A3-MB14-MU-02	11:11	Anodonta	Live	na	9.5	A3-MU-C002	1	2	na	26.15	all BERA analytes	Y	
A3	F	A3-MB14-MU-03	11:15	Anodonta	Live	na	9.5	A3-MU-C003	2	3	na	66	all BERA analytes	Y	field rep of A3-MU-C004

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A3	F	A3-MB14-MU-04	11:18	Anodonta	Live	na	7	A3-MU-C003	2	3	na	66	all BERA analytes	Y	field rep of A3-MU-C004
A3	F	A3-MB14-MU-05	11:21	Anodonta	Live	na	9.5	A3-MU-C003	2	3	na	66	all BERA analytes	Y	field rep of A3-MU-C004
A3	F	A3-MB14-MU-14	12:02	Anodonta	Live	na	24	A3-MU-C003	2	3	na	66	all BERA analytes	Y	field rep of A3-MU-C004
A3	F	A3-MB14-MU-17	12:13	Anodonta	Live	na	16	A3-MU-C003	2	3	na	66	all BERA analytes	Y	field rep of A3-MU-C004
A3	F	A3-MB14-MU-15	12:05	Anodonta	Live	na	22	A3-MU-C004	2	4	na	67	all BERA analytes	Y	field rep of A3-MU-C003
A3	F	A3-MB14-MU-06	11:25	Anodonta	Live	na	4.5	A3-MU-C004	2	4	na	67	all BERA analytes	Y	field rep of A3-MU-C003
A3	F	A3-MB14-MU-07	11:39	Anodonta	Live	na	4.5	A3-MU-C004	2	4	na	67	all BERA analytes	Y	field rep of A3-MU-C003
A3	F	A3-MB14-MU-08	11:43	Anodonta	Live	na	6	A3-MU-C004	2	4	na	67	all BERA analytes	Y	field rep of A3-MU-C003
A3	F	A3-MB14-MU-16	12:09	Anodonta	Live	na	30	A3-MU-C004	2	4	na	67	all BERA analytes	Y	field rep of A3-MU-C003
A3	F	A3-MB14-MU-09	11:46	Anodonta	Live	na	7.5	A3-MU-C005	2	5	na	65.5	all BERA analytes	Y	field rep of A3-MU-C006
A3	F	A3-MB14-MU-10	11:49	Anodonta	Live	na	6	A3-MU-C005	2	5	na	65.5	all BERA analytes	Y	field rep of A3-MU-C006
A3	F	A3-MB14-MU-11	11:52	Anodonta	Live	na	7.5	A3-MU-C005	2	5	na	65.5	all BERA analytes	Y	field rep of A3-MU-C006
A3	F	A3-MB14-MU-18	12:17	Anodonta	Live	na	12	A3-MU-C005	2	5	na	65.5	all BERA analytes	Y	field rep of A3-MU-C006
A3	F	A3-MB14-MU-19	12:21	Anodonta	Live	na	32.5	A3-MU-C005	2	5	na	65.5	all BERA analytes	Y	field rep of A3-MU-C006
A3	F	A3-MB14-MU-12	11:55	Anodonta	Live	na	6.5	A3-MU-C006	2	6	na	62	all BERA analytes	Y	field rep of A3-MU-C005
A3	F	A3-MB14-MU-13	11:58	Anodonta	Live	na	20.5	A3-MU-C006	2	6	na	62	all BERA analytes	Y	field rep of A3-MU-C005
A3	F	A3-MB14-MU-20	12:25	Anodonta	Live	na	12.5	A3-MU-C006	2	6	na	62	all BERA analytes	Y	field rep of A3-MU-C005
A3	F	A3-MB14-MU-21	12:28	Anodonta	Live	na	13	A3-MU-C006	2	6	na	62	all BERA analytes	Y	field rep of A3-MU-C005
A3	F	A3-MB14-MU-22	12:31	Anodonta	Live	na	9.5	A3-MU-C006	2	6	na	62	all BERA analytes	Y	field rep of A3-MU-C005
A3	S	A3-MB06-MU-01	15:16	Anodonta sp.	Dead	N	0.5	na	na	na	na	na	na	na	archive
A3	S	A3-MB06-MU-02	15:22	Anodonta sp.	Dead	N	0.5	na	na	na	na	na	na	na	archive
A3	S	A3-MB12-MU-01	14:52	Anodonta sp.	Dead	N	1.2	na	na	na	na	na	na	na	archive
A3	S	A3-MB13-MU-01	15:50	Anodonta sp.	Dead	N	1.05	na	na	na	na	na	na	na	archive
A3	S	A3-MB13-MU-02	15:59	Anodonta sp.	Live	N	2	na	na	na	na	na	na	na	archive
A4	F	A4-MB18-MU-01	11:40	Anodonta	Live	na	17.5	A4-MU-C001	2	1	na	106	all BERA analytes	Y	field rep of A4-MU-C002
A4	F	A4-MB18-MU-02	11:46	Anodonta	Live	na	21	A4-MU-C001	2	1	na	106	all BERA analytes	Y	field rep of A4-MU-C002
A4	F	A4-MB18-MU-03	11:50	Anodonta	Live	na	29	A4-MU-C001	2	1	na	106	all BERA analytes	Y	field rep of A4-MU-C002
A4	F	A4-MB18-MU-04	11:53	Anodonta	Live	na	21	A4-MU-C001	2	1	na	106	all BERA analytes	Y	field rep of A4-MU-C002
A4	F	A4-MB18-MU-05	11:55	Anodonta	Live	na	17.5	A4-MU-C001	2	1	na	106	all BERA analytes	Y	field rep of A4-MU-C002
A4	F	A4-MB18-MU-06	11:59	Anodonta	Live	na	22	A4-MU-C002	2	2	na	113	all BERA analytes	Y	field rep of A4-MU-C001
A4	F	A4-MB18-MU-07	12:02	Anodonta	Live	na	22.5	A4-MU-C002	2	2	na	113	all BERA analytes	Y	field rep of A4-MU-C001
A4	F	A4-MB18-MU-08	12:05	Anodonta	Live	na	25	A4-MU-C002	2	2	na	113	all BERA analytes	Y	field rep of A4-MU-C001
A4	F	A4-MB18-MU-09	12:07	Anodonta	Live	na	23	A4-MU-C002	2	2	na	113	all BERA analytes	Y	field rep of A4-MU-C001
A4	F	A4-MB18-MU-10	12:11	Anodonta	Live	na	20.5	A4-MU-C002	2	2	na	113	all BERA analytes	Y	field rep of A4-MU-C001
A4	F	A4-MB18-MU-11	12:14	Anodonta	Live	na	22	A4-MU-C003	1	3	na	101	all BERA analytes	Y	
A4	F	A4-MB18-MU-12	12:17	Anodonta	Live	na	19.5	A4-MU-C003	1	3	na	101	all BERA analytes	Y	
A4	F	A4-MB18-MU-13	12:20	Anodonta	Live	na	16.5	A4-MU-C003	1	3	na	101	all BERA analytes	Y	
A4	F	A4-MB18-MU-14	12:24	Anodonta	Live	na	24	A4-MU-C003	1	3	na	101	all BERA analytes	Y	
A4	F	A4-MB18-MU-15	12:27	Anodonta	Live	na	19	A4-MU-C003	1	3	na	101	all BERA analytes	Y	
A4	F	A4-MB19-MU-01	12:34	Anodonta	Live	na	18	A4-MU-C004	2	4	na	85.5	all BERA analytes	Y	field rep of A4-MU-C005
A4	F	A4-MB19-MU-02	12:38	Anodonta	Live	na	23	A4-MU-C004	2	4	na	85.5	all BERA analytes	Y	field rep of A4-MU-C005
A4	F	A4-MB19-MU-05	12:48	Anodonta	Live	na	19.5	A4-MU-C004	2	4	na	85.5	all BERA analytes	Y	field rep of A4-MU-C005
A4	F	A4-MB19-MU-12	13:08	Anodonta	Live	na	11.5	A4-MU-C004	2	4	na	85.5	all BERA analytes	Y	field rep of A4-MU-C005
A4	F	A4-MB19-MU-15	13:17	Anodonta	Live	na	13.5	A4-MU-C004	2	4	na	85.5	all BERA analytes	Y	field rep of A4-MU-C005
A4	F	A4-MB19-MU-06	12:51	Anodonta	Live	na	18	A4-MU-C005	2	5	na	86.5	all BERA analytes	Y	field rep of A4-MU-C004
A4	F	A4-MB19-MU-07	12:53	Anodonta	Live	na	17.5	A4-MU-C005	2	5	na	86.5	all BERA analytes	Y	field rep of A4-MU-C004
A4	F	A4-MB19-MU-08	12:56	Anodonta	Live	na	16	A4-MU-C005	2	5	na	86.5	all BERA analytes	Y	field rep of A4-MU-C004
A4	F	A4-MB19-MU-09	12:59	Anodonta	Live	na	17	A4-MU-C005	2	5	na	86.5	all BERA analytes	Y	field rep of A4-MU-C004
A4	F	A4-MB19-MU-10	13:02	Anodonta	Live	na	18	A4-MU-C005	2	5	na	86.5	all BERA analytes	Y	field rep of A4-MU-C004
A4	F	A4-MB19-MU-04	12:45	Anodonta	Live	na	27.5	A4-MU-C006	1	6	na	91.5	all BERA analytes	Y	
A4	F	A4-MB19-MU-03	12:41	Anodonta	Live	na	17	A4-MU-C006	1	6	na	91.5	all BERA analytes	Y	
A4	F	A4-MB19-MU-11	13:05	Anodonta	Live	na	16	A4-MU-C006	1	6	na	91.5	all BERA analytes	Y	
A4	F	A4-MB19-MU-13	13:12	Anodonta	Live	na	16.5	A4-MU-C006	1	6	na	91.5	all BERA analytes	Y	

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Area	Spring or Fall? (S/F)	Organism ID	Sample Time	Species	Health	Delayed Cooler Sample?	Estimated Tissue Weight (g)	Composite ID	Sample Type	Composite #	Original Composite # (from spring)	Sample Mass	Recommended Analyses	Enough Mass for EPA Split?	Comments
A4	F	A4-MB19-MU-14	13:14	Anodonta	Live	na	14.5	A4-MU-C006	1	6	na	91.5	all BERA analytes	Y	
A4	S	A4-MB07-MU-01	14:41	Anodonta sp.	Dead	N	5.5	na	na	na	na	na	na	na	archive
A4	S	A4-MB10-MU-01	15:14	Anodonta sp.	Dead	N	11	na	na	na	na	na	na	na	archive
A4	S	A4-MB13-MU-01	15:18	Anodonta sp.	Dead	N	5	na	na	na	na	na	na	na	archive
A4	S	A4-MB13-MU-02	15:22	Anodonta sp.	Dead	N	2.9	na	na	na	na	na	na	na	archive
A5	F	A5-MB21-MU-01	11:03	Anodonta	Live	na	11	A5-MU-C001	1b	1	na	65	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB21-MU-02	11:07	Anodonta	Live	na	12.5	A5-MU-C001	1b	1	na	65	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB21-MU-05	11:15	Anodonta	Live	na	11	A5-MU-C001	1b	1	na	65	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB21-MU-06	11:19	Anodonta	Live	na	8.5	A5-MU-C001	1b	1	na	65	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB21-MU-10	12:39	Anodonta	Live	na	9.5	A5-MU-C001	1b	1	na	65	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB21-MU-04	11:12	Anodonta	Live	na	12.5	A5-MU-C001	1b	1	na	65	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB21-MU-11	12:42	Anodonta	Live	na	7.5	A5-MU-C002	2	2	na	65	all HHRA and BERA analytes	Y	field rep of A5-MU-C003
A5	F	A5-MB21-MU-03	11:10	Anodonta	Live	na	16.5	A5-MU-C002	2	2	na	65	all HHRA and BERA analytes	Y	field rep of A5-MU-C003
A5	F	A5-MB21-MU-07	11:22	Anodonta	Live	na	10	A5-MU-C002	2	2	na	65	all HHRA and BERA analytes	Y	field rep of A5-MU-C003
A5	F	A5-MB21-MU-08	11:26	Anodonta	Live	na	10.5	A5-MU-C002	2	2	na	65	all HHRA and BERA analytes	Y	field rep of A5-MU-C003
A5	F	A5-MB21-MU-09	11:29	Anodonta	Live	na	11	A5-MU-C002	2	2	na	65	all HHRA and BERA analytes	Y	field rep of A5-MU-C003
A5	F	A5-MB21-MU-12	12:44	Anodonta	Live	na	9.5	A5-MU-C002	2	2	na	65	all HHRA and BERA analytes	Y	field rep of A5-MU-C003
A5	F	A5-MB21-MU-13	12:47	Anodonta	Live	na	7.5	A5-MU-C003	2	3	na	64.5	all HHRA and BERA analytes	Y	field rep of A5-MU-C002
A5	F	A5-MB21-MU-14	12:51	Anodonta	Live	na	10	A5-MU-C003	2	3	na	64.5	all HHRA and BERA analytes	Y	field rep of A5-MU-C002
A5	F	A5-MB21-MU-15	12:53	Anodonta	Live	na	4.5	A5-MU-C003	2	3	na	64.5	all HHRA and BERA analytes	Y	field rep of A5-MU-C002
A5	F	A5-MB21-MU-16	12:56	Anodonta	Live	na	9.5	A5-MU-C003	2	3	na	64.5	all HHRA and BERA analytes	Y	field rep of A5-MU-C002
A5	F	A5-MB21-MU-17	12:59	Anodonta	Live	na	16.5	A5-MU-C003	2	3	na	64.5	all HHRA and BERA analytes	Y	field rep of A5-MU-C002
A5	F	A5-MB21-MU-18	13:01	Anodonta	Live	na	16.5	A5-MU-C003	2	3	na	64.5	all HHRA and BERA analytes	Y	field rep of A5-MU-C002
A5	F	A5-MB22-MU-01	13:08	Anodonta	Live	na	11	A5-MU-C004	1b	4	na	95	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB22-MU-02	13:10	Anodonta	Live	na	11	A5-MU-C004	1b	4	na	95	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB22-MU-03	13:13	Anodonta	Live	na	16	A5-MU-C004	1b	4	na	95	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB22-MU-04	13:15	Anodonta	Live	na	15.5	A5-MU-C004	1b	4	na	95	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB22-MU-05	13:17	Anodonta	Live	na	22.5	A5-MU-C004	1b	4	na	95	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB22-MU-06	13:20	Anodonta	Live	na	19	A5-MU-C004	1b	4	na	95	all HHRA and BERA analytes	Y	field split
A5	F	A5-MB23-MU-01	13:29	Anodonta	Live	na	3	A5-MU-C005	1	5	na	50	all HHRA and BERA analytes	Y	
A5	F	A5-MB23-MU-02	13:33	Anodonta	Live	na	2.5	A5-MU-C005	1	5	na	50	all HHRA and BERA analytes	Y	
A5	F	A5-MB24-MU-03	15:45	Anodonta	Live	na	11	A5-MU-C005	1	5	na	50	all HHRA and BERA analytes	Y	
A5	F	A5-MB24-MU-04	15:48	Anodonta	Live	na	7.5	A5-MU-C005	1	5	na	50	all HHRA and BERA analytes	Y	
A5	F	A5-MB24-MU-09	16:02	Anodonta	Live	na	13.5	A5-MU-C005	1	5	na	50	all HHRA and BERA analytes	Y	
A5	F	A5-MB24-MU-10	16:07	Anodonta	Live	na	12.5	A5-MU-C005	1	5	na	50	all HHRA and BERA analytes	Y	
A5	F	A5-MB24-MU-01	15:40	Anodonta	Live	na	7.5	A5-MU-C006	1	6	na	47.5	all HHRA and BERA analytes	Y	
A5	F	A5-MB24-MU-02	15:42	Anodonta	Live	na	7.5	A5-MU-C006	1	6	na	47.5	all HHRA and BERA analytes	Y	
A5	F	A5-MB24-MU-05	15:51	Anodonta	Live	na	8	A5-MU-C006	1	6	na	47.5	all HHRA and BERA analytes	Y	
A5	F	A5-MB24-MU-06	15:53	Anodonta	Live	na	9	A5-MU-C006	1	6	na	47.5	all HHRA and BERA analytes	Y	
A5	F	A5-MB24-MU-07	15:55	Anodonta	Live	na	7	A5-MU-C006	1	6	na	47.5	all HHRA and BERA analytes	Y	
A5	F	A5-MB24-MU-08	15:58	Anodonta	Live	na	8.5	A5-MU-C006	1	6	na	47.5	all HHRA and BERA analytes	Y	
A5	S	A5-MB08-MU-01	16:15	Anodonta sp.	Dead	Y	2.1	na	na	na	na	na	na	na	archive
A6	S	A6-MB01-MU-01	12:45	Anodonta	Live	N	1.5	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-02	11:43	Anodonta	Live	N	1	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-04	11:58	Anodonta	Live	N	1	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-06	12:06	Anodonta	Live	N	0.5	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-07	13:46	Anodonta	Live	N	1.7	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-08	13:50	Anodonta	Live	N	0.75	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-09	13:52	Anodonta	Live	N	1.1	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-10	13:55	Anodonta	Live	N	0.55	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-11	13:57	Anodonta	Live	N	0.9	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-12	13:59	Anodonta	Live	N	0.8	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-13	14:02	Anodonta	Live	N	0.7	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	

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Area	Spring or Fall? (S/F)	Organism ID	Sample Time	Species	Health	Delayed Cooler Sample?	Estimated Tissue Weight (g)	Composite ID	Sample Type	Composite #	Original Composite # (from spring)	Sample Mass	Recommended Analyses	Enough Mass for EPA Split?	Comments
A6	S	A6-MB01-MU-14	14:04	Anodonta	Live	N	0.75	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-15	14:07	Anodonta	Live	N	0.85	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-17	14:10	Anodonta	Live	N	1.05	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-18	14:12	Anodonta	Live	N	1	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-19	14:15	Anodonta	Live	N	0.9	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-20	14:17	Anodonta	Live	N	1.35	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-21	14:19	Anodonta	Live	N	0.6	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB01-MU-23	14:26	Anodonta	Live	N	1.15	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB07-MU-01	11:09	Anodonta	Live	N	0.8	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB07-MU-02	11:14	Anodonta	Live	N	0.75	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB07-MU-03	11:16	Anodonta	Live	N	1.2	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB07-MU-04	11:24	Anodonta	Live	N	1.65	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB07-MU-05	11:31	Anodonta	Live	N	1.5	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB07-MU-06	11:34	Anodonta	Live	N	1.8	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB07-MU-07	11:38	Anodonta	Live	N	1.35	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB07-MU-08	11:42	Anodonta	Live	N	1.55	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB07-MU-09	11:46	Anodonta	Live	N	1.6	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB07-MU-10	11:49	Anodonta	Live	N	0.65	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB08-MU-04	11:15	Anodonta	Live	N	0.95	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB08-MU-05	11:19	Anodonta	Live	N	0.5	A6-MU-C001	1	1	1	32.45	all HHRA and BERA analytes	N	
A6	S	A6-MB03-MU-01	15:36	Anodonta	Live	N	1	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB03-MU-02	15:42	Anodonta	Live	N	1.5	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB03-MU-03	15:45	Anodonta	Live	N	1.5	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB03-MU-04	15:48	Anodonta	Live	N	1.5	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB03-MU-05	15:50	Anodonta	Live	N	2	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB03-MU-06	15:53	Anodonta	Live	N	1	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB03-MU-07	15:56	Anodonta	Live	N	1	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB05-MU-01	11:44	Anodonta	Live	N	1.2	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB05-MU-02	11:59	Anodonta	Live	N	1	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB05-MU-03	12:08	Anodonta	Live	N	0.45	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB05-MU-04	12:14	Anodonta	Live	N	1.1	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB09-MU-01	13:50	Anodonta	Live	N	1	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB09-MU-02	13:53	Anodonta	Live	N	1.5	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB09-MU-03	13:55	Anodonta	Live	N	1.5	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB09-MU-04	13:57	Anodonta	Live	N	1.15	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB09-MU-05	13:58	Anodonta	Live	N	1.25	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB09-MU-06	14:00	Anodonta	Live	N	1.05	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB09-MU-07	14:02	Anodonta	Live	N	1	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB09-MU-09	14:07	Anodonta	Live	N	0.25	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	S	A6-MB09-MU-10	14:09	Anodonta	Live	N	0.5	A6-MU-C002	1	2	2	41.95	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-01	11:31	Anodonta	Live	na	11.5	A6-MU-C002	1	2	na	41.95	all HHRA and BERA analytes	Y	
A6	F	A6-MB12-MU-04	13:07	Anodonta	Live	na	8	A6-MU-C002	1	2	na	41.95	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-02	11:34	Anodonta	Live	na	10	A6-MU-C003	1	3	na	42	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-06	11:48	Anodonta	Live	na	8.5	A6-MU-C003	1	3	na	42	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-11	12:15	Anodonta	Live	na	6.5	A6-MU-C003	1	3	na	42	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-13	12:22	Anodonta	Live	na	6	A6-MU-C003	1	3	na	42	all HHRA and BERA analytes	Y	
A6	F	A6-MB12-MU-01	12:58	Anodonta	Live	na	11	A6-MU-C003	1	3	na	42	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-05	11:45	Anodonta	Live	na	10.5	A6-MU-C004	2	4	na	45	all HHRA and BERA analytes	Y	field rep of A6-MU-C006
A6	F	A6-MB11-MU-07	11:51	Anodonta	Live	na	3.5	A6-MU-C004	2	4	na	45	all HHRA and BERA analytes	Y	field rep of A6-MU-C006
A6	F	A6-MB11-MU-08	12:04	Anodonta	Live	na	8.5	A6-MU-C004	2	4	na	45	all HHRA and BERA analytes	Y	field rep of A6-MU-C006
A6	F	A6-MB11-MU-09	12:08	Anodonta	Live	na	8	A6-MU-C004	2	4	na	45	all HHRA and BERA analytes	Y	field rep of A6-MU-C006
A6	F	A6-MB11-MU-10	12:12	Anodonta	Live	na	7.5	A6-MU-C004	2	4	na	45	all HHRA and BERA analytes	Y	field rep of A6-MU-C006
A6	F	A6-MB11-MU-12	12:19	Anodonta	Live	na	7	A6-MU-C004	2	4	na	45	all HHRA and BERA analytes	Y	field rep of A6-MU-C006

Teck American Inc
Macroinvertebrate Tissue Study
Spring 2016

Area	Spring or Fall? (S/F)	Organism ID	Sample Time	Species	Health	Delayed Cooler Sample?	Estimated Tissue Weight (g)	Composite ID	Sample Type	Composite #	Original Composite # (from spring)	Sample Mass	Recommended Analyses	Enough Mass for EPA Split?	Comments
A6	F	A6-MB11-MU-03	11:38	Anodonta	Live	na	9.5	A6-MU-C005	1	5	na	43.5	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-14	12:24	Anodonta	Live	na	6.5	A6-MU-C005	1	5	na	43.5	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-15	12:29	Anodonta	Live	na	6.5	A6-MU-C005	1	5	na	43.5	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-16	12:32	Anodonta	Live	na	10	A6-MU-C005	1	5	na	43.5	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-17	12:34	Anodonta	Live	na	5.5	A6-MU-C005	1	5	na	43.5	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-18	12:38	Anodonta	Live	na	5.5	A6-MU-C005	1	5	na	43.5	all HHRA and BERA analytes	Y	
A6	F	A6-MB11-MU-04	11:42	Anodonta	Live	na	6.5	A6-MU-C006	2	6	na	45.5	all HHRA and BERA analytes	Y	field rep of A6-MU-C004
A6	F	A6-MB11-MU-19	12:41	Anodonta	Live	na	8.5	A6-MU-C006	2	6	na	45.5	all HHRA and BERA analytes	Y	field rep of A6-MU-C004
A6	F	A6-MB11-MU-20	12:44	Anodonta	Live	na	4.5	A6-MU-C006	2	6	na	45.5	all HHRA and BERA analytes	Y	field rep of A6-MU-C004
A6	F	A6-MB11-MU-21	12:48	Anodonta	Live	na	4.5	A6-MU-C006	2	6	na	45.5	all HHRA and BERA analytes	Y	field rep of A6-MU-C004
A6	F	A6-MB12-MU-02	13:01	Anodonta	Live	na	11	A6-MU-C006	2	6	na	45.5	all HHRA and BERA analytes	Y	field rep of A6-MU-C004
A6	F	A6-MB12-MU-03	13:04	Anodonta	Live	na	10.5	A6-MU-C006	2	6	na	45.5	all HHRA and BERA analytes	Y	field rep of A6-MU-C004
A6	S	A6-MB01-MU-03	11:52	Anodonta	Dead	N	0.5	na	na	na	na	na	na	na	archive
A6	S	A6-MB01-MU-05	12:01	Anodonta	Dead	N	0.5	na	na	na	na	na	na	na	archive
A6	S	A6-MB01-MU-16	14:08	Anodonta	Dead	N	0.55	na	na	na	na	na	na	na	archive
A6	S	A6-MB01-MU-22	14:22	Anodonta	Dead	N	0.8	na	na	na	na	na	na	na	archive
A6	S	A6-MB01-MU-24	14:29	Anodonta	Dead	N	0.6	na	na	na	na	na	na	na	archive
A6	S	A6-MB01-MU-25	14:30	Anodonta	Dead	N	1	na	na	na	na	na	na	na	archive
A6	S	A6-MB01-MU-26	14:32	Anodonta	Dead	N	0.7	na	na	na	na	na	na	na	archive
A6	S	A6-MB01-MU-27	14:35	Anodonta	Dead	N	0.95	na	na	na	na	na	na	na	archive
A6	S	A6-MB04-MU-01	11:28	Anodonta	dead	N	1.05	na	na	na	na	na	na	na	archive
A6	S	A6-MB05-MU-05	12:17	Anodonta	Dead	N	0.75	na	na	na	na	na	na	na	archive
A6	S	A6-MB05-MU-06	12:59	Anodonta	Dead	N	0.9	na	na	na	na	na	na	na	archive
A6	S	A6-MB05-MU-07	13:05	Anodonta	Dead	N	0.8	na	na	na	na	na	na	na	archive
A6	S	A6-MB07-MU-11	11:54	Anodonta	Dead	N	0.75	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-08	11:29	Anodonta	Dead	Y	0.5	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-09	11:33	Anodonta	Dead	N	0.35	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-10	11:35	Anodonta	Dead	N	0.95	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-11	11:39	Anodonta	Dead	Y	0.55	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-12	11:42	Anodonta	Dead	N	0.3	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-13	11:45	Anodonta	Dead	N	0.65	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-14	11:47	Anodonta	Dead	N	0.4	na	na	na	na	na	na	na	archive
A6	S	A6-MB09-MU-08	14:03	Anodonta	Dead	N	0.55	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-01	11:03	Anodonta	Live	Y	1	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-02	11:09	Anodonta	Live	Y	1	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-03	11:12	Anodonta	Live	Y	1	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-06	11:24	Anodonta	Live	Y	0.7	na	na	na	na	na	na	na	archive
A6	S	A6-MB08-MU-07	11:27	Anodonta	Live	Y	0.65	na	na	na	na	na	na	na	archive
SR	S	SR-MB03-MU-01	16:35	Western pearlsh	Live	N	16	SR-MU-C001	1	1	1	41.35	all HHRA analytes	Y	
SR	S	SR-MB04-MU-01	16:47	Western pearlsh	Live	N	5.05	SR-MU-C001	1	1	1	41.35	all HHRA analytes	Y	
SR	S	SR-MB09-MU-01	11:02	Western pearlsh	Live	N	0.65	SR-MU-C001	1	1	1	41.35	all HHRA analytes	Y	
SR	S	SR-MB09-MU-02	10:30	Western pearlsh	Live	N	0.7	SR-MU-C001	1	1	1	41.35	all HHRA analytes	Y	
SR	S	SR-MB09-MU-03	10:30	Western pearlsh	Live	N	1.15	SR-MU-C001	1	1	1	41.35	all HHRA analytes	Y	
SR	S	SR-MB09-MU-04	10:30	Western pearlsh	Live	N	1.05	SR-MU-C001	1	1	1	41.35	all HHRA analytes	Y	
SR	S	SR-MB09-MU-05	10:30	Western pearlsh	Live	N	4.25	SR-MU-C001	1	1	1	41.35	all HHRA analytes	Y	
SR	S	SR-MB09-MU-06	10:30	Western pearlsh	Live	N	5	SR-MU-C001	1	1	1	41.35	all HHRA analytes	Y	
SR	S	SR-MB09-MU-07	10:30	Western pearlsh	Live	N	7.5	SR-MU-C001	1	1	1	41.35	all HHRA analytes	Y	
SR	S	SR-MB01-MU-01	13:00	Western pearlsh	Live	N	0.55	SR-MU-C002	1	2	2	37.6	all HHRA analytes	Y	
SR	S	SR-MB01-MU-02	13:00	Western pearlsh	Live	N	1.25	SR-MU-C002	1	2	2	37.6	all HHRA analytes	Y	
SR	S	SR-MB01-MU-03	13:00	Western pearlsh	Live	N	4.2	SR-MU-C002	1	2	2	37.6	all HHRA analytes	Y	
SR	S	SR-MB01-MU-04	13:00	Western pearlsh	Live	N	5.1	SR-MU-C002	1	2	2	37.6	all HHRA analytes	Y	
SR	F	SR-MB34-MU-01	0:00	Western pearlsh	Live	na	7	SR-MU-C002	1	2	na	37.6	all HHRA analytes	Y	
SR	F	SR-MB34-MU-07	9:27	Western pearlsh	Live	na	19.5	SR-MU-C002	1	2	na	37.6	all HHRA analytes	Y	

Teck American Inc
Macroinvertebrate Tissue Study
Spring 2016

Area	Spring or Fall? (S/F)	Organism ID	Sample Time	Species	Health	Delayed Cooler Sample?	Estimated Tissue Weight (g)	Composite ID	Sample Type	Composite #	Original Composite # (from spring)	Sample Mass	Recommended Analyses	Enough Mass for EPA Split?	Comments
SR	S	SR-MB08-MU-01	15:00	Western pearlsh	Live	N	2.4	na	na	na	3	na	na	na	archive
SR	S	SR-MB08-MU-02	15:00	Western pearlsh	Live	N	2.8	na	na	na	3	na	na	na	archive
SR	S	SR-MB08-MU-03	15:00	Western pearlsh	Live	N	3.25	na	na	na	3	na	na	na	archive
SR	S	SR-MB11-MU-01	14:15	Western pearlsh	Live	N	0.6	na	na	na	3	na	na	na	archive
SR	F	SR-MB34-MU-05	9:22	Western pearlsh	Live	na	14	SR-MU-C003	2	3	na	62.5	all HHRA analytes	Y	field rep of SR-MU-C004
SR	F	SR-MB34-MU-14	15:33	Western pearlsh	Live	na	21	SR-MU-C003	2	3	na	62.5	all HHRA analytes	Y	field rep of SR-MU-C004
SR	F	SR-MB34-MU-03	9:20	Western pearlsh	Live	na	8	SR-MU-C003	2	3	na	62.5	all HHRA analytes	Y	field rep of SR-MU-C004
SR	F	SR-MB34-MU-08	9:29	Western pearlsh	Live	na	19.5	SR-MU-C003	2	3	na	62.5	all HHRA analytes	Y	field rep of SR-MU-C004
SR	F	SR-MB34-MU-11	15:32	Western pearlsh	Live	na	10	SR-MU-C004	2	4	na	55.5	all HHRA analytes	Y	field rep of SR-MU-C003
SR	F	SR-MB34-MU-12	15:32	Western pearlsh	Live	na	10	SR-MU-C004	2	4	na	55.5	all HHRA analytes	Y	field rep of SR-MU-C003
SR	F	SR-MB34-MU-13	15:32	Western pearlsh	Live	na	13.5	SR-MU-C004	2	4	na	55.5	all HHRA analytes	Y	field rep of SR-MU-C003
SR	F	SR-MB34-MU-15	15:33	Western pearlsh	Live	na	22	SR-MU-C004	2	4	na	55.5	all HHRA analytes	Y	field rep of SR-MU-C003
SR	F	SR-MB34-MU-02	9:15	Western pearlsh	Live	na	4.25	SR-MU-C005	1	5	na	61.75	all HHRA analytes	Y	
SR	F	SR-MB34-MU-04	9:21	Western pearlsh	Live	na	11	SR-MU-C005	1	5	na	61.75	all HHRA analytes	Y	
SR	F	SR-MB34-MU-06	9:26	Western pearlsh	Live	na	20	SR-MU-C005	1	5	na	61.75	all HHRA analytes	Y	
SR	F	SR-MB34-MU-09	9:33	Western pearlsh	Live	na	20	SR-MU-C005	1	5	na	61.75	all HHRA analytes	Y	
SR	F	SR-MB34-MU-10	15:30	Western pearlsh	Live	na	6.5	SR-MU-C005	1	5	na	61.75	all HHRA analytes	Y	
SR	F	SR-MB35-MU-01	14:25	Western pearlsh	Live	na	4	SR-MU-C006	1	6	na	38.75	all HHRA analytes	Y	
SR	F	SR-MB35-MU-02	14:28	Western pearlsh	Live	na	3	SR-MU-C006	1	6	na	38.75	all HHRA analytes	Y	
SR	F	SR-MB36-MU-01	15:05	Western pearlsh	Live	na	3	SR-MU-C006	1	6	na	38.75	all HHRA analytes	Y	
SR	F	SR-MB36-MU-02	15:07	Western pearlsh	Live	na	16	SR-MU-C006	1	6	na	38.75	all HHRA analytes	Y	
SR	F	SR-MB38-MU-01	10:10	Western pearlsh	Live	na	2	SR-MU-C006	1	6	na	38.75	all HHRA analytes	Y	
SR	F	SR-MB38-MU-02	10:12	Western pearlsh	Live	na	5.5	SR-MU-C006	1	6	na	38.75	all HHRA analytes	Y	
SR	F	SR-MB41-MU-01	12:48	Western pearlsh	Live	na	4	SR-MU-C006	1	6	na	38.75	all HHRA analytes	Y	
SR	F	SR-MB42-MU-01	13:30	Western pearlsh	Live	na	1.25	SR-MU-C006	1	6	na	38.75	all HHRA analytes	Y	

Notes:
BERA - baseline ecological risk assessment
F - fall
HHRA - human health risk assessment
na - not applicable
S - spring
SR - Sanpoil River

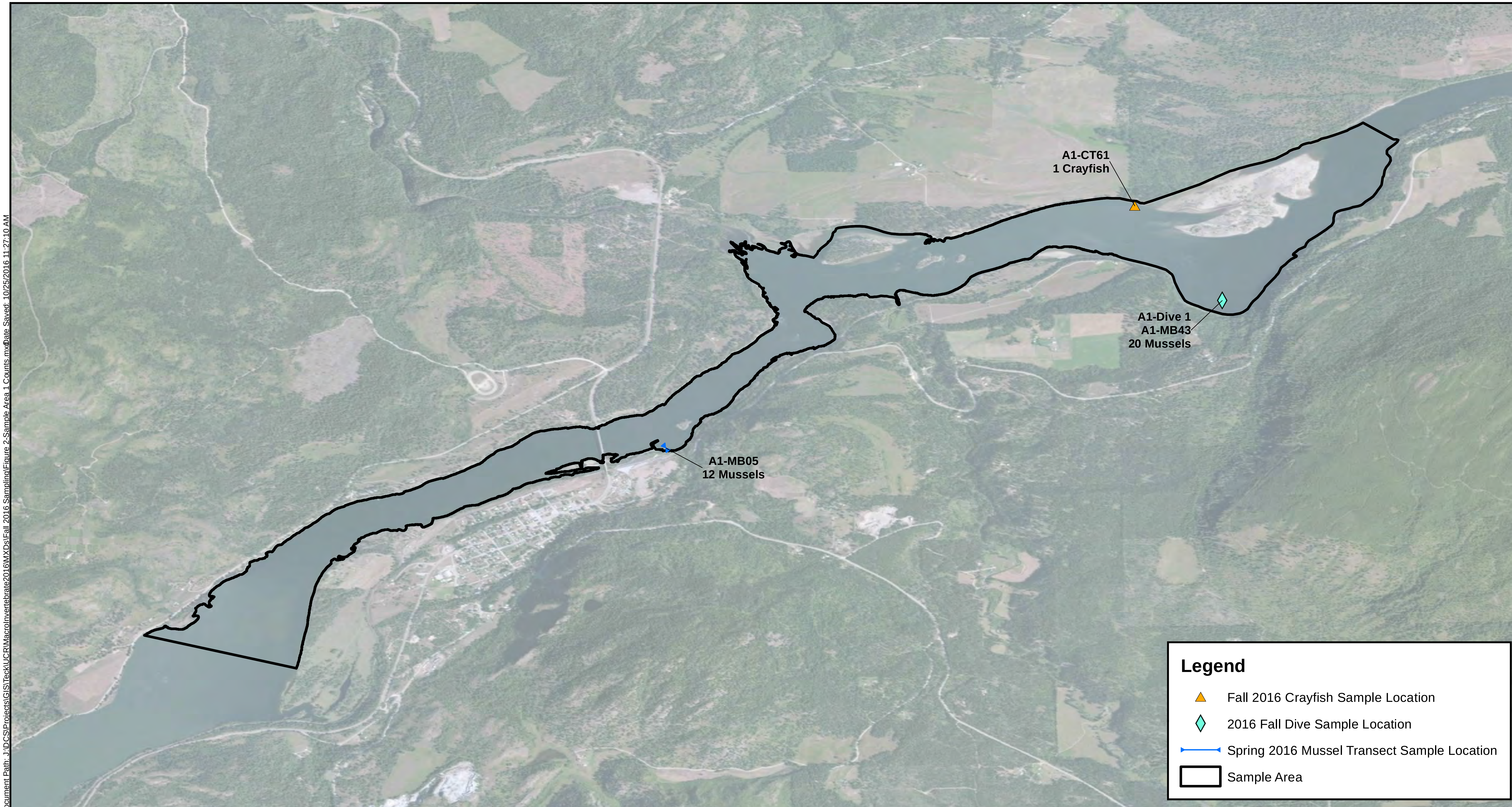

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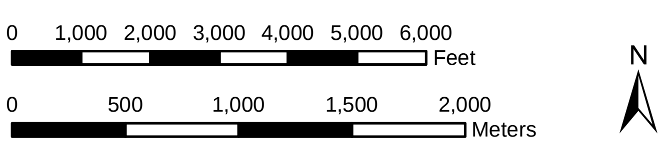
Figure 1

AECOM



Sampling Area 1 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

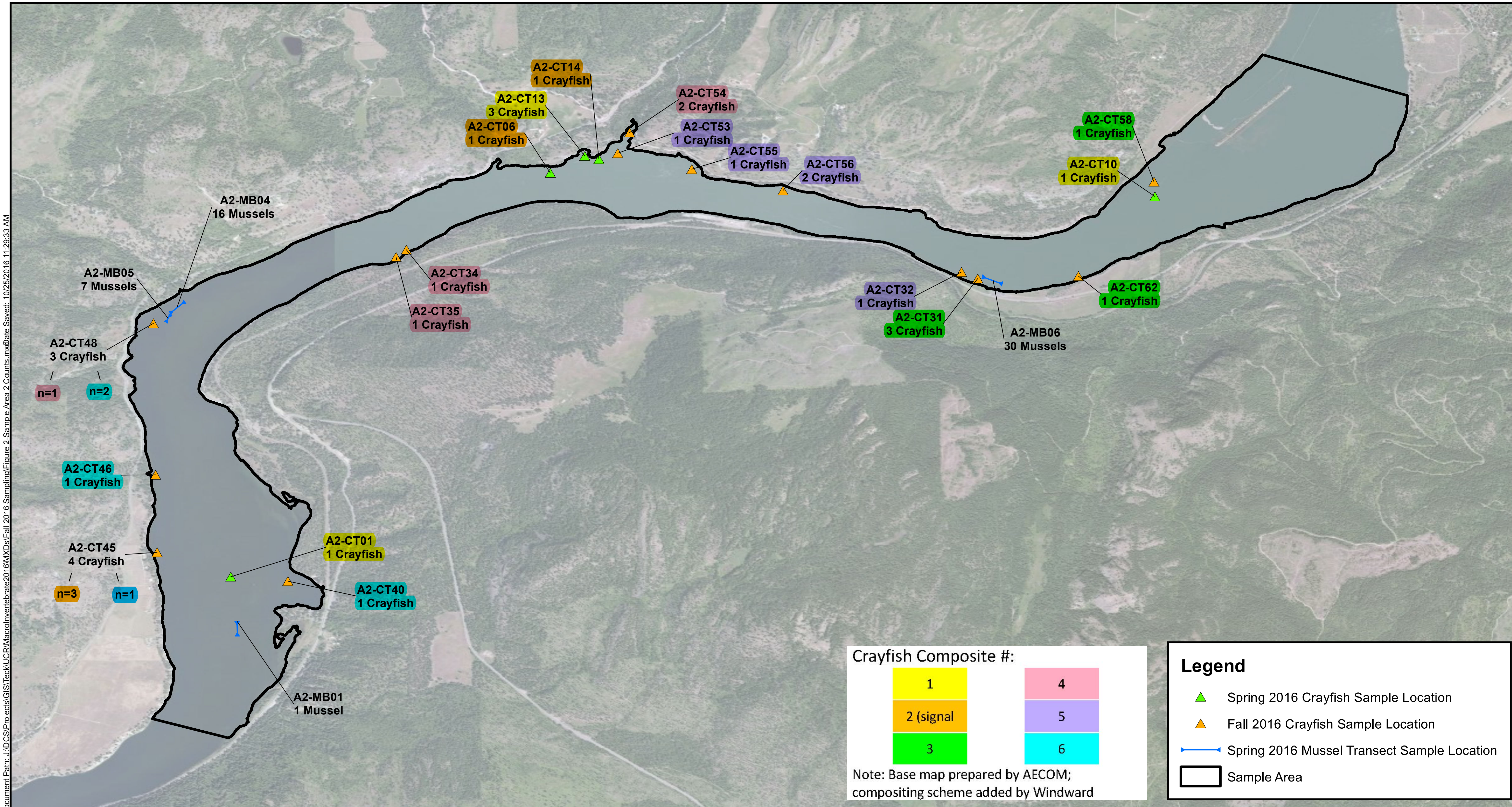


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Figure 2

AECOM

0 1,000 2,000 3,000 4,000 5,000 6,000 Feet

0 500 1,000 1,500 2,000 Meters

N

Sampling Area 2 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

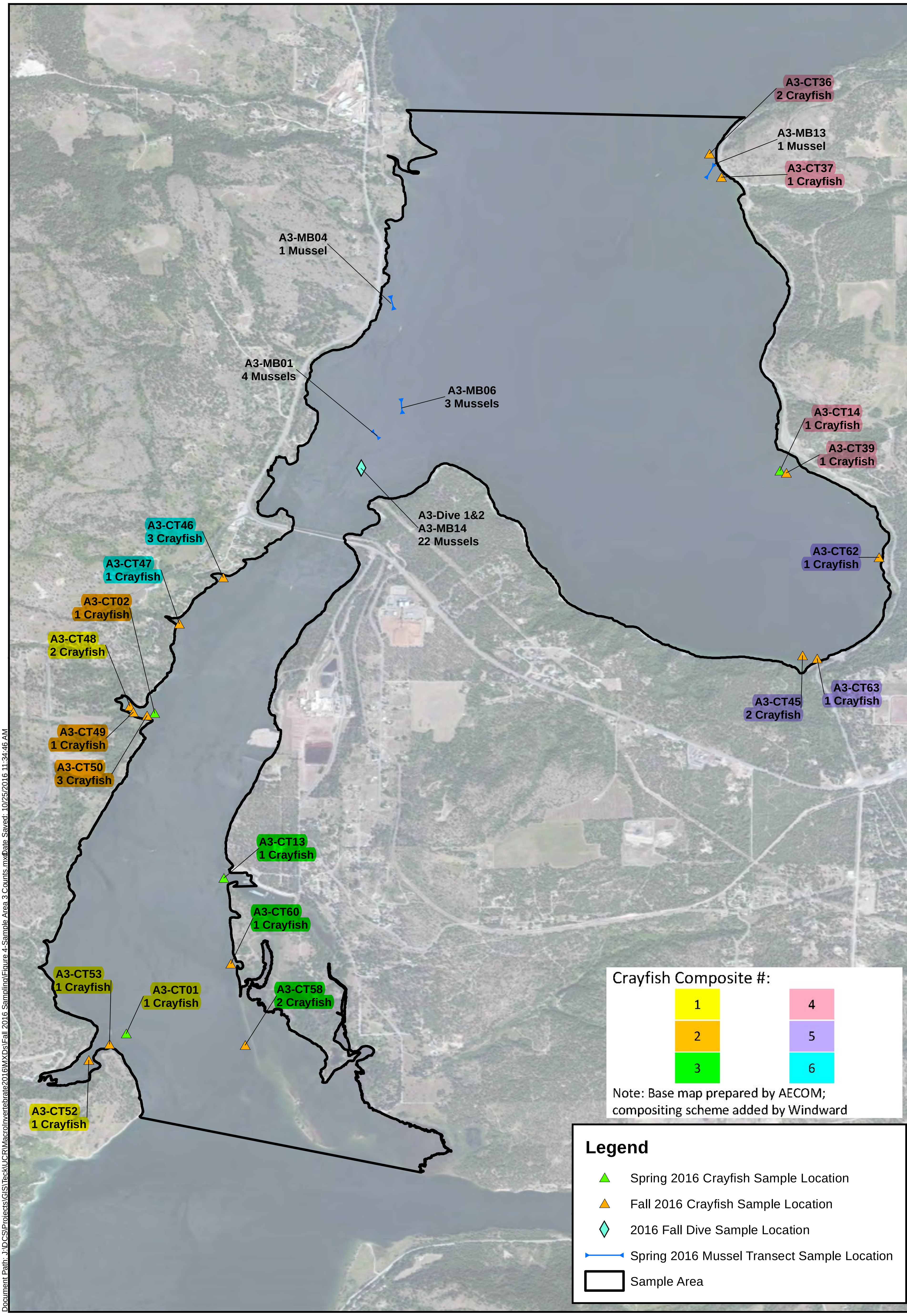


Figure 3

AECOM

0 1,000 2,000 3,000 4,000 5,000 Feet

0 500 1,000 1,500 Meters

N

Sampling Area 3 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

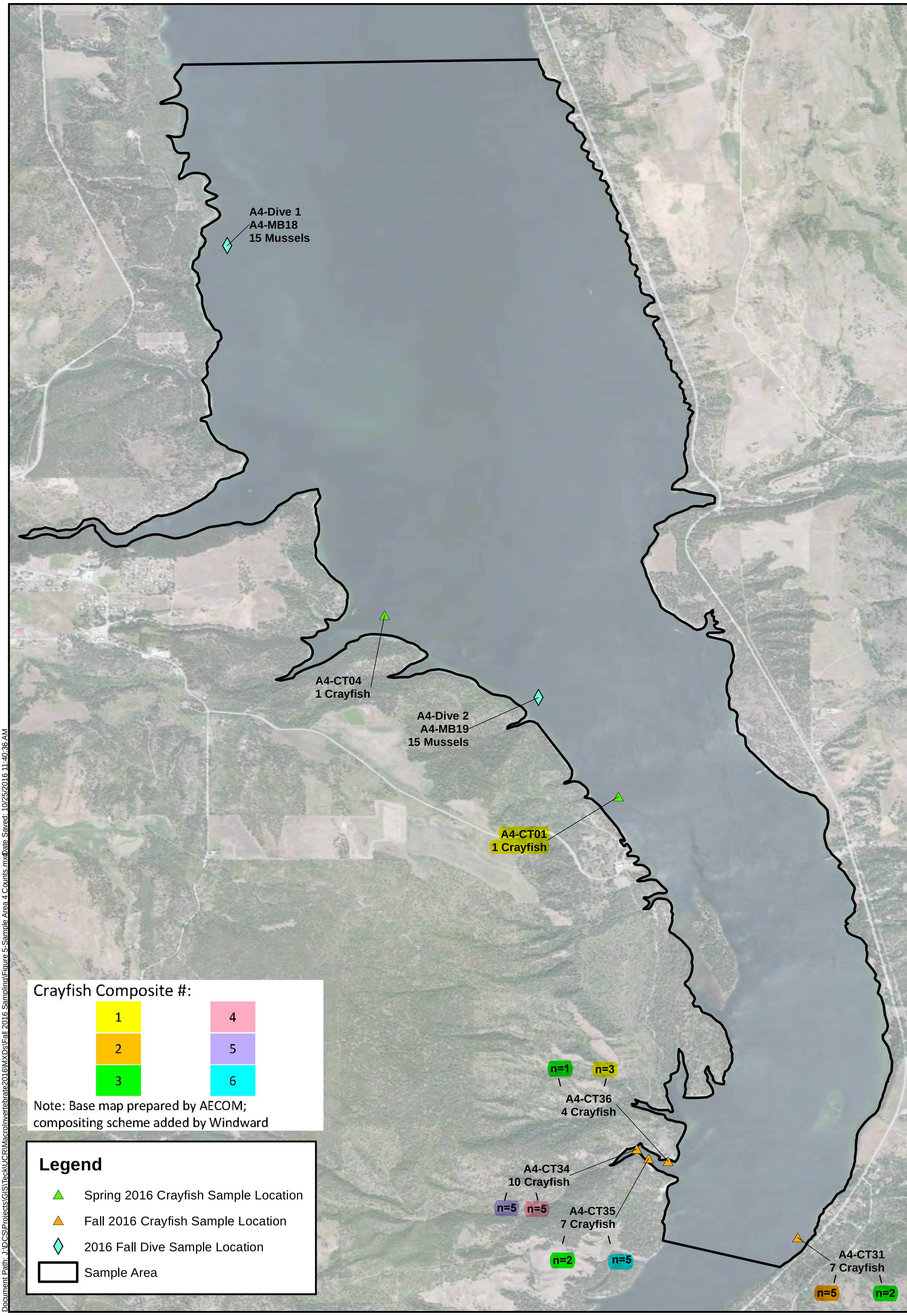
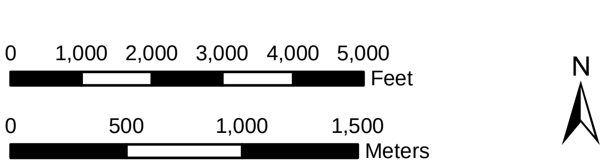


Figure 4

AECOM



Sampling Area 4 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

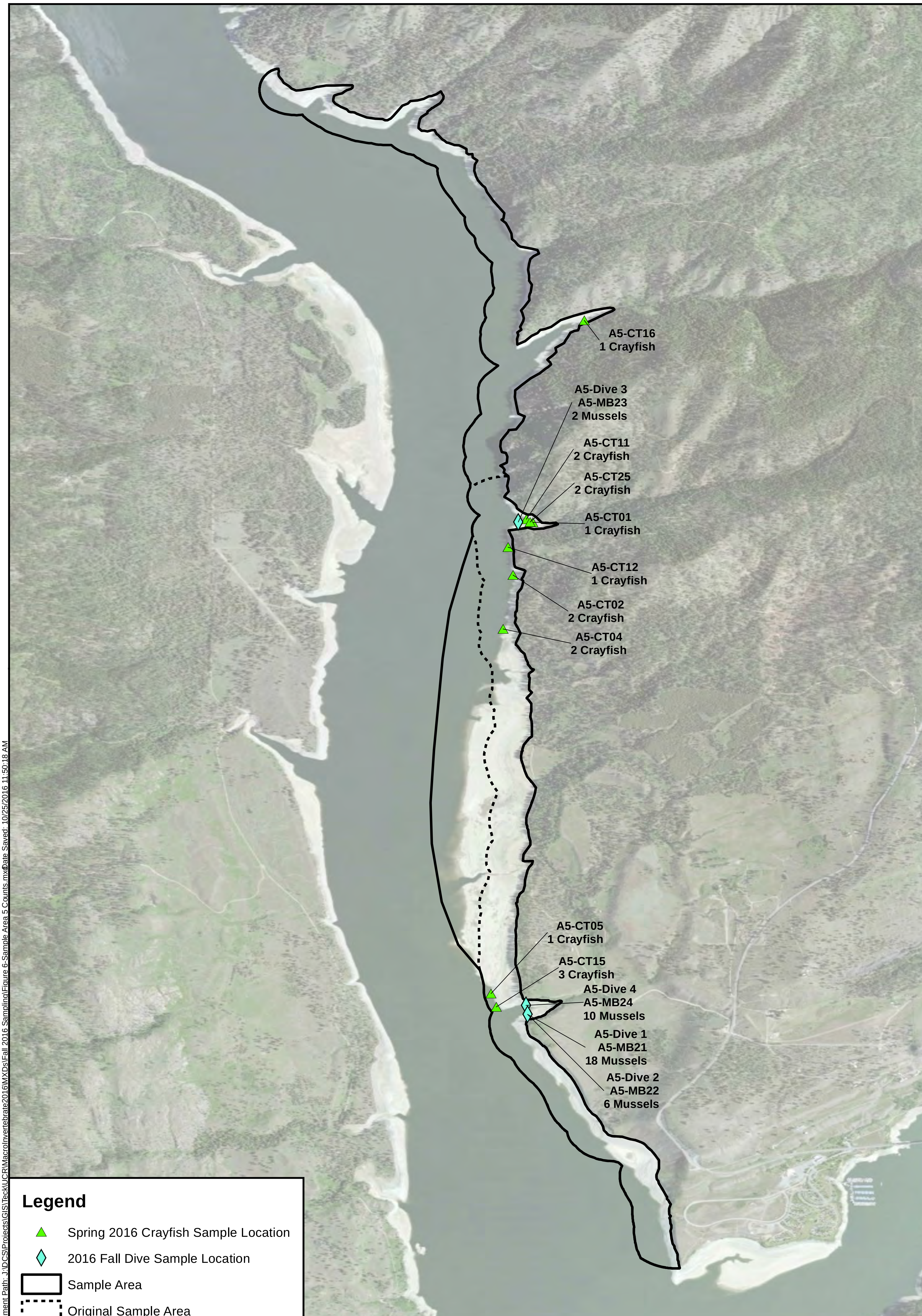


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Figure 5

AECOM

0 1,000 2,000 3,000 4,000 5,000 Feet

0 500 1,000 1,500 Meters

N

Sampling Area 5 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

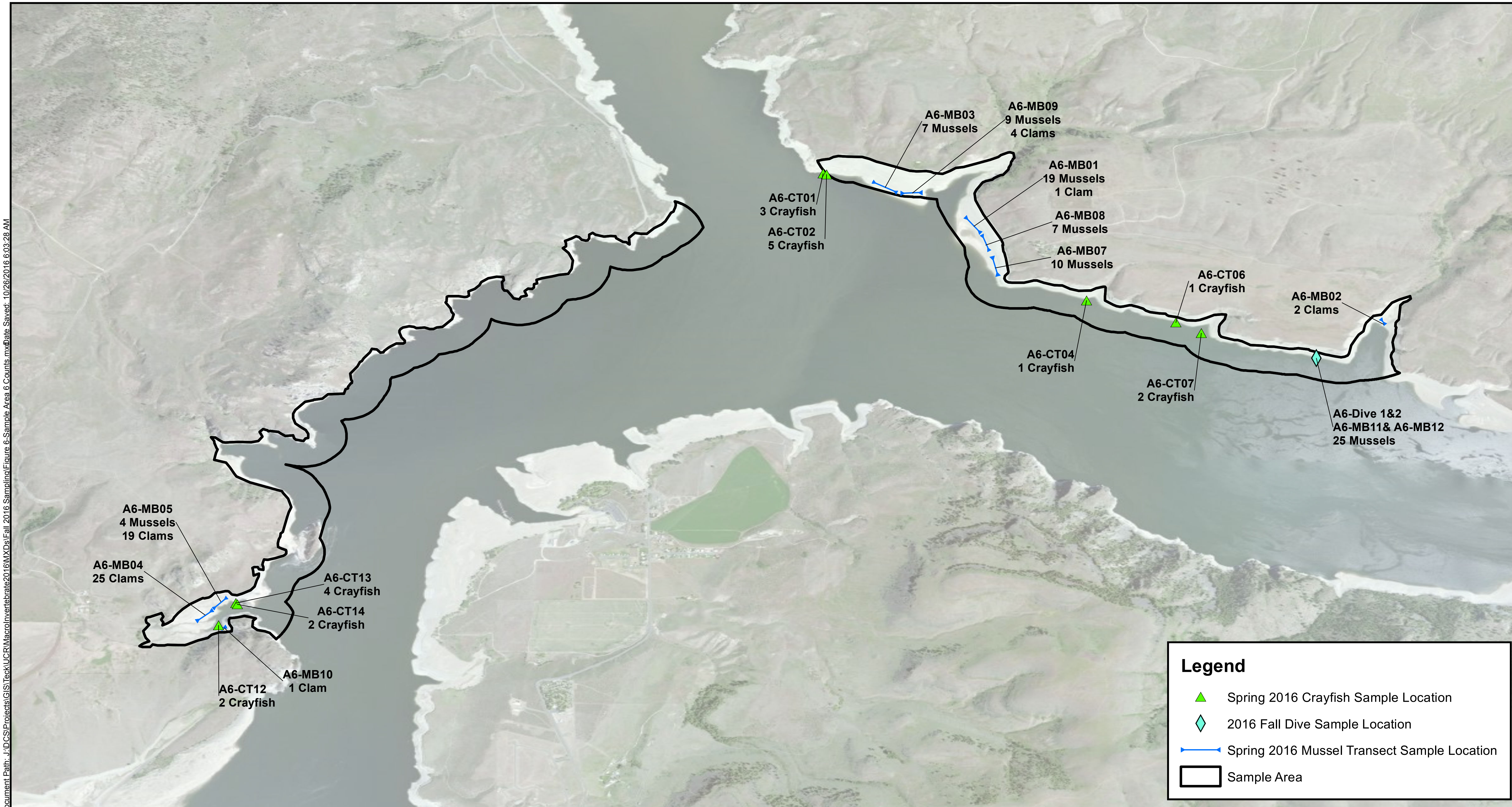

Figure 6

AECOM

0 1,000 2,000 3,000 4,000 5,000 Feet

0 500 1,000 1,500 2,000 Meters

N

Sampling Area 6 Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

Figure 7

AECOM

0 1,000 2,000 3,000 Feet

0 500 1,000 Meters

N

Buffalo Lake Alternate Reference Area Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

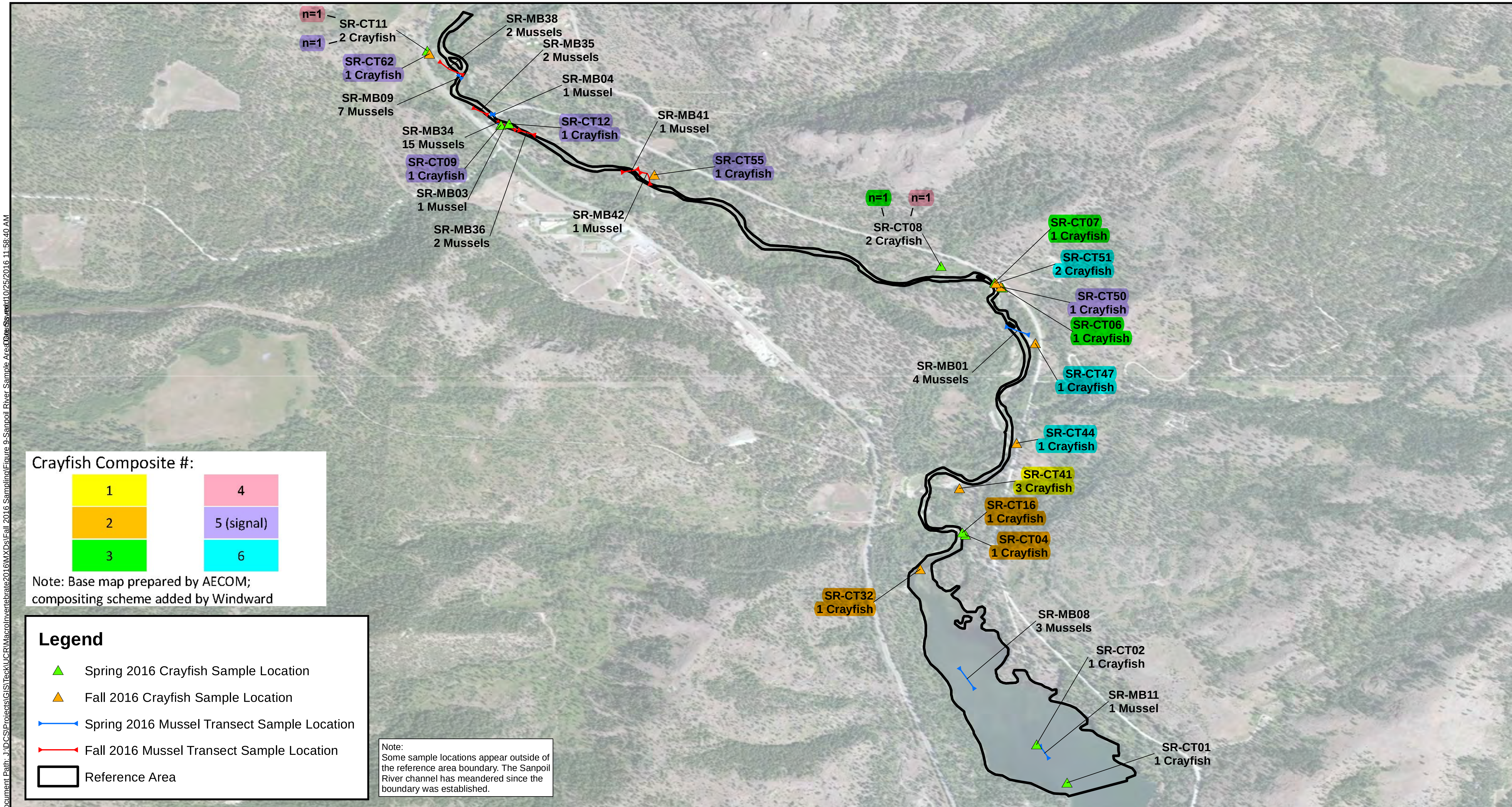

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Figure 8 - Crayfish

AECOM

0 1,000 2,000 Feet

0 500 1,000 Meters

N

Sanpoil River Reference Area Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

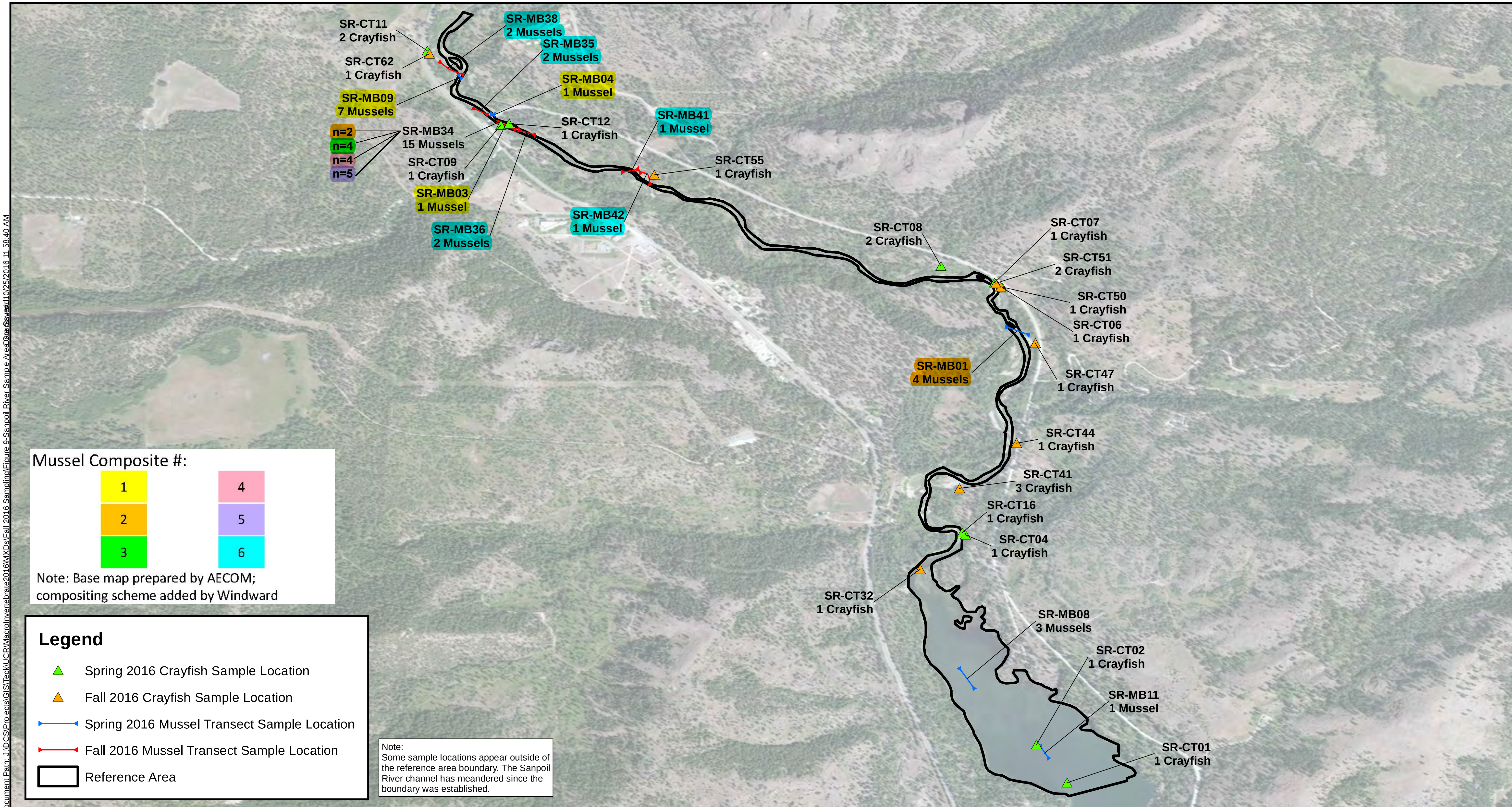

Figure 8 - Mussels

AECOM

0 1,000 2,000 Feet

0 500 1,000 Meters

N

Sanpoil River Reference Area Results
Teck American Incorporated
2016 Macroinvertebrate Tissue Study

Kessel Cristy SPOK

From:	McCaig Kris SPOK
Sent:	Thursday, November 3, 2016 2:03 PM
To:	Dustan Bott (Bott.Dustan@epa.gov)
Cc:	John Toll; Berit Bergquist (BeritB@windwardenv.com); Kate McPeek; Nancy Judd (NancyJ@windwardenv.com); Jennifer Pretare (Jennifer.Pretare@aecom.com); Kessel Cristy SPOK; Enos Dave SPOK; Dina Johnson (DLJohnson@ramboll.com)
Subject:	RE: Draft Final BMI Compositing Workbook and Maps
Attachments:	11-03-16_BMI Study_Draft Final BMI compositing process summary_DBott.pdf

Hi Dustan,

Per your request, please see the attached summary of the process and details of the draft final BMI compositing plan submitted to EPA las Thursday October 27, 2016. Let me know if you have questions.

Thanks,

Kris

Kris McCaig
Manager, Environment & Public Affairs
Teck American Incorporated
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From: McCaig Kris SPOK
Sent: Thursday, October 27, 2016 5:39 PM
To: Dustan Bott (Bott.Dustan@epa.gov) <Bott.Dustan@epa.gov>
Cc: John Toll <JohnT@windwardenv.com>; Berit Bergquist (BeritB@windwardenv.com) <BeritB@windwardenv.com>; Kate McPeek <katem@windwardenv.com>; Nancy Judd (NancyJ@windwardenv.com) <NancyJ@windwardenv.com>; Jennifer Pretare (Jennifer.Pretare@aecom.com) <Jennifer.Pretare@aecom.com>; Kessel Cristy SPOK <Cristy.Kessel@teck.com>; Enos Dave SPOK <Dave.Enos@teck.com>; Dina Johnson (DLJohnson@ramboll.com) <DLJohnson@ramboll.com>
Subject: FW: Draft Final BMI Compositing Workbook and Maps

Hi Dustan,

Please see the attached files and the notes below from Berit for review. If it would be helpful for us to give an overview to you and others that will be reviewing the plan we would be happy to have a call. Possible dates/times next week for an hour meeting are:

Tuesday 11/1 between 9:00 and 11:00 a.m.
Wednesday 11/2 from 11:00 a.m. to 12:00 p.m.
Thursday 11/3 between 1:00 and 3:00 p.m.

We look forward to working with you to finalize the plan and getting the labs started on processing and anlysis.

Thanks,

Kris

Kris McCaig
Manager, Environment & Public Affairs
Teck American Incorporated
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From: Berit Bergquist [mailto:BeritB@windwardenv.com]
Sent: Wednesday, October 26, 2016 4:13 PM
To: McCaig Kris SPOK <Kris.McCaig@teck.com>
Cc: Pretare, Jennifer <jennifer.pretare@aecom.com>; Kate McPeek <katem@windwardenv.com>; Nancy Judd <NancyJ@windwardenv.com>; John Toll <JohnT@windwardenv.com>; Kessel Cristy SPOK <Cristy.Kessel@teck.com>
Subject: UCR: Draft Final BMI Compositing Workbook and Maps

Hi Kris,

Attached is a draft version of the final BMI compositing Excel workbook ready to send to EPA. Also attached are maps showing the locations where live organisms were collected in both spring and fall. On a subset of the maps, the locations have been color-coded to facilitate understanding of compositing among different locations. Here are a few notes about the Excel workbook and maps:

- The workbook includes: 1) an “Overall Summary” spreadsheet with the total number of composites per area, 2) “Crayfish Composite Summary” and “Mussel Composite Summary” spreadsheets which summarize the numbers of organisms per composite, tissue mass available for analysis for each composite, and potential and/or designated QC samples, and 3) “Crayfish Composites” and “Mussel Composites” spreadsheets with organism-specific information ordered by proposed composite number. Also included are spreadsheets with raw field data for crayfish, mussels, and clams.
- Codes have not yet been assigned to the composite IDs to identify QC samples; this will be completed once the plan and selected QC samples have been agreed upon.
- We have indicated where EPA splits are possible in the “Crayfish Composite Summary” and “Mussel Composite Summary” spreadsheets, but for now we have left the selection of those samples up to EPA.
- The maps include only those locations where live organisms were collected, because no dead organisms are proposed for chemical analysis. The only exception is location (A1-CT61), which is included on Figure 1 because one half-dead crayfish was collected there. We are not proposing that this crayfish be analyzed, but the location is presented on the map for EPA’s review of the proposal to exclude this organism.

Please let me know if you have any questions.

Berit

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UCR Crayfish and Mussel Compositing Approach 11/3/16

TAI prepared a draft compositing plan for crayfish and mussels collected from the UCR in the spring and fall of 2016, as presented in a workbook and maps submitted to EPA by email on October 27, 2016. This text has been prepared to accompany the workbook and maps in order to describe the general approach for the compositing scheme, and to explain the specific approach for each area and tissue type.

General Approach

The general approach for the proposed final compositing plan is consistent with the approach for the interim compositing plan, which was submitted by TAI to EPA on June 18, 2016, and revised by EPA on July 22, 2016. The interim compositing plan included the following approach components:

- Only live organisms were proposed for analysis.
- Crayfish composites were separated by species when both northern and signal crayfish were collected from the same area.
- Organisms were grouped together spatially as much as possible.
- Organism weights were distributed evenly among composites.

The proposed final compositing plan does not change spring composites, except for cases wherein a) additional organisms from fall were added because there was only one spring organism, b) additional mass was needed for analytical requirements, or in some cases, c) additional sample mass was available from the fall (even if it was not required). In several cases, two or more spring composites containing only one or two organisms each were combined into a single composite, because additional sample mass was available from the fall to create more composites.

The interim compositing plan included a preference to keep organisms from the delayed cooler together in the same composites, and also to keep crayfish collected with cat food bait together in the same composites. These variables are not relevant for the fall samples; however, as noted above, the spring sampling scheme incorporating these preferences was kept where possible.

Crayfish Samples

The following subsections describe the compositing scheme for crayfish collected from each of the areas.

Area 1

- Archived: one half-dead organism collected in fall
- No other crayfish collected

Area 2

- Composite 1: contains only organisms from spring; unchanged from interim plan
- Composite 2: three fall signal crayfish composited with three spring signal crayfish to keep the same species in one composite
- Composites 3–6: all contain fall organisms; composites grouped spatially

Area 3

- Composites 1–4: fall organisms added to each of the spring composites that contained only one organism; composites grouped spatially
- Composites 5 and 6: contain only fall organisms; grouped spatially

Area 4

- Composite 1: contains one spring crayfish and three fall crayfish
- Composite 2: contains only fall crayfish from CT31
- Composites 3–6: contain remaining two fall crayfish from CT31 and fall crayfish from CT34, CT35, and CT36 (all in the same embayment)
- Archived organisms: 1 spring crayfish from CT04 was previously proposed for analysis; now proposed to be archived because it was collected using cat food bait and sufficient tissue was otherwise available, and two spring crayfish that were dead when collected

Area 5

- All organisms from spring; compositing scheme unchanged from the interim plan
- Composites 4–6: organisms were in delayed cooler; grouped spatially
- Composite 3: two signal crayfish grouped together
- Composites 1 and 2: distributed to obtain sufficient mass in each composite

Area 6

- All organisms from spring; compositing scheme unchanged from the interim plan
- Per the interim plan, crayfish were distributed among composites for spatial grouping, although some reorganizing was needed so that samples had sufficient mass and more than one organism.

Buffalo Lake[1]

- All organisms from spring; compositing scheme unchanged from the interim plan
- Composites 1–6: organisms from the same traps kept together
- Archived: all organisms caught with cat food bait, plus organisms from locations with small numbers of samples

Sanpoil River

- Composite 1: all fall crayfish; all from CT41
- Composite 2: one fall crayfish from CT32 added to spring composite; similar locations
- Composites 3 and 4: spring composites unchanged from interim plan; grouped spatially if possible
- Composite 5: all signal crayfish; three from spring and three from fall
- Composite 6: all fall organisms; spatially grouped
- Archived: organisms from CT01 and CT02; organisms were from the lower Sanpoil River, considered by EPA possibly to be within site influence

MUSSEL SAMPLES

The following subsections describe the compositing scheme for mussels collected from each of the areas.

Area 1

- Composites 1 and 2: all spring mussels from MB05; all mussels were in delayed cooler; unchanged from interim plan except that former Composites 2 and 3 combined as Composite 2
- Composites 3–6: all fall mussels from MB43; distributed evenly by weight among all four composites

Area 2

- All organisms from spring; compositing scheme unchanged from the interim plan
- Composite 1: all mussels from MB04; one added from MB05 for sufficient mass
- Composites 2 and 3: all organisms from MB05
- Composites 4–6: all organisms from MB06

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[1] Note that crayfish samples collected from Buffalo Lake were given the sample identifier “RL”.

- Archived: one mussel from outlier location not needed to obtain sufficient mass and eight crayfish that were dead when collected

Area 3

- Composite 1: all spring organisms; unchanged from interim plan; MB01 and MB04 grouped together
- Composite 2: three spring organisms from MB06; two fall organisms from MB14 added to obtain sufficient mass
- Composites 3–6: all fall organisms from MB14
- Archived: one small spring mussel from outlier location and four spring mussels that were dead when collected

Area 4

- Composites 1–3: all fall mussels from MB18
- Composites 4–6: all fall mussels from MB19
- Archived four spring mussels that were dead when collected

Area 5

- Composites 1–3: all fall mussels from MB21
- Composite 4: all fall mussels from MB22
- Composite 5: all fall mussels from MB24 plus two from MB23 (northernmost dive location)
- Composite 6: all fall mussels from MB24
- Archived 1 spring mussel that was dead when collected and was in the delayed cooler

Area 6

- Composite 1: all spring mussels; unchanged from interim plan
- Composite 2: all spring mussels plus two from fall to obtain sufficient mass
- Composites 3–6: all fall mussels grouped by area
- Archived: five spring mussels from delayed cooler (sufficient mass was obtained in fall sampling) and 21 spring mussels that were dead when collected, two of which were in the delayed

Sanpoil

- Composite 1: all spring mussels; grouped spatially; unchanged from interim plan

- Composite 2: four spring mussels from MB01 plus two fall mussels from MB34 to obtain sufficient mass
- Composites 3–5: all fall mussels from MB34
- Composite 6: remaining fall mussels from MB35, MB36, MB38, MB41, and MB42
- Archived: organisms from MB08 and MB11; organisms were from the lower Sanpoil River, considered by EPA possibly to be within site influence

Section 4:
EPA’s response dated 12/21/16

McCaig Kris SPOK

From:	Buelow, Laura <Buelow.Laura@epa.gov>
Sent:	Wednesday, December 21, 2016 11:55 AM
To:	McCaig Kris SPOK
Cc:	Marilyn Gauthier (Marilyn.Gauthier@ch2m.com); Shaun.Roark@ch2m.com; Stifelman, Marc; thayer@srcinc.com; Cerise, Kathryn
Subject:	Benthic invert memo
Attachments:	BMI Compositing Recommendations.pdf; CP memo Figures.pdf; Att 2 BMI Mussels Compositing Preferred EPA Options.xlsx; Att 1 BMI Crayfish Compositing Preferred EPA Options.xlsx

Kris,

Please see the attached memo describing how we developed the composites for the BMI study. We also have been discussing our other 2 action items.

Our initial thought is that the reference locations may be useful for the BERA, however we are still working on a write up for that. It won't be to you until the new year.

For the human health analysis of Corbicula, we believe since we don't have data to say otherwise, we should err on the side of inclusion and analyze the composite for all HH analytes.

Just to let you know my schedule, I will be in through Friday morning and then out of the office until January 4.

Laura Buelow, Ph.D.
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TECHNICAL MEMORANDUM

Explanation of Recommended Benthic Macroinvertebrate Compositing Plan

PREPARED FOR:	Laura Buelow/EPA Marc Stifelman/EPA
PREPARED BY:	Shaun Roark/CH2M Rachel Zajac-Fay/CH2M
DATE:	December 21, 2016

This memorandum presents the rationale for EPA's suggested compositing of individual crayfish and mussels collected from the Upper Columbia River (UCR) Site in spring and fall of 2016.

Background

Crayfish and mussels were collected from the UCR by Tech American Inc. (TAI), in spring and fall of 2016. Sampling was conducted in accordance with the Final Quality Assurance Project Plan for Macroinvertebrate Tissue Study (TAI, 2016a) and the Final Quality Assurance Project Plan for Macroinvertebrate Tissue Study Addendum No. 1 (TAI, 2016b). During the course of the two sampling efforts, mussels were collected from seven sampling areas, including six areas on the UCR (Areas 1 through 6) and one reference location (the Sanpoil River). Crayfish were collected from seven sampling locations, which included five areas on the UCR (Areas 2 through 6) and two reference locations (the Sanpoil River and Buffalo Lake). A single crayfish was collected from Area 1, but was of insufficient size for chemical analysis. Mussels and crayfish were collected opportunistically with regard to size and species.

Following completion of the second round of macroinvertebrate sampling, TAI developed a draft compositing plan (spreadsheet transmitted October 26, 2016) following discussions with EPA and the Participating Parties. In the TAI draft plan, crayfish and mussels were placed into composites by species (i.e., mixed-species composites were avoided). All proposed composites had multiple individuals, and individuals that were dead or were from delayed shipment coolers were not included in composite, but were to be archived. In most cases, crayfish and mussels were grouped based on proximity within each area; those with sufficient mass were identified for splits and those with sufficient mass and quantity were identified for field replicates. Both crayfish and mussel composites proposed by TAI appeared to be random or possibly uniform with respect to the mass of each individual; composites of insufficient mass for analysis were avoided. Due to prioritizing of compositing by proximity, there were substantial differences in size distribution among mussel composites within and among areas.

After recognizing the wide variation in size for both mussels and crayfish composites, EPA was interested in exploring the possibility of stratifying by size. The presence of a strong size/concentration relationship could complicate interpretation of analytical results if all individuals were composited randomly with regard to size, given the large size range of individuals collected. EPA (2000) guidance on compositing samples for chemical analyses, which is used to establish fish consumption advisories, recommends against having large size discrepancies of individuals within composites.

Although there is not currently any information about size preference for human consumption of mussels or crayfish from the UCR, and EPA recognizes that the sample collections were not designed to assess the size/concentration relationships, potential information about a correlation between size and contaminant concentrations may be valuable. Using size-based composites, rather than random composites, could require consideration of size when calculating the exposure concentrations for humans and wildlife. This will be possible by using a size-weighted average. Similar considerations could be needed for the compositing initially proposed by TAI, because these composites were not necessarily random with respect to size, and were non-random with respect to proximity.

After discussing with the Participating Parties, EPA is recommending TAI consider the compositing options in Attachments 1 and 2, which are explained below.

Compositing Considerations

Size Stratification

Histograms of crayfish mass and mussel mass and shell length were evaluated to compare size distributions among areas, to determine if there was evidence of size classes other apparent size breaks for either taxon, and to identify a break-point that could be used to divide each taxon in to two size classes, as described below:

- Crayfish - The median and mean mass for crayfish across all areas were 28 and 32 grams (g). Either value could have been selected as the break-point for the two size classes, but because a larger number of small individuals are needed to meet the same mass requirements for chemical analyses, a value greater than the median and mean was desirable. Based on review of the histograms for crayfish weight in each collection area (Figures 1), the value of 38 g was selected as a point that would split individuals in each area into two size classes with a sufficient number individuals for at least one composite sample from each size class.

  Using this approach for crayfish, the size classes are the same for each area. However, because the actual sizes of individuals (e.g., mean) in each size class is variable, comparisons of concentrations within or among areas for either size class could be misleading. That is, comparisons of concentrations among areas may still need to consider average size of individuals in each sample.

- Mussels - Initially for mussels, an approach similar to that described above for mussels was used to identify size classes. However, there was a greater difference in size distributions among mussels, and no single mass or length would result in two size classes in each area with sufficient mass for at least one composite sample from each size class. Therefore, area-specific size classes were developed using the median value as a starting point for the size-break, and adjusted as necessary to achieve six representative composites of sufficient mass. Because there was some concern that the estimated mass for very small mussels might be an unreliable estimate of dry weight, due to water content when collected, mussel shell length was used to establish the size categories (Figures 2 through 4).

Once crayfish and mussels were separated by size classes (or in some cases other factors, discussed below), all individuals within that size class were randomly assigned to composite samples using the following process in Microsoft Excel:

1. The “rand()” function was used to generate a random number between 0 and 1 for each individual sample in each cell in a column adjacent to the mussel or crayfish sample.
2. The sample group to be randomize (e.g., all individuals in a size class) was selected, and sorted in the order of the random numbers, low to high. This process re-orders the data in the random sequence, based on the random numbers.

3. Individuals were then assigned to composites by grouping adjacent samples (rows) so that each composite met minimum mass requirements and the number of individuals was approximately evenly divided among composites.

In some cases, the randomization process resulted in a sequence of individuals that was not conducive to creating composites that met mass requirements. It these instances, the randomization process was repeated.

Additional Factors

The following factors were considered, in addition to size, in assigning individual organisms into composite samples.

- Species – Single-species composites were used (e.g., signal crayfish only or northern crayfish only) unless otherwise noted.
- Season – No specific attempt was made to composite species collected in fall separately from those collected in spring; in some cases stratification by size- and/or area- resulted in separation by season.
- Live or Dead – Organisms identified as “dead” were not included in composites.
- Bait – Crayfish captured using all bait types, including cat food, were included in the composites. Compositing was random with respect to bait type. There has been some concern voiced about the unknown chemistry of the cat food. However, due to the type of bait canisters used, crayfish were not able to consume cat food. If crayfish caught in cat food-baited traps were not included for analysis, six individuals, including two female crayfish with eggs, would be excluded.
- Eggs – Female crayfish with eggs were included in composites. The eggs should be analyzed with the edible portion. Both humans and ecological receptors may consume the eggs.
- Delayed cooler – Organisms that were in the delayed coolers, which were received at the laboratory with elevated temperatures, were composited separately from other samples, if possible.
- Single-organism samples – This was avoided if possible. However, use of single-organism samples was necessary at some locations to obtain six composite samples and still meet targets for size and other factors.

Recommended Composites

Crayfish

This section provide details of the compositing approach used for crayfish in each Area. Individual crayfish mass in each composite is depicted in Figure 5.

Area 2

Crayfish were divided into two size classes, equal to or less than 38 g, and greater than 38 g. The larger crayfish were also categorized by species. Weights ranged between 4 and 89 g. Twenty crayfish equal to or less than 38 g were divided into three composite samples. Ten crayfish greater than 38 g were divided into three composite samples. Two of these composite samples are northern species, and one composite is signal species. The remaining signal crayfish weighs 36 g, and would be too small for a single organism sample.

Area 3

Crayfish were divided into two size classes, equal to or less than 38 g, and greater than 38 g and also by two areas, north and south. Weights ranged between 1 and 55 g.

Nine crayfish were collected from north locations. Two of these crayfish are in one composite, and are greater than 38 g. Seven crayfish equal to or less than 38 g are in a second composite.

Eighteen crayfish were collected from south locations. Only one crayfish from this area was larger than 38 g, and is a single organism sample. The remaining seventeen crayfish are all equal to or less than 38 g, and are split between three composite samples.

Area 4

Crayfish were divided into two size classes, equal to or less than 38 g, and greater than 38 g. Weights ranged between 3.1 and 105 g. Sixteen crayfish equal to or less than 30 g were split into three composite samples. Fourteen crayfish greater than 38 g were split into three composites. One crayfish, CT4-CR04-CR01, was caught in a trap that used cat food as bait.

Area 5

Crayfish were divided into two size classes (equal to or less than 38 g, and greater than 38 g), by species, and crayfish from delayed coolers were kept together. This resulted in one composite sample for northern crayfish that were equal to or less than 38 g (not delayed). All remaining crayfish were greater than 38 g. There were two single organism samples necessary due to accommodating composites of different species and delayed coolers. Four northern crayfish from delayed coolers were split into two composites.

Crayfish A5-CT15-CR02 was excluded from the composite samples, as this was the only crayfish in the smaller size class that was in a delayed cooler. At 27 g, it would be too small for analysis.

Area 6

Crayfish were divided into two size classes (equal to or less than 38 g, and greater than 38 g) and also by area (east and west portions of Area 6). Weights ranged between 9 and 62 g.

Twelve crayfish were collected from the east area. Four crayfish were less than or equal 38 g, and are one composite sample. The remaining eight crayfish are greater than 38 g and were split into three composite samples.

Eight crayfish were collected from the west area. Six crayfish were less than or equal 38 g, and are one composite sample. Two crayfish greater than 38 g are one composite sample.

Buffalo Lake

Crayfish were divided into two size classes (equal to or less than 38 g, and greater than 38 g). Weights ranged between 3 and 57 g. Thirty-six crayfish weighing equal to or less than 38 g were split into three composite samples. Sixteen crayfish greater than 38 g were split into three composites. Crayfish collected from traps with cat food bait are included in these composites.

Sanpoil River

Crayfish were divided into two size classes (equal to or less than 38 g, and greater than 38 g) and by species. Six signal crayfish that were less than 38 g are one composite, and seven northern crayfish less than 38 g are split into two composites. Seven northern crayfish greater than 38 g are split into three composite samples.

Crayfish collected from traps CT01, CT02, and CT32 were not included in composite samples, as these were collected from locations that fall within the influence of the reservoir.

Mussels

Individual mussel mass and length in each composite is depicted in Figures 6 and 7, respectively.

Area 1

At Area 1, mussel composites were first separated spatially and then stratified by size. The spatial areas were Dead Man's Eddy (DME), where all mussels were collected by divers in the fall, and Northport, where all mussels were collected during beach surveys in the spring.

The mussels collected from Northport ranged between 22.4 and 78.6 millimeters (mm). These were split at 48 mm, with mussels between 22.4 and 46.5 mm in length being in one composite, and mussels between 48.8 and 78.6 mm in length being placed in a separate composite.

The mussels collected from DME ranged between 7.5 and 21 mm. These were split at the median, with mussels less than 70 mm split between two composites, and mussels greater than 70 mm split between two composites. The individual mussels in these size classes were randomly assigned in composites using the method described in the Compositing Considerations section of this memo.

Area 2

In Area 2, the mussel composites were stratified by two size classes. Mussel length ranged between 27 and 87.5 mm, with a median of 68 mm. Twenty-seven mussels that were less than 68 mm in length were split between three composite samples, and 27 that were greater than 68 mm in length were split between three composite samples.

Mussel A2-MB01-MU-01 was not included in a composite sample under TAI's plan and was listed as "archive;" this mussel was included in a composite in EPA's recommendation.

Area 3

In Area 3, the mussels were divided based on two size classes. Mussel length ranged between 21 and 93 mm, with a median of 53 mm. Fifteen individual mussels that were less than 53 mm in length were split between three composite samples. Sixteen individual mussels that were greater than 53 mm in length were split between three composite samples.

Mussel A3-MB13-MU-02 was not included in a composite sample under TAI's plan and was listed as "archive;" this mussel was added into a composite in EPA's recommendation.

Area 4

In Area 4, mussel composites were first separated spatially and then stratified by size. The spatial areas were north (MB18) and south (MB19).

In the north area, mussels ranged in length between 67 and 88 mm, with the median falling at 75 mm. However, 75 mm could not be used to create evenly divided samples; therefore 76 mm was chosen as the midpoint. One composite was created for mussels that were less than 76 mm in length, and one composite was created for mussels greater than 76 mm in length.

In the southern area, mussels ranged in length between 55 and 82 mm, with the median at 70 mm. Mussels less than 70 mm in length were split into two composites, and mussels 70 mm or greater were split into two composites.

Area 5

In Area 5, the mussels were divided based on two size classes. Mussel length ranged between 40 and 80 mm, with a midpoint of 59 mm. Nineteen individual mussels that were less than or equal to 59 mm in length were split between three composite samples. Seventeen individual mussels that were greater than 59 mm in length were split between three composite samples.

Area 6

In Area 6, mussels were divided into two size classes, which also aligned with two spatial areas. The spatial areas were those collected by divers and by beach surveys. Mussel length ranged between 3 and 64 mm.

The beach area mussels all have mussels equal to or less than 40 mm. Fifty-six mussels were split into two composite samples. Five mussels in one of these composites were part of the delayed cooler shipment. Dive area mussels were all greater than 40 mm in length. Twenty-five mussels were split into three composites.

All 51 Corbicula clams we placed into one composite. These clams may be consumed by humans. With compositing by size and by cooler shipment, if Corbicula were not included, there would only be enough mass for five composite samples of mussels. To obtain six composites of only mussels (not including Corbicula), the samples could be completely randomized—not stratified by size or area. EPA's recommended approach to include the corbicula and stratification by size and area is a more informative approach.

Sanpoil River

Mussels were divided into two class sizes, equal to or less than 60 mm and greater than 60 mm in length. Twenty-six mussels equal to or less than 60 mm were split into three composites. Ten mussels greater than 60 mm in length were split into three composites.

Mussels collected from beach survey locations SR-MB08 (four mussels) and SR-MB11 (one mussel) were not included in the composite samples, as these are from locations that may be influenced by the reservoir and may not be representative of riverine conditions. If reservoir mussels (and crayfish) naturally accumulate more or less metals or other contaminants than river-dwelling organisms, then the background estimate could be biased low or high.

References

United States Environmental Protection Agency (EPA) (). 2000. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1, Fish Sampling and Analysis, Third Edition. Office of Science and Technology, Office of Water, Washington, DC. EPA 823-B-00-007.

Teck American Inc. (TAI). 2016a. Final Upper Columbia River Quality Assurance Project Plan for the Macroinvertebrate Tissue Study. Prepared by Exponent and HDR.

Teck American Inc. (TAI). 2016b. Final Upper Columbia River Quality Assurance Project Plan for the Macroinvertebrate Tissue Study, Addendum No. 1. Prepared by Windward.

Figures

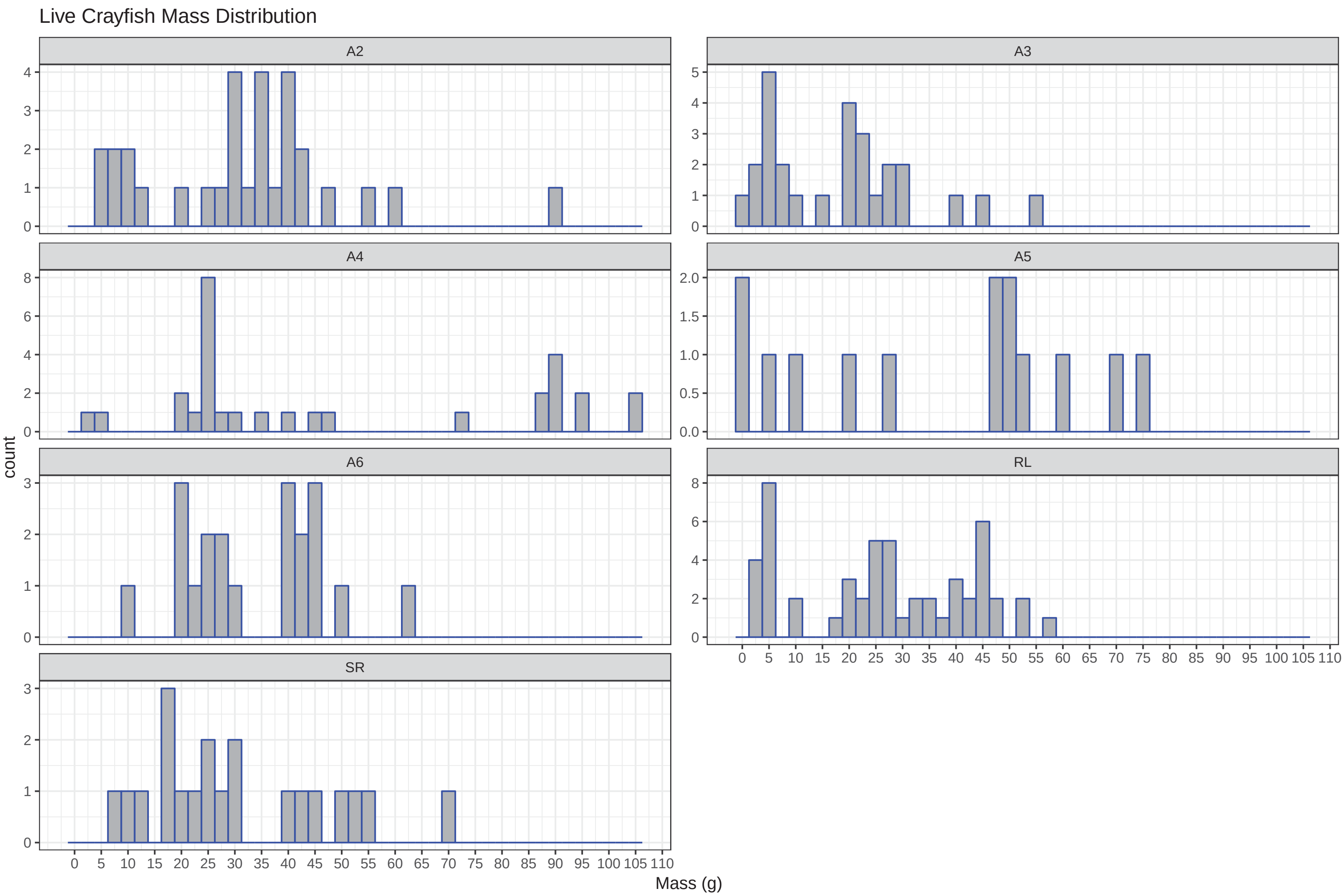

Figure 1. Histograms of crayfish mass (g) in each sampling area on the Upper Columbia River.
A2 = Area 2, A3 = Area 3, A4 = Area 4, A5 = Area 5, A6 = Area 6,
RL = Buffalo Lake, SR = Sanpoil River

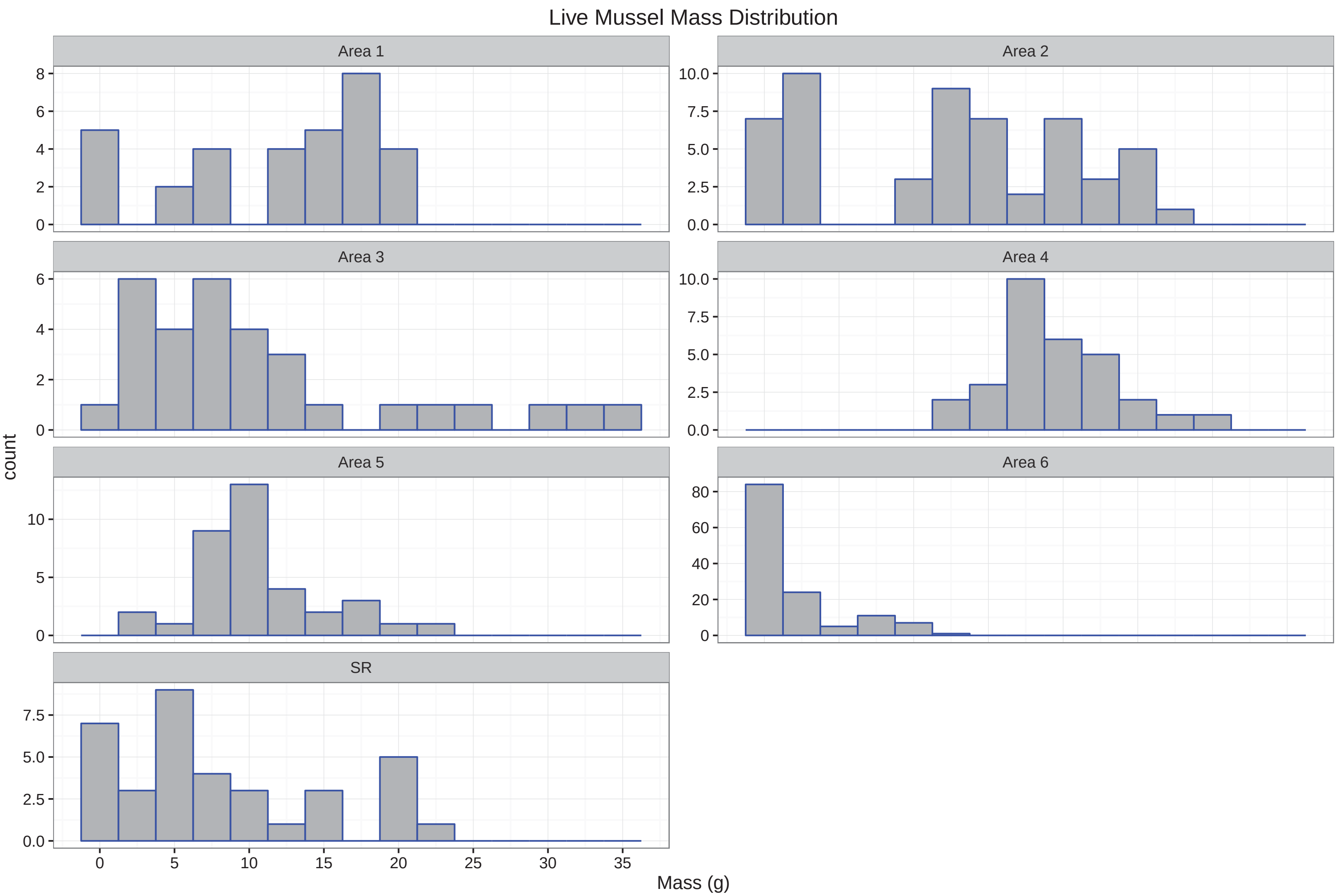

Figure 2. Histograms of mussel mass (g) in each sampling area on the Upper Columbia River.
RL = Buffalo Lake, SR = Sanpoil River

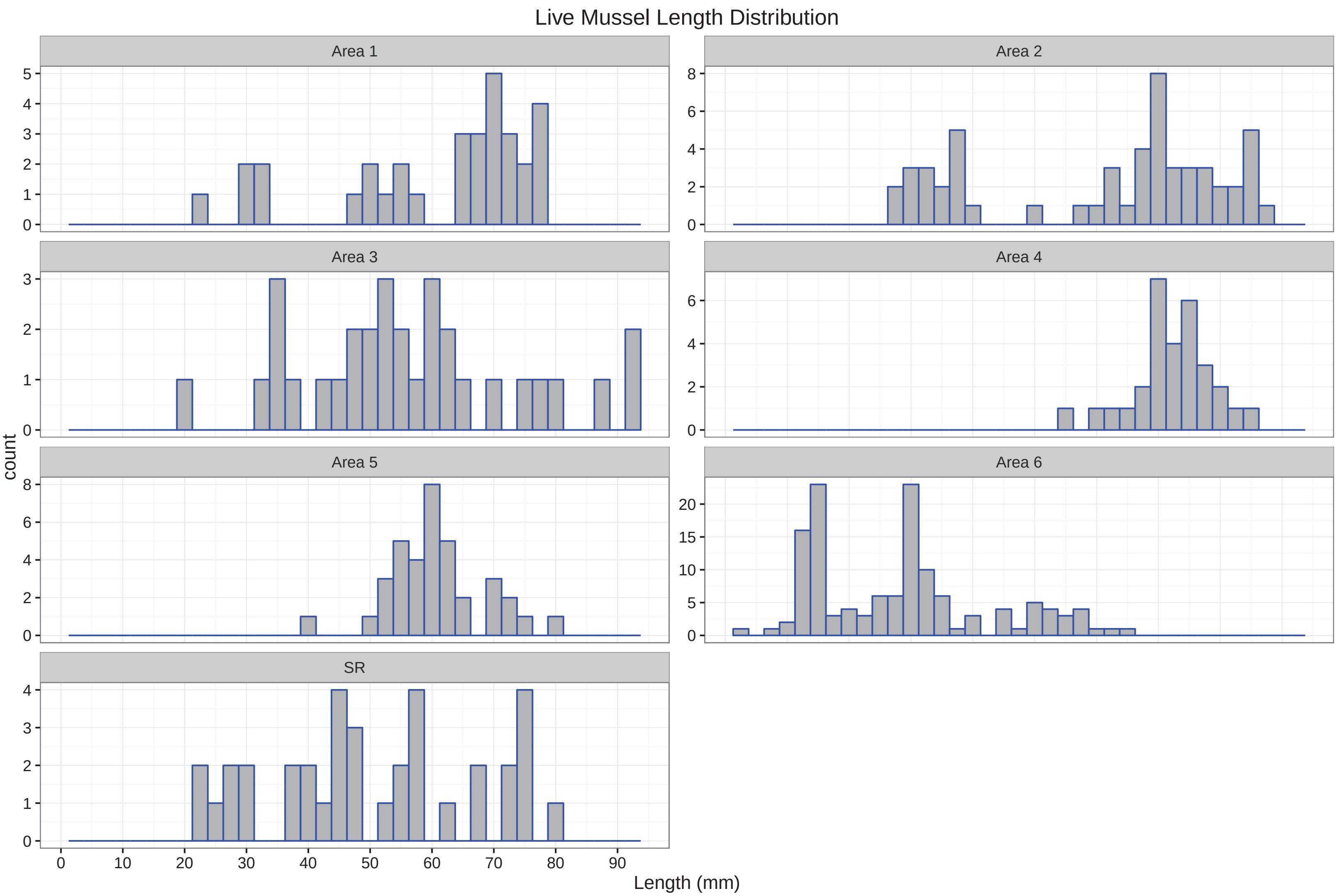

Figure 3. Histograms of mussel length (mm) in each sampling area on the Upper Columbia River.
RL = Buffalo Lake, SR = Sanpoil River

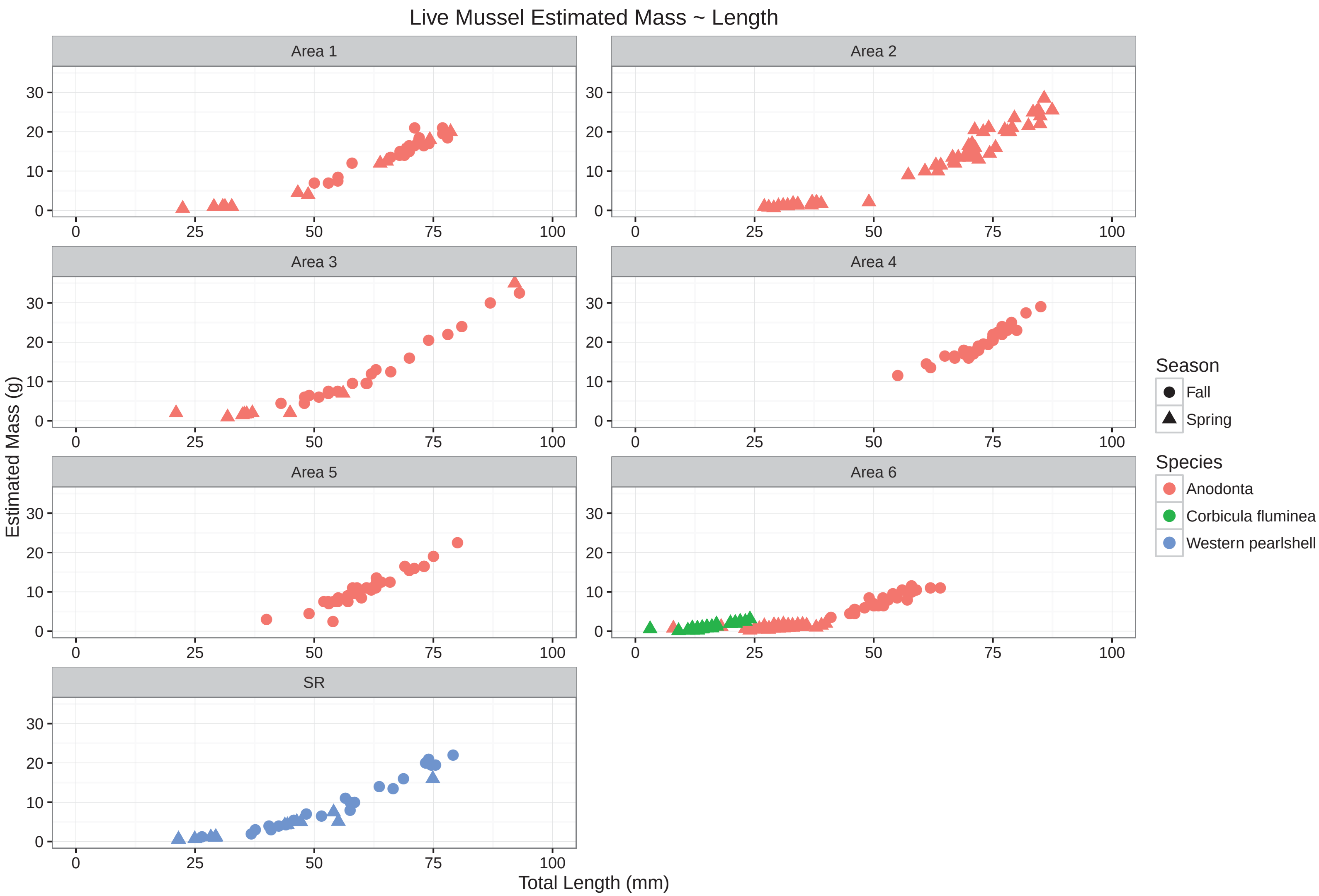

Figure 4. Scatterplots of estimated mass (g) and measured mussel length (mm) of mussels in each sampling area on the Upper Columbia River.
RL = Buffalo Lake, SR = Sanpoil River

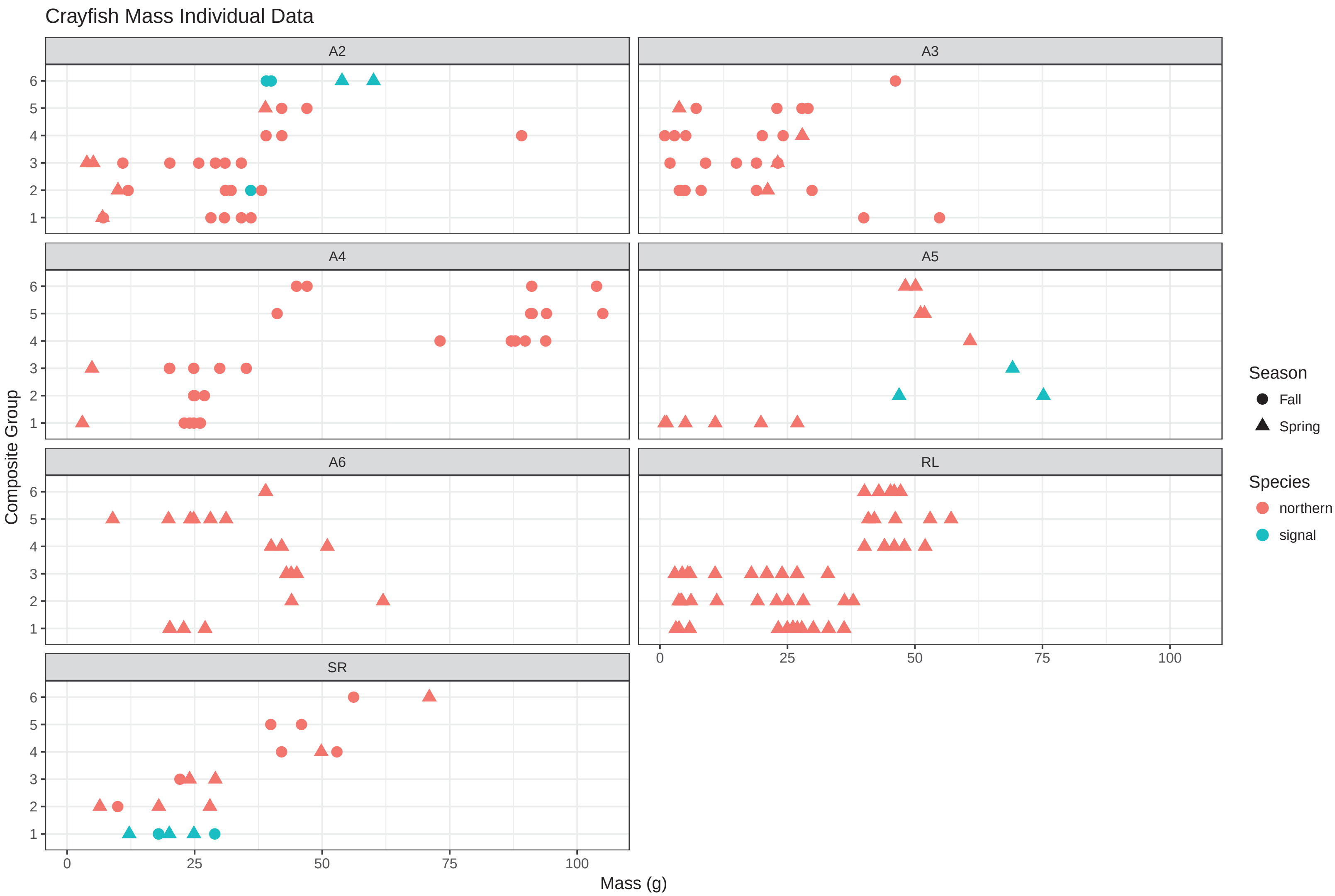

Figure 5. Mass (g) of individual crayfish in each proposed composite in each sampling area on the Upper Columbia River.
A2 = Area 2, A3 = Area 3, A4 = Area 4, A5 = Area 5, A6 = Area 6,
RL = Buffalo Lake, SR = Sanpoil River

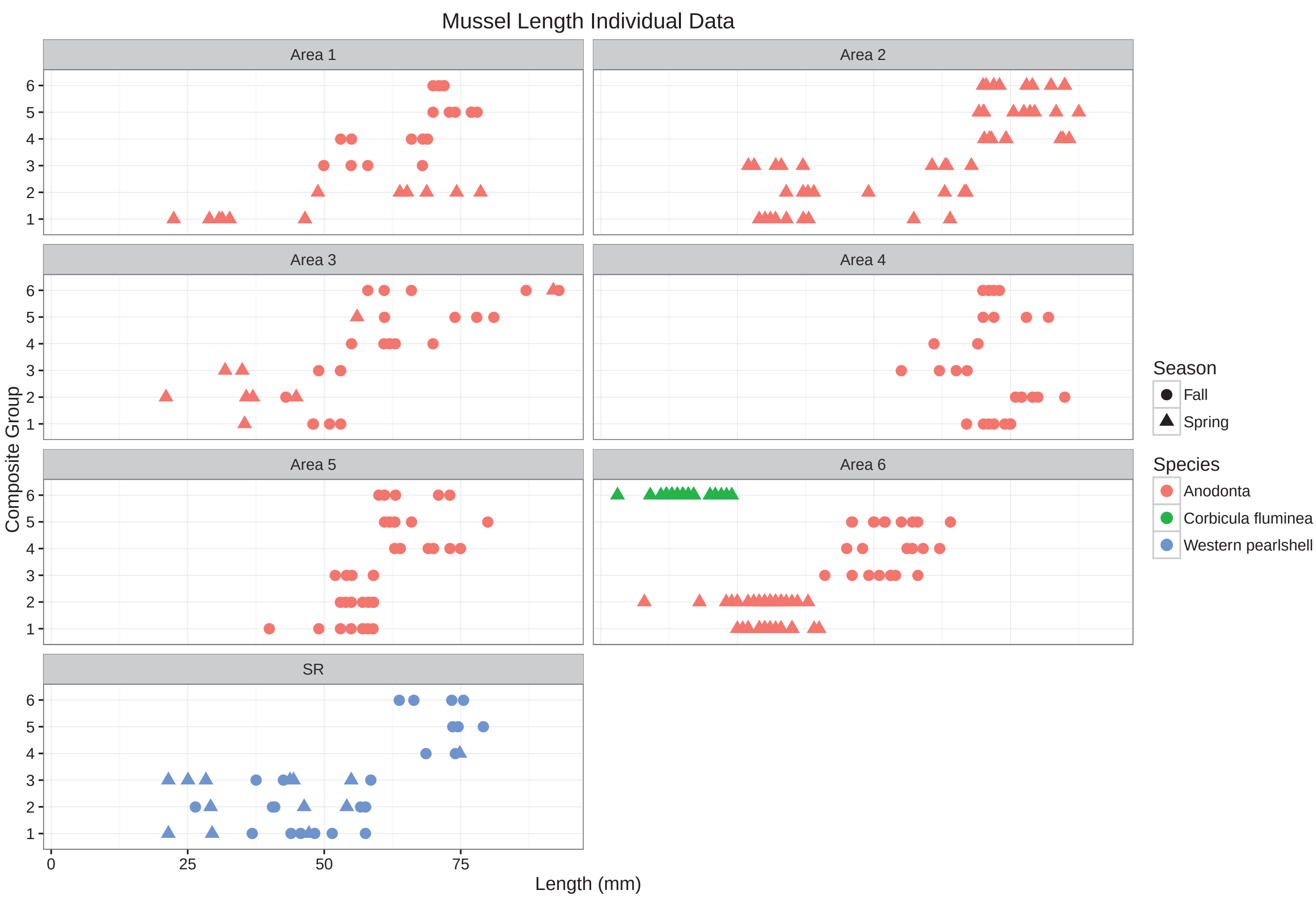

Figure 6. Graphs of individual mussel length (mm) in each proposed composite sample in each sampling area on the Upper Columbia River.
RL = Buffalo Lake, SR = Sanpoil River

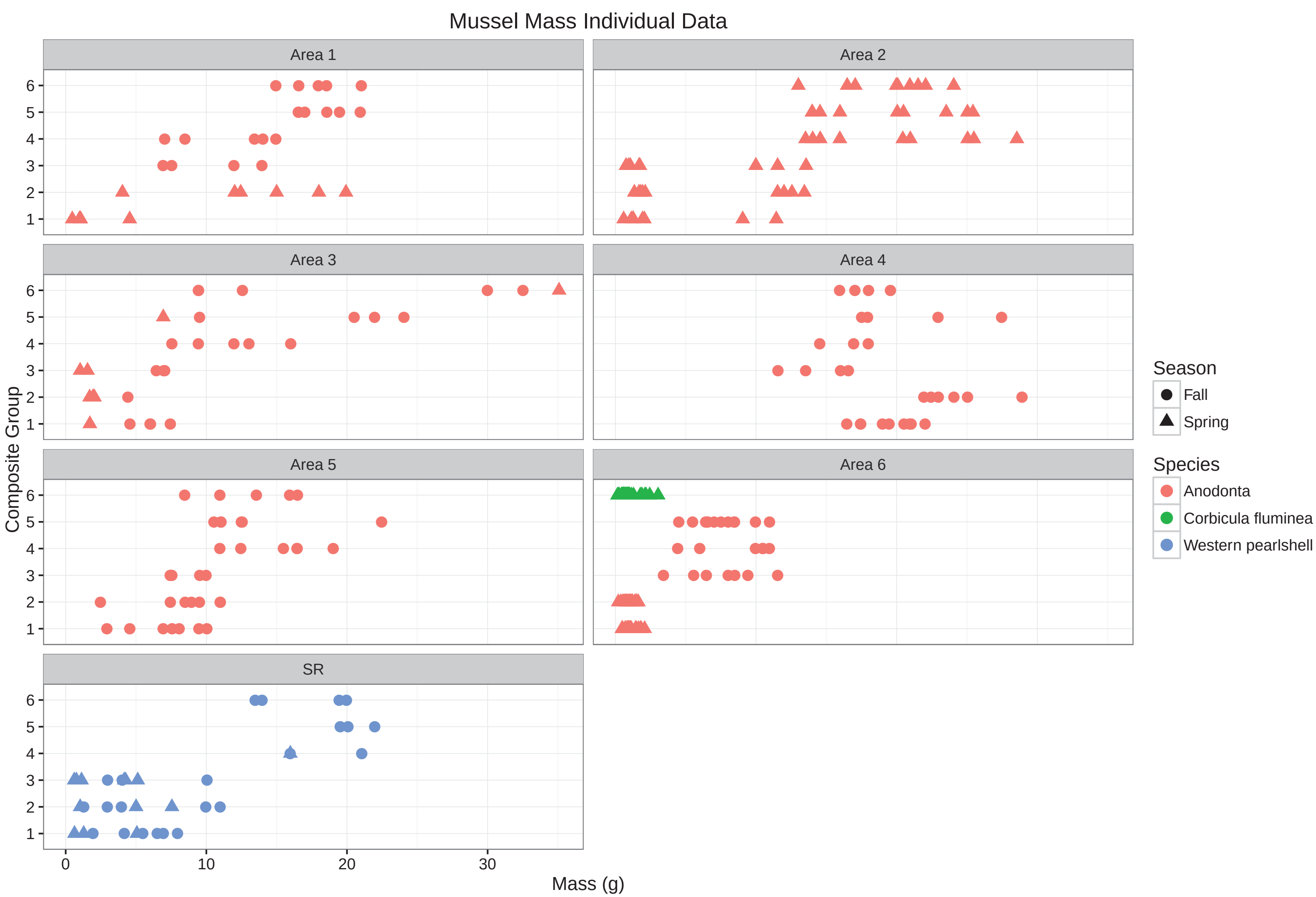

Figure 7. Graphs of individual mussel mass (g) in each proposed composite sample in each sampling area on the Upper Columbia River.
RL = Buffalo Lake, SR = Sanpoil River

Attachment 1
Crayfish Compositing Options

Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Weight (g)	Bait	Delayed Cooler Sample?	Size Class (g)	Composite Number	Sample Mass	Recommended Analyses	Sufficient mass for BERA and HHRA? (60 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (120 g)	Comments
EPA Preferred Option - Two size classes: ≤ 38 g and >38 g and separate species in the >38 g size class.															
A2	F	A2-CT31-CR-03	A2-CT31	northern crayfish	Live	7	Salmon	No	≤38	1	143	all HHRA and BERA analytes	Yes	Yes	
A2	S	A2-CT10-CR-01	A2-CT10	northern crayfish	Live	7	Chicken	No	≤38						
A2	F	A2-CT45-CR-01	A2-CT45	northern crayfish	Live	31	Salmon	No	≤38						
A2	F	A2-CT46-CR-01	A2-CT46	northern crayfish	Live	36	Salmon	No	≤38						
A2	F	A2-CT48-CR-01	A2-CT48	northern crayfish	Live	34	Salmon	No	≤38						
A2	F	A2-CT34-CR-01	A2-CT34	northern crayfish	Live	28	Salmon	No	≤38						
A2	F	A2-CT45-CR-04	A2-CT45	signal crayfish	Live	36	Salmon	No	≤38	2	159	all HHRA and BERA analytes	Yes	Yes	
A2	F	A2-CT54-CR-02	A2-CT54	northern crayfish	Live	38	Salmon	No	≤38						
A2	F	A2-CT31-CR-02	A2-CT31	northern crayfish	Live	32	Salmon	No	≤38						
A2	F	A2-CT48-CR-03	A2-CT48	northern crayfish	Live	31	Salmon	No	≤38						
A2	S	A2-CT13-CR-01	A2-CT13	northern crayfish	Live	10	None	No	≤38						
A2	F	A2-CT32-CR-01	A2-CT32	northern crayfish	Live	12	Salmon	No	≤38						
A2	F	A2-CT62-CR-01	A2-CT62	northern crayfish	Live	34	Salmon	No	≤38	3	160	all HHRA and BERA analytes	Yes	Yes	
A2	F	A2-CT56-CR-01	A2-CT56	northern crayfish	Live	26	Salmon	No	≤38						
A2	S	A2-CT01-CR-01	A2-CT01	northern crayfish	Live	4	Chicken	No	≤38						
A2	F	A2-CT40-CR-01	A2-CT40	northern crayfish	Live	11	Salmon	No	≤38						
A2	F	A2-CT31-CR-01	A2-CT31	northern crayfish	Live	20	Salmon	No	≤38						
A2	F	A2-CT48-CR-02	A2-CT48	northern crayfish	Live	29	Salmon	No	≤38						
A2	S	A2-CT13-CR-02	A2-CT13	northern crayfish	Live	5	None	No	≤38						
A2	F	A2-CT56-CR-02	A2-CT56	northern crayfish	Live	31	Salmon	No	≤38						
A2	F	A2-CT35-CR-01	A2-CT35	northern crayfish	Live	39	Salmon	No	>38	4	170	all HHRA and BERA analytes	Yes	Yes	
A2	F	A2-CT58-CR-01	A2-CT58	northern crayfish	Live	89	Salmon	No	>38						
A2	F	A2-CT55-CR-01	A2-CT55	northern crayfish	Live	42	Salmon	No	>38						
A2	S	A2-CT13-CR-03	A2-CT13	northern crayfish	Live	39	Chicken	No	>38	5	128	all HHRA and BERA analytes	Yes	Yes	
A2	F	A2-CT54-CR-01	A2-CT54	northern crayfish	Live	42	Salmon	No	>38						
A2	F	A2-CT53-CR-01	A2-CT53	northern crayfish	Live	47	Salmon	No	>38						
A2	F	A2-CT45-CR-02	A2-CT45	signal crayfish	Live	40	Salmon	No	>38	6	193	all HHRA and BERA analytes	Yes	Yes	
A2	S	A2-CT14-CR-01	A2-CT14	signal crayfish	Live	54	Chicken	No	>38						
A2	S	A2-CT06-CR-01	A2-CT06	signal crayfish	Live	60	Chicken	No	>38						
A2	F	A2-CT45-CR-03	A2-CT45	signal crayfish	Live	39	Salmon	No	>38						

A3 Crayfish

Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Weight (g)	Bait	Delayed Cooler Sample?	Size Class (g)	Composite Number	Sample Mass	Recommended Analyses	Sufficient mass for BERA only? (4.5 g)	Sufficient mass for BERA only EPA split or field rep? (9 g)	Sufficient mass for BERA and HHRA? (60 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (120 g)	Comments
EPA Preferred Option. Two size classes: ≤38 g and > 38 g and separate by north and south																	
A3-north	F	A3-CT36-CR-02	A3-CT36	northern crayfish	Live	40	Salmon	No	>38	1	95	all BERA analytes	Yes	Yes	Yes	No	
A3-north	F	A3-CT36-CR-01	A3-CT36	northern crayfish	Live	55	Salmon	No	>38								
A3-north	F	A3-CT39-CR-01	A3-CT39	northern crayfish	Live	19	Salmon	No	≤38	2	91	all BERA analytes	Yes	Yes	Yes	No	
A3-north	S	A3-CT14-CR-01	A3-CT14	northern crayfish	Live	21	aptured using	No	≤38								
A3-north	F	A3-CT62-CR-01	A3-CT62	northern crayfish	Live	30	Salmon	No	≤38								
A3-north	F	A3-CT45-CR-02	A3-CT45	northern crayfish	Live	5	Salmon	No	≤38								
A3-north	F	A3-CT63-CR-01	A3-CT63	northern crayfish	Live	4	Salmon	No	≤38								
A3-north	F	A3-CT45-CR-01	A3-CT45	northern crayfish	Live	8	Salmon	No	≤38								
A3-north	F	A3-CT37-CR-01	A3-CT37	northern crayfish	Live	4	Salmon	No	≤38								
A3-south	F	A3-CT47-CR-01	A3-CT47	northern crayfish	Live	2	Salmon	No	≤38	3	91	all BERA analytes	Yes	Yes	Yes	No	
A3-south	S	A3-CT13-CR-01	A3-CT13	northern crayfish	Live	23	t, captured us	No	≤38								
A3-south	F	A3-CT46-CR-01	A3-CT46	northern crayfish	Live	23	Salmon	No	≤38								
A3-south	F	A3-CT58-CR-01	A3-CT58	northern crayfish	Live	15	Salmon	No	≤38								
A3-south	F	A3-CT60-CR-01	A3-CT60	northern crayfish	Live	9	Salmon	No	≤38								
A3-south	F	A3-CT48-CR-01	A3-CT48	northern crayfish	Live	19	Salmon	No	≤38								
A3-south	F	A3-CT46-CR-02	A3-CT46	northern crayfish	Live	24	Salmon	No	≤38	4	81	all BERA analytes	Yes	Yes	Yes	No	
A3-south	S	A3-CT01-CR-01	A3-CT01	northern crayfish	Live	28	Chicken	No	≤38								
A3-south	F	A3-CT49-CR-01	A3-CT49	northern crayfish	Live	5	Salmon	No	≤38								
A3-south	F	A3-CT48-CR-02	A3-CT48	northern crayfish	Live	1	Salmon	No	≤38								
A3-south	F	A3-CT50-CR-01	A3-CT50	northern crayfish	Live	20	Salmon	No	≤38								
A3-south	F	A3-CT53-CR-01	A3-CT53	northern crayfish	Live	3	Salmon	No	≤38								
A3-south	F	A3-CT50-CR-02	A3-CT50	northern crayfish	Live	29	Salmon	No	≤38	5	90.9	all BERA analytes	Yes	Yes	Yes	No	
A3-south	F	A3-CT46-CR-03	A3-CT46	northern crayfish	Live	23	Salmon	No	≤38								
A3-south	F	A3-CT50-CR-03	A3-CT50	northern crayfish	Live	28	Salmon	No	≤38								
A3-south	S	A3-CT02-CR-01	A3-CT02	northern crayfish	Live	3.9	Chicken	No	≤38								
A3-south	F	A3-CT58-CR-02	A3-CT58	northern crayfish	Live	7	Salmon	No	≤38								
A3-south	F	A3-CT52-CR-01	A3-CT52	northern crayfish	Live	46	Salmon	No	>38	6	46	all BERA analytes	Yes	Yes	No	No	Single individual in size class

Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Weight (g)	Bait	Delayed Cooler Sample?	Size Class (g)	Composite Number	Sample Mass	Recommended Analyses	Sufficient mass for BERA only? (4.5 g)	Sufficient mass for BERA only EPA split or field rep? (9 g)	Sufficient mass for BERA and HHRA? (60 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (120 g)	Comments
EPA Preferred Option -Two size classes: ≤38 g and >38 g																	
A4	F	A4-CT31-CR-07	A4-CT31	northern crayfish	Live	25	Salmon	No	≤38	1	127.1	all BERA analytes	Yes	Yes	Yes	Yes	
A4	F	A4-CT34-CR-03	A4-CT34	northern crayfish	Live	24	Salmon	No	≤38								
A4	S	A4-CT01-CR-01	A4-CT01	northern crayfish	Live	3.1	Chicken	No	≤38								
A4	F	A4-CT31-CR-04	A4-CT31	northern crayfish	Live	23	Salmon	No	≤38								
A4	F	A4-CT34-CR-08	A4-CT34	northern crayfish	Live	26	Salmon	No	≤38								
A4	F	A4-CT34-CR-01	A4-CT34	northern crayfish	Live	26	Salmon	No	≤38								
A4	F	A4-CT34-CR-07	A4-CT34	northern crayfish	Live	25	Salmon	No	≤38	2	102	all BERA analytes	Yes	Yes	Yes	No	
A4	F	A4-CT34-CR-02	A4-CT34	northern crayfish	Live	27	Salmon	No	≤38								
A4	F	A4-CT31-CR-01	A4-CT31	northern crayfish	Live	25	Salmon	No	≤38								
A4	F	A4-CT34-CR-05	A4-CT34	northern crayfish	Live	25	Salmon	No	≤38								
A4	F	A4-CT31-CR-05	A4-CT31	northern crayfish	Live	25	Salmon	No	≤38	3	134.7	all BERA analytes	Yes	Yes	Yes	Yes	
A4	F	A4-CT31-CR-02	A4-CT31	northern crayfish	Live	20	Salmon	No	≤38								
A4	F	A4-CT31-CR-06	A4-CT31	northern crayfish	Live	20	Salmon	No	≤38								
A4	F	A4-CT31-CR-03	A4-CT31	northern crayfish	Live	35	Salmon	No	≤38								
A4	S	A4-CT04-CR-01	A4-CT04	northern crayfish	Live	4.7	Cat Food	No	≤38								
A4	F	A4-CT34-CR-06	A4-CT34	northern crayfish	Live	30	Salmon	No	≤38								
A4	F	A4-CT36-CR-02	A4-CT36	northern crayfish	Live	90	Salmon	No	>38	4	432	all BERA analytes	Yes	Yes	Yes	Yes	
A4	F	A4-CT35-CR-01	A4-CT35	northern crayfish	Live	73	Salmon	No	>38								
A4	F	A4-CT35-CR-06	A4-CT35	northern crayfish	Live	87	Salmon	No	>38								
A4	F	A4-CT36-CR-01	A4-CT36	northern crayfish	Live	88	Salmon	No	>38								
A4	F	A4-CT35-CR-05	A4-CT35	northern crayfish	Live	94	Salmon	No	>38								
A4	F	A4-CT35-CR-07	A4-CT35	northern crayfish	Live	91	Salmon	No	>38	5	422	all BERA analytes	Yes	Yes	Yes	Yes	
A4	F	A4-CT35-CR-04	A4-CT35	northern crayfish	Live	94	Salmon	No	>38								
A4	F	A4-CT36-CR-04	A4-CT36	northern crayfish	Live	91	Salmon	No	>38								
A4	F	A4-CT35-CR-03	A4-CT35	northern crayfish	Live	105	Salmon	No	>38								
A4	F	A4-CT34-CR-10	A4-CT34	northern crayfish	Live	41	Salmon	No	>38								
A4	F	A4-CT34-CR-09	A4-CT34	northern crayfish	Live	47	Salmon	No	>38	6	287	all BERA analytes	Yes	Yes	Yes	Yes	
A4	F	A4-CT34-CR-04	A4-CT34	northern crayfish	Live	45	Salmon	No	>38								
A4	F	A4-CT35-CR-02	A4-CT35	northern crayfish	Live	104	Salmon	No	>38								
A4	F	A4-CT36-CR-03	A4-CT36	northern crayfish	Live	91	Salmon	No	>38								

Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Weight (g)	Bait	Delayed Cooler Sample?	Size Class (g)	Composite Number	Sample Mass (g)	Recommended Analyses	Sufficient mass for BERA and HHRA? (60 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (120 g)	Comments
EPA Preferred Option -Two size classes: ≤38 g and >38 g															
A5	S	A5-CT15-CR-03	A5-CT15	northern crayfish	Live	5	Cat Food	No	≤38	1	65.2	all HHRA and BERA analytes	Yes	No	Enough mass for one sample from small size class
A5	S	A5-CT25-CR-02	A5-CT25	northern crayfish	Live	1	Chicken	No	≤38						
A5	S	A5-CT05-CR-01	A5-CT05	northern crayfish	Live	27	Salmon	No	≤38						
A5	S	A5-CT16-CR-01	A5-CT16	northern crayfish	Live	20	Salmon	No	≤38						
A5	S	A5-CT25-CR-01	A5-CT25	northern crayfish	Live	11	Chicken	No	≤38						
A5	S	A5-CT11-CR-02	A5-CT11	northern crayfish	Live	1.2	Salmon	No	≤38						
A5	S	A5-CT02-CR-02	A5-CT02	signal crayfish	Live	47	Salmon	No	>38	2	122	all HHRA and BERA analytes	Yes	Yes	
A5	S	A5-CT04-CR-01	A5-CT04	signal crayfish	Live	75	Salmon	No	>38						
A5	S	A5-CT04-CR-02	A5-CT04	signal crayfish	Live	69	Salmon	Yes	>38	3	69	all HHRA and BERA analytes			Single organism sample. Delayed cooler sample
A5	S	A5-CT02-CR-01	A5-CT02	northern crayfish	Live	61	Salmon	No	>38	4	61	all HHRA and BERA analytes	Yes	No	Single organism sample
A5	S	A5-CT12-CR-01	A5-CT12	northern crayfish	Live	51	Salmon	Yes	>38	5	103	all HHRA and BERA analytes	Yes	No	All organisms in this sample were in a delayed cooler.
A5	S	A5-CT11-CR-01	A5-CT11	northern crayfish	Live	52	Salmon	Yes	>38						
A5	S	A5-CT15-CR-01	A5-CT15	northern crayfish	Live	48	Cat Food	Yes	>38	6	98	all HHRA and BERA analytes	Yes	No	All organisms in this sample were in a delayed cooler.
A5	S	A5-CT01-CR-01	A5-CT01	northern crayfish	Live	50	Salmon	Yes	>38						
A5	S	A5-CT15-CR-02	A5-CT15	northern crayfish	Live	27	Cat Food	Yes	≤38 g		--	None			Only crayfish in small class size from delayed cooler. This will not be included in a composite.

Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Weight (g)	Bait	Delayed Cooler Sample?	Size Class (g)	Composite Number	Sample Mass (g)	Recommended Analyses	Sufficient mass for BERA and HHRA? (60 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (120 g)	Comments
EPA Preferred Option -Two size classes: ≤38 g and >38 g and split by east and west															
A6-east	S	A6-CT02-CR-01	A6-CT02	northern crayfish	live	20	Chicken	No	≤38	1	90	all HHRA and BERA analytes	Yes	No	
A6-east	S	A6-CT02-CR-03	A6-CT02	northern crayfish	live	23	Salmon	No	≤38						
A6-east	S	A6-CT06-CR-01	A6-CT06	northern crayfish	live	27	Chicken	No	≤38						
A6-east	S	A6-CT01-CR-03	A6-CT01	northern crayfish	live	20	Salmon	No	≤38						
A6-east	S	A6-CT01-CR-02	A6-CT01	northern crayfish	live	62	Salmon	No	>38	2	106	all HHRA and BERA analytes	Yes	No	
A6-east	S	A6-CT02-CR-04	A6-CT02	northern crayfish	live	44	Salmon	No	>38						
A6-east	S	A6-CT07-CR-01	A6-CT07	northern crayfish	live	45	Chicken	No	>38	3	132	all HHRA and BERA analytes	Yes	Yes	
A6-east	S	A6-CT07-CR-02	A6-CT07	northern crayfish	live	44	Chicken	No	>38						
A6-east	S	A6-CT01-CR-01	A6-CT01	northern crayfish	live	43	Chicken	No	>38						
A6-east	S	A6-CT02-CR-02	A6-CT02	northern crayfish	live	51	Salmon	No	>38	4	133	all HHRA and BERA analytes	Yes	Yes	
A6-east	S	A6-CT02-CR-05	A6-CT02	northern crayfish	live	40	Salmon	No	>38						
A6-east	S	A6-CT04-CR-01	A6-CT04	northern crayfish	live	42	Chicken	No	>38						
A6-west	S	A6-CT12-CR-02	A6-CT12	northern crayfish	live	9	Chicken	No	≤38	5	137	all HHRA and BERA analytes	Yes	Yes	
A6-west	S	A6-CT14-CR-01	A6-CT14	northern crayfish	live	20	Chicken, Salmon	No	≤38						
A6-west	S	A6-CT14-CR-02	A6-CT14	northern crayfish	live	24	Chicken, Salmon	No	≤38						
A6-west	S	A6-CT13-CR-03	A6-CT13	northern crayfish	live	28	Chicken, Salmon	No	≤38						
A6-west	S	A6-CT13-CR-04	A6-CT13	northern crayfish	live	31	Chicken, Salmon	No	≤38						
A6-west	S	A6-CT13-CR-02	A6-CT13	northern crayfish	live	25	Chicken, Salmon	No	≤38						
A6-west	S	A6-CT12-CR-01	A6-CT12	northern crayfish	live	39	Chicken	No	>38	6	78	all HHRA and BERA analytes	Yes	No	
A6-west	S	A6-CT13-CR-01	A6-CT13	northern crayfish	live	39	Chicken, Salmon	No	>38						

Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Weight (g)	Bait	Delayed Cooler Sample?	Size Class (g)	Composite Number	Sample Mass (g)	Recommended Analyses	Sufficient mass for BERA and HHRA? (60 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (120 g)	Comments
EPA Preferred Option -Two size classes: ≤38 g and >38 g															
RL	S	RL-CT05-CR-01	RL-CT05	northern crayfish	Live	3	Salmon	No	≤38	1	266.5	all HHRA and BERA analytes	Yes	Yes	
RL	S	RL-CT01-CR-10	RL-CT01	northern crayfish	Live	28	Salmon	No	≤38						
RL	S	RL-CT09-CR-02	RL-CT09	northern crayfish	Live	3.6	Salmon	No	≤38						
RL	S	RL-CT08-CR-04	RL-CT08	northern crayfish	Live	27	Salmon	No	≤38						
RL	S	RL-CT08-CR-08	RL-CT08	northern crayfish	Live	5.9	Salmon	No	≤38						
RL	S	RL-CT08-CR-03	RL-CT08	northern crayfish	Live	33	Salmon	No	≤38						
RL	S	RL-CT02-CR-07	RL-CT02	northern crayfish	Live	26	Salmon	No	≤38						
RL	S	RL-CT08-CR-06	RL-CT08	northern crayfish	Live	36	Salmon	No	≤38						
RL	S	RL-CT03-CR-06	RL-CT03	northern crayfish	Live	30	Salmon	No	≤38						
RL	S	RL-CT08-CR-01	RL-CT08	northern crayfish	Live	26	Salmon	No	≤38						
RL	S	RL-CT04-CR-05	RL-CT04	northern crayfish	Live	25	Salmon	No	≤38						
RL	S	RL-CT01-CR-11	RL-CT01	northern crayfish	Live	23	Salmon	No	≤38						
RL	S	RL-CT03-CR-05	RL-CT03	northern crayfish	Live	4.1	Salmon	No	≤38	2	201.5	all HHRA and BERA analytes	Yes	Yes	
RL	S	RL-CT10-CR-01	RL-CT10	northern crayfish	Live	4.1	Salmon	No	≤38						
RL	S	RL-CT01-CR-08	RL-CT01	northern crayfish	Live	36	Salmon	No	≤38						
RL	S	RL-CT03-CR-04	RL-CT03	northern crayfish	Live	3.8	Salmon	No	≤38						
RL	S	RL-CT10-CR-05	RL-CT10	northern crayfish	Live	23	Salmon	No	≤38						
RL	S	RL-CT01-CR-06	RL-CT01	northern crayfish	Live	38	Salmon	No	≤38						
RL	S	RL-CT04-CR-06	RL-CT04	northern crayfish	Live	19	Salmon	No	≤38						
RL	S	RL-CT03-CR-02	RL-CT03	northern crayfish	Live	28	Salmon	No	≤38						
RL	S	RL-CT11-CR-02	RL-CT11	northern crayfish	Live	3.6	Salmon	No	≤38						
RL	S	RL-CT01-CR-12	RL-CT01	northern crayfish	Live	5.9	Salmon	No	≤38						
RL	S	RL-CT09-CR-01	RL-CT09	northern crayfish	Live	11	Cat Food	No	≤38						
RL	S	RL-CT02-CR-01	RL-CT02	northern crayfish	Live	25	Cat Food	No	≤38						
RL	S	RL-CT04-CR-02	RL-CT04	northern crayfish	Live	11	Salmon	No	≤38	3	200.6	all HHRA and BERA analytes	Yes	Yes	
RL	S	RL-CT11-CR-01	RL-CT11	northern crayfish	Live	5.9	Salmon	No	≤38						
RL	S	RL-CT02-CR-08	RL-CT02	northern crayfish	Live	21	Salmon	No	≤38						
RL	S	RL-CT07-CR-01	RL-CT07	northern crayfish	Live	5.5	Cat Food	No	≤38						
RL	S	RL-CT08-CR-07	RL-CT08	northern crayfish	Live	21	Salmon	No	≤38						
RL	S	RL-CT04-CR-01	RL-CT04	northern crayfish	Live	33	Salmon	No	≤38						
RL	S	RL-CT02-CR-06	RL-CT02	northern crayfish	Live	24	Salmon	No	≤38						
RL	S	RL-CT03-CR-01	RL-CT03	northern crayfish	Live	27	Salmon	No	≤38						
RL	S	RL-CT01-CR-02	RL-CT01	northern crayfish	Live	27	Cat Food	No	≤38						
RL	S	RL-CT10-CR-04	RL-CT10	northern crayfish	Live	4.2	Salmon	No	≤38						
RL	S	RL-CT01-CR-09	RL-CT01	northern crayfish	Live	18	Salmon	No	≤38						
RL	S	RL-CT02-CR-09	RL-CT02	northern crayfish	Live	3	Salmon	No	≤38						
RL	S	RL-CT08-CR-05	RL-CT08	northern crayfish	Live	40	Salmon	No	>38	4	274	all HHRA and BERA analytes	Yes	Yes	
RL	S	RL-CT10-CR-02	RL-CT10	northern crayfish	Live	52	Salmon	No	>38						
RL	S	RL-CT02-CR-02	RL-CT02	northern crayfish	Live	44	Cat Food	No	>38						
RL	S	RL-CT02-CR-05	RL-CT02	northern crayfish	Live	44	Salmon	No	>38						
RL	S	RL-CT01-CR-07	RL-CT01	northern crayfish	Live	46	Salmon	No	>38						
RL	S	RL-CT04-CR-04	RL-CT04	northern crayfish	Live	48	Salmon	No	>38						
RL	S	RL-CT08-CR-02	RL-CT08	northern crayfish	Live	53	Salmon	No	>38	5	239	all HHRA and BERA analytes	Yes	Yes	
RL	S	RL-CT01-CR-03	RL-CT01	northern crayfish	Live	57	Salmon	No	>38						
RL	S	RL-CT10-CR-03	RL-CT10	northern crayfish	Live	46	Salmon	No	>38						
RL	S	RL-CT01-CR-05	RL-CT01	northern crayfish	Live	41	Salmon	No	>38						
RL	S	RL-CT01-CR-04	RL-CT01	northern crayfish	Live	42	Salmon	No	>38						
RL	S	RL-CT02-CR-04	RL-CT02	northern crayfish	Live	45	Salmon	No	>38	6	221	all HHRA and BERA analytes	Yes	Yes	
RL	S	RL-CT02-CR-03	RL-CT02	northern crayfish	Live	43	Salmon	No	>38						
RL	S	RL-CT04-CR-03	RL-CT04	northern crayfish	Live	40	Salmon	No	>38						
RL	S	RL-CT03-CR-03	RL-CT03	northern crayfish	Live	47	Salmon	No	>38						
RL	S	RL-CT01-CR-01	RL-CT01	northern crayfish	Live	46	Cat Food	No	>38						

Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Weight (g)	Bait	Delayed Cooler Sample?	Size Class (g)	Composite Number	Sample Mass (g)	Recommended Analyses	Sufficient mass for BERA and HHRA? (60 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (120 g)	Comments
EPA Preferred Option -Two size classes: ≤38 g and >38 g															
SR	S	SR-CT12-CR-01	SR-CT12	signal crayfish	Live	12	Chicken	No	≤38	1	122	all HHRA and BERA analytes	Yes	Yes	
SR	F	SR-CT62-CR-01	SR-CT62	signal crayfish	Live	29	Salmon	No	≤38						
SR	F	SR-CT55-CR-01	SR-CT55	signal crayfish	Live	18	Salmon	No	≤38						
SR	F	SR-CT50-CR-01	SR-CT50	signal crayfish	Live	18	Salmon	No	≤38						
SR	S	SR-CT09-CR-01	SR-CT09	signal crayfish	Live	20	Salmon	No	≤38						
SR	S	SR-CT11-CR-02	SR-CT11	signal crayfish	Live	25	Chicken	No	≤38						
SR	S	SR-CT07-CR-01	SR-CT07	northern crayfish	Live	28	Salmon	No	≤38	2	62.5	all HHRA and BERA analytes	Yes	No	
SR	S	SR-CT16-CR-01	SR-CT16	northern crayfish	Live	18	Salmon	No	≤38						
SR	S	SR-CT06-CR-01	SR-CT06	northern crayfish	Live	6.5	Salmon	No	≤38						
SR	F	SR-CT41-CR-03	SR-CT41	northern crayfish	Live	10	Salmon	No	≤38						
SR	F	SR-CT41-CR-02	SR-CT41	northern crayfish	Live	22	Salmon	No	≤38	3	75	all HHRA and BERA analytes	Yes	No	
SR	S	SR-CT11-CR-01	SR-CT11	northern crayfish	Live	24	Chicken	No	≤38						
SR	S	SR-CT08-CR-01	SR-CT08	northern crayfish	Live	29	Salmon	No	≤38						
SR	F	SR-CT44-CR-01	SR-CT44	northern crayfish	Live	53	Salmon	No	>38	4	145	all HHRA and BERA analytes	Yes	Yes	
SR	F	SR-CT41-CR-01	SR-CT41	northern crayfish	Live	42	Salmon	No	>38						
SR	S	SR-CT08-CR-02	SR-CT08	northern crayfish	Live	50	Salmon	No	>38						
SR	F	SR-CT51-CR-02	SR-CT51	northern crayfish	Live	40	Salmon	No	>38	5	86	all HHRA and BERA analytes	Yes	No	
SR	F	SR-CT47-CR-01	SR-CT47	northern crayfish	Live	46	Salmon	No	>38						
SR	S	SR-CT04-CR-01	SR-CT04	northern crayfish	Live	71	Salmon	No	>38	6	127	all HHRA and BERA analytes	Yes	Yes	
SR	F	SR-CT51-CR-01	SR-CT51	northern crayfish	Live	56	Salmon	No	>38						

Attachment 2
Mussel Compositing Options

Area	Sub Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Delayed Cooler Sample?	Length (mm)	Estimated Tissue Weight (g)	Composite Number	Sample Mass	Size Class (mm)	Recommended Analyses	Sufficient mass for BERA only? (4.5 g)	Sufficient mass for BERA only EPA field split or field rep? (9 g)	Sufficient mass for BERA and HHRA? (30 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (60 g)	Comments
EPA Preferred Option -Two spatial areas and separated by size. Northport (MB05) split <47 mm and >48 mm and DME (MB43) split																		
A1	Northport	S	A1-MB05-MU-02	A1-MB05	Anodonta sp.	Live	Y	22.4	0.5	1	9	<47	all BERA analytes (4.5 g)	Yes	Yes	No	No	Delayed cooler samples
A1	Northport	S	A1-MB05-MU-04	A1-MB05	Anodonta sp.	Live	Y	29	1			<47	all BERA analytes (4.5 g)					
A1	Northport	S	A1-MB05-MU-03	A1-MB05	Anodonta sp.	Live	Y	30.8	1			<47	all BERA analytes (4.5 g)					
A1	Northport	S	A1-MB05-MU-01	A1-MB05	Anodonta sp.	Live	Y	31.3	1			<47	all BERA analytes (4.5 g)					
A1	Northport	S	A1-MB05-MU-05	A1-MB05	Anodonta sp.	Live	Y	32.7	1			<47	all BERA analytes (4.5 g)					
A1	Northport	S	A1-MB05-MU-07	A1-MB05	Anodonta sp.	Live	Y	46.5	4.5			<47	all BERA analytes (4.5 g)					
A1	Northport	S	A1-MB05-MU-06	A1-MB05	Anodonta sp.	Live	Y	48.8	4	2	81.5	>48	all BERA analytes (4.5 g)	Yes	Yes	Yes	Yes	Delayed cooler samples
A1	Northport	S	A1-MB05-MU-09	A1-MB05	Anodonta sp.	Live	Y	63.9	12			>48	all BERA analytes (4.5 g)					
A1	Northport	S	A1-MB05-MU-08	A1-MB05	Anodonta sp.	Live	Y	65.2	12.5			>48	all BERA analytes (4.5 g)					
A1	Northport	S	A1-MB05-MU-10	A1-MB05	Anodonta sp.	Live	Y	68.7	15			>48	all BERA analytes (4.5 g)					
A1	Northport	S	A1-MB05-MU-11	A1-MB05	Anodonta sp.	Live	Y	74.3	18			>48	all BERA analytes (4.5 g)					
A1	Northport	S	A1-MB05-MU-12	A1-MB05	Anodonta sp.	Live	Y	78.6	20			>48	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-15	A1-MB43	Anodonta	Live	N	55	7.5	3	40.5	<70	all BERA analytes (4.5 g)	Yes	Yes	Yes	No	
A1	DME	F	A1-MB43-MU-09	A1-MB43	Anodonta	Live	N	68	14			<70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-19	A1-MB43	Anodonta	Live	N	50	7			<70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-13	A1-MB43	Anodonta	Live	N	58	12			<70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-20	A1-MB43	Anodonta	Live	N	53	7	4	58	<70	all BERA analytes (4.5 g)	Yes	Yes	Yes	No	
A1	DME	F	A1-MB43-MU-16	A1-MB43	Anodonta	Live	N	66	13.5			<70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-10	A1-MB43	Anodonta	Live	N	68	15			<70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-17	A1-MB43	Anodonta	Live	N	69	14			<70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-18	A1-MB43	Anodonta	Live	N	55	8.5			<70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-06	A1-MB43	Anodonta	Live	N	70	16.5	5	109	≥70	all BERA analytes (4.5 g)	Yes	Yes	Yes	Yes	
A1	DME	F	A1-MB43-MU-03	A1-MB43	Anodonta	Live	N	74	17			≥70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-02	A1-MB43	Anodonta	Live	N	77	19.5			≥70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-01	A1-MB43	Anodonta	Live	N	78	18.5			≥70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-12	A1-MB43	Anodonta	Live	N	73	16.5			≥70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-04	A1-MB43	Anodonta	Live	N	77	21			≥70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-08	A1-MB43	Anodonta	Live	N	72	18	6	89	≥70	all BERA analytes (4.5 g)	Yes	Yes	Yes	Yes	
A1	DME	F	A1-MB43-MU-11	A1-MB43	Anodonta	Live	N	71	21			≥70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-07	A1-MB43	Anodonta	Live	N	72	18.5			≥70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-05	A1-MB43	Anodonta	Live	N	71	16.5			≥70	all BERA analytes (4.5 g)					
A1	DME	F	A1-MB43-MU-14	A1-MB43	Anodonta	Live	N	70	15			≥70	all BERA analytes (4.5 g)					

Area	Sub Area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Delayed Cooler Sample?	Length (mm)	Estimated Tissue Weight (g)	Composite Number	Number of indviduals in composite	Sample Mass	Size Class (mm)	Recommended Analyses	Sufficient mass for BERA and HHRA? (30 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (60 g)	Comments
EPA Preferred Option - Two size classes (split <68 mm and >68 mm), no spatial subdivision																	
Area 2	west	S	A2-MB04-MU-14	A2-MB04	Anodonta sp.	Live	N	29	0.65	1	9	30.2	<68	all HHRA and BERA analytes	Yes	No	
Area 2	west	S	A2-MB04-MU-13	A2-MB04	Anodonta sp.	Live	N	31	1.25				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-04	A2-MB04	Anodonta sp.	Live	N	34	1.3				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-09	A2-MB04	Anodonta sp.	Live	N	30	1.15				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-11	A2-MB04	Anodonta sp.	Live	N	32	1.25				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-06	A2-MB04	Anodonta sp.	Live	N	37	2.1				<68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-14	A2-MB06	Anodonta sp.	Live	N	57.3	9				<68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-24	A2-MB06	Anodonta sp.	Live	N	64	11.5				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-21	A2-MB04	Anodonta sp.	Live	N	38	2				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-08	A2-MB04	Anodonta sp.	Live	N	38	1.95	2	9	58.3	<68	all HHRA and BERA analytes	Yes	No	
Area 2	east	S	A2-MB06-MU-12	A2-MB06	Anodonta sp.	Live	N	66.5	13.5				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-05	A2-MB04	Anodonta sp.	Live	N	49	2.15				<68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-11	A2-MB06	Anodonta sp.	Live	N	66.8	12.5				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-19	A2-MB04	Anodonta sp.	Live	N	34	1.6				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-07	A2-MB04	Anodonta sp.	Live	N	39	1.75				<68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-13	A2-MB06	Anodonta sp.	Live	N	63	11.5				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB05-MU-03	A2-MB05	Anodonta sp.	Live	N	67	12				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-22	A2-MB04	Anodonta sp.	Live	N	37	1.35				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-17	A2-MB04	Anodonta sp.	Live	N	37	1.65	3	9	51.3	<68	all HHRA and BERA analytes	Yes	No	
Area 2	west	S	A2-MB04-MU-10	A2-MB04	Anodonta sp.	Live	N	32	1.1				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-15	A2-MB04	Anodonta sp.	Live	N	28	0.8				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB04-MU-12	A2-MB04	Anodonta sp.	Live	N	33	1.75				<68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-07	A2-MB06	Anodonta sp.	Live	N	67.8	13.5				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB05-MU-05	A2-MB05	Anodonta sp.	Live	N	63	11.5				<68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB01-MU-01	A2-MB01	Anodonta sp.	Live	N	27	1				<68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-15	A2-MB06	Anodonta sp.	Live	N	63.4	10				<68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-25	A2-MB06	Anodonta sp.	Live	N	60.7	10				<68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-03	A2-MB06	Anodonta sp.	Live	N	84.2	25	4	9	178.5	>68	all HHRA and BERA analytes	Yes	Yes	
Area 2	east	S	A2-MB06-MU-30	A2-MB06	Anodonta sp.	Live	N	85.8	28.5				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-21	A2-MB06	Anodonta sp.	Live	N	71.5	14				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-27	A2-MB06	Anodonta sp.	Live	N	70.2	13.5				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-08	A2-MB06	Anodonta sp.	Live	N	74.1	21				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-23	A2-MB06	Anodonta sp.	Live	N	74.3	14.5				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-20	A2-MB06	Anodonta sp.	Live	N	71.2	20.5				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-22	A2-MB06	Anodonta sp.	Live	N	84.6	25.5				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-09	A2-MB06	Anodonta sp.	Live	N	71.2	16				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-06	A2-MB06	Anodonta sp.	Live	N	79.5	23.5	5	9	173	>68	all HHRA and BERA analytes	Yes	Yes	
Area 2	east	S	A2-MB06-MU-29	A2-MB06	Anodonta sp.	Live	N	75.5	16				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-04	A2-MB06	Anodonta sp.	Live	N	83.4	25				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-10	A2-MB06	Anodonta sp.	Live	N	70	14				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-16	A2-MB06	Anodonta sp.	Live	N	70.1	14.5				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-26	A2-MB06	Anodonta sp.	Live	N	69.2	14				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-01	A2-MB06	Anodonta sp.	Live	N	87.5	25.5				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-18	A2-MB06	Anodonta sp.	Live	N	78.6	20				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-28	A2-MB06	Anodonta sp.	Live	N	77.4	20.5				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-02	A2-MB06	Anodonta sp.	Live	N	82.4	21.5	6	9	175	>68	all HHRA and BERA analytes	Yes	Yes	
Area 2	west	S	A2-MB05-MU-07	A2-MB05	Anodonta sp.	Live	N	79	21				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-17	A2-MB06	Anodonta sp.	Live	N	70.6	17				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-19	A2-MB06	Anodonta sp.	Live	N	73	20				>68	all HHRA and BERA analytes			
Area 2	east	S	A2-MB06-MU-05	A2-MB06	Anodonta sp.	Live	N	84.9	22				>68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB05-MU-02	A2-MB05	Anodonta sp.	Live	N	70	16.5				>68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB05-MU-04	A2-MB05	Anodonta sp.	Live	N	78	20				>68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB05-MU-01	A2-MB05	Anodonta sp.	Live	N	85	24				>68	all HHRA and BERA analytes			
Area 2	west	S	A2-MB05-MU-06	A2-MB05	Anodonta sp.	Live	N	72	13				>68	all HHRA and BERA analytes			

Area	Sub area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Delayed Cooler Sample?	Length (mm)	Estimated Tissue Weight (g)	Composite Number	Number of indviduals in composite	Sample Mass	Size Class (mm)	Recommended Analyses	Sufficient mass for BERA only? (4.5 g)	Sufficient mass for BERA only EPA split or field rep? (9 g)	Sufficient mass for BERA and HHRA? (30 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (60 g)	Comments
EPA Preferred Option - Two size classes (split ≤53 mm and >53 mm), no spatial subdivision																			
Area 3		F	A3-MB14-MU-10	A3-MB14	Anodonta	Live	N	48	6	1	5	25.7	≤53	all BERA analytes (4.5 g)	Yes	Yes	No	No	
Area 3		F	A3-MB14-MU-07	A3-MB14	Anodonta	Live	N	48	4.5				≤53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-09	A3-MB14	Anodonta	Live	N	53	7.5				≤53	all BERA analytes (4.5 g)					
Area 3		S	A3-MB06-MU-04	A3-MB06	Anodonta sp.	Live	N	35.4	1.7				≤53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-08	A3-MB14	Anodonta	Live	N	51	6				≤53	all BERA analytes (4.5 g)					
Area 3		S	A3-MB01-MU-01	A3-MB01	Anodonta sp.	Live	N	21	2	2	5	12.25	≤53	all BERA analytes (4.5 g)	Yes	Yes	No	No	
Area 3		S	A3-MB13-MU-02	A3-MB13	Anodonta sp.	Live	N	44.9	2				≤53	all BERA analytes (4.5 g)					
Area 3		S	A3-MB04-MU-01	A3-MB04	Anodonta sp.	Live	N	35.8	1.75				≤53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-06	A3-MB14	Anodonta	Live	N	43	4.5				≤53	all BERA analytes (4.5 g)					
Area 3		S	A3-MB01-MU-04	A3-MB01	Anodonta sp.	Live	N	37	2				≤53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-12	A3-MB14	Anodonta	Live	N	49	6.5	3	5	22.95	≤53	all BERA analytes (4.5 g)	Yes	Yes	No	No	
Area 3		S	A3-MB01-MU-03	A3-MB01	Anodonta sp.	Live	N	35	1.5				≤53	all BERA analytes (4.5 g)					
Area 3		S	A3-MB06-MU-03	A3-MB06	Anodonta sp.	Live	N	31.8	0.95				≤53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-04	A3-MB14	Anodonta	Live	N	53	7				≤53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-01	A3-MB14	Anodonta	Live	N	53	7				≤53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-17	A3-MB14	Anodonta	Live	N	70	16	4	5	58	>53	all BERA analytes (4.5 g)	Yes	Yes	Yes	No	
Area 3		F	A3-MB14-MU-22	A3-MB14	Anodonta	Live	N	61	9.5				>53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-21	A3-MB14	Anodonta	Live	N	63	13				>53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-18	A3-MB14	Anodonta	Live	N	62	12				>53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-11	A3-MB14	Anodonta	Live	N	55	7.5				>53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-14	A3-MB14	Anodonta	Live	N	81	24	5	5	83	>53	all BERA analytes (4.5 g)	Yes	Yes	Yes	Yes	
Area 3		F	A3-MB14-MU-13	A3-MB14	Anodonta	Live	N	74	20.5				>53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-03	A3-MB14	Anodonta	Live	N	61	9.5				>53	all BERA analytes (4.5 g)					
Area 3		S	A3-MB06-MU-05	A3-MB06	Anodonta sp.	Live	N	56	7				>53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-15	A3-MB14	Anodonta	Live	N	78	22				>53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-05	A3-MB14	Anodonta	Live	N	58	9.5	6	6	129	>53	all BERA analytes (4.5 g)	Yes	Yes	Yes	Yes	
Area 3		F	A3-MB14-MU-19	A3-MB14	Anodonta	Live	N	93	32.5				>53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-16	A3-MB14	Anodonta	Live	N	87	30				>53	all BERA analytes (4.5 g)					
Area 3		S	A3-MB01-MU-02	A3-MB01	Anodonta sp.	Live	N	92	35				>53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-20	A3-MB14	Anodonta	Live	N	66	12.5				>53	all BERA analytes (4.5 g)					
Area 3		F	A3-MB14-MU-02	A3-MB14	Anodonta	Live	N	61	9.5				>53	all BERA analytes (4.5 g)					

Area	Sub area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Delayed Cooler Sample?	Length (mm)	Estimated Tissue Weight (g)	Composite Number	Number of indviduals in composite	Sample Mass	size class (mm)	Recommended Analyses	Sufficient mass for BERA only? (4.5 g)	Sufficient mass for BERA only EPA split or field rep? (9 g)	Sufficient mass for BERA and HHRA? (30 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (60 g)	Comments
EPA Preferred Option - Two spatial areas. North (MB18) split <76 mm and ≥76 mm, and South (MB19) split <70 mm and ≥70 mm.																			
Area 4	North	F	A4-MB18-MU-05	A4-MB18	Anodonta	Live	N	70	17.5	1	9	174.5	<76	all BERA analytes (4.5 g)	Yes	Yes	Yes	Yes	
Area 4	North	F	A4-MB18-MU-12	A4-MB18	Anodonta	Live	N	74	19.5				<76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-04	A4-MB18	Anodonta	Live	N	75	21				<76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-15	A4-MB18	Anodonta	Live	N	72	19				<76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-10	A4-MB18	Anodonta	Live	N	75	20.5				<76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-11	A4-MB18	Anodonta	Live	N	75	22				<76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-13	A4-MB18	Anodonta	Live	N	67	16.5				<76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-01	A4-MB18	Anodonta	Live	N	71	17.5				<76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-02	A4-MB18	Anodonta	Live	N	75	21				<76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-07	A4-MB18	Anodonta	Live	N	76	22.5	2	6	145.5	≥76	all BERA analytes (4.5 g)	Yes	Yes	Yes	Yes	
Area 4	North	F	A4-MB18-MU-03	A4-MB18	Anodonta	Live	N	85	29				≥76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-14	A4-MB18	Anodonta	Live	N	77	24				≥76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-06	A4-MB18	Anodonta	Live	N	77	22				≥76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-09	A4-MB18	Anodonta	Live	N	80	23				≥76	all BERA analytes (4.5 g)					
Area 4	North	F	A4-MB18-MU-08	A4-MB18	Anodonta	Live	N	79	25				≥76	all BERA analytes (4.5 g)					
Area 4	South	F	A4-MB19-MU-08	A4-MB19	Anodonta	Live	N	67	16	3	4	57.5	<70	all BERA analytes (4.5 g)	Yes	Yes	Yes	No	
Area 4	South	F	A4-MB19-MU-13	A4-MB19	Anodonta	Live	N	65	16.5				<70	all BERA analytes (4.5 g)					
Area 4	South	F	A4-MB19-MU-15	A4-MB19	Anodonta	Live	N	62	13.5				<70	all BERA analytes (4.5 g)					
Area 4	South	F	A4-MB19-MU-12	A4-MB19	Anodonta	Live	N	55	11.5				<70	all BERA analytes (4.5 g)					
Area 4	South	F	A4-MB19-MU-10	A4-MB19	Anodonta	Live	N	69	18	4	3	49.5	<70	all BERA analytes (4.5 g)	Yes	Yes	Yes	No	
Area 4	South	F	A4-MB19-MU-14	A4-MB19	Anodonta	Live	N	61	14.5				<70	all BERA analytes (4.5 g)					
Area 4	South	F	A4-MB19-MU-03	A4-MB19	Anodonta	Live	N	69	17				<70	all BERA analytes (4.5 g)					
Area 4	South	F	A4-MB19-MU-01	A4-MB19	Anodonta	Live	N	72	18	5	4	86	≥70	all BERA analytes (4.5 g)	Yes	Yes	Yes	Yes	
Area 4	South	F	A4-MB19-MU-07	A4-MB19	Anodonta	Live	N	70	17.5				≥70	all BERA analytes (4.5 g)					
Area 4	South	F	A4-MB19-MU-04	A4-MB19	Anodonta	Live	N	82	27.5				≥70	all BERA analytes (4.5 g)					
Area 4	South	F	A4-MB19-MU-02	A4-MB19	Anodonta	Live	N	78	23				≥70	all BERA analytes (4.5 g)					
Area 4	South	F	A4-MB19-MU-09	A4-MB19	Anodonta	Live	N	71	17	6	4	70.5	≥70	all BERA analytes (4.5 g)	Yes	Yes	Yes	Yes	
Area 4	South	F	A4-MB19-MU-05	A4-MB19	Anodonta	Live	N	73	19.5				≥70	all BERA analytes (4.5 g)					
Area 4	South	F	A4-MB19-MU-11	A4-MB19	Anodonta	Live	N	70	16				≥70	all BERA analytes (4.5 g)					
Area 4	South	F	A4-MB19-MU-06	A4-MB19	Anodonta	Live	N	72	18				≥70	all BERA analytes (4.5 g)					

Area	sub area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Delayed Cooler Sample?	Length (mm)	Estimated Tissue Weight (g)	Composite Number	Number of indviduals in composite	Sample Mass	Size Class (mm)	Recommended Analyses (30 g)	Sufficient mass for BERA and HHRA? (30 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (60 g)	Comments
EPA Preferred Option - Two size classes (split in half, ≤59 mm and >59 mm), no spatial subdivision																	
A5		F	A5-MB24-MU-05	A5-MB24	Anodonta	Live	N	55	8	1	7	49.5	≤59	all HHRA and BERA analytes	Yes	No	
A5		F	A5-MB21-MU-10	A5-MB21	Anodonta	Live	N	58	9.5				≤59	all HHRA and BERA analytes			
A5		F	A5-MB24-MU-07	A5-MB24	Anodonta	Live	N	53	7				≤59	all HHRA and BERA analytes			
A5		F	A5-MB24-MU-01	A5-MB24	Anodonta	Live	N	57	7.5				≤59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-15	A5-MB21	Anodonta	Live	N	49	4.5				≤59	all HHRA and BERA analytes			
A5		F	A5-MB23-MU-01	A5-MB23	Anodonta	Live	N	40	3				≤59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-14	A5-MB21	Anodonta	Live	N	59	10				≤59	all HHRA and BERA analytes			
A5		F	A5-MB24-MU-03	A5-MB24	Anodonta	Live	N	58	11	2	7	59	≤59	all HHRA and BERA analytes	Yes	No	
A5		F	A5-MB22-MU-02	A5-MB22	Anodonta	Live	N	59	11				≤59	all HHRA and BERA analytes			
A5		F	A5-MB23-MU-02	A5-MB23	Anodonta	Live	N	54	2.5				≤59	all HHRA and BERA analytes			
A5		F	A5-MB24-MU-02	A5-MB24	Anodonta	Live	N	53	7.5				≤59	all HHRA and BERA analytes			
A5		F	A5-MB24-MU-06	A5-MB24	Anodonta	Live	N	57	9				≤59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-16	A5-MB21	Anodonta	Live	N	59	9.5				≤59	all HHRA and BERA analytes			
A5		F	A5-MB24-MU-08	A5-MB24	Anodonta	Live	N	55	8.5				≤59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-11	A5-MB21	Anodonta	Live	N	55	7.5	3	5	42	≤59	all HHRA and BERA analytes	Yes	No	
A5		F	A5-MB24-MU-04	A5-MB24	Anodonta	Live	N	52	7.5				≤59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-13	A5-MB21	Anodonta	Live	N	54	7.5				≤59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-12	A5-MB21	Anodonta	Live	N	59	9.5				≤59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-07	A5-MB21	Anodonta	Live	N	59	10				≤59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-03	A5-MB21	Anodonta	Live	N	69	16.5	4	6	91	>59	all HHRA and BERA analytes	Yes	Yes	
A5		F	A5-MB22-MU-04	A5-MB22	Anodonta	Live	N	70	15.5				>59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-04	A5-MB21	Anodonta	Live	N	64	12.5				>59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-05	A5-MB21	Anodonta	Live	N	63	11				>59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-18	A5-MB21	Anodonta	Live	N	73	16.5				>59	all HHRA and BERA analytes			
A5		F	A5-MB22-MU-06	A5-MB22	Anodonta	Live	N	75	19				>59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-08	A5-MB21	Anodonta	Live	N	62	10.5	5	6	80	>59	all HHRA and BERA analytes	Yes	Yes	
A5		F	A5-MB21-MU-02	A5-MB21	Anodonta	Live	N	66	12.5				>59	all HHRA and BERA analytes			
A5		F	A5-MB24-MU-10	A5-MB24	Anodonta	Live	N	63	12.5				>59	all HHRA and BERA analytes			
A5		F	A5-MB22-MU-01	A5-MB22	Anodonta	Live	N	61	11				>59	all HHRA and BERA analytes			
A5		F	A5-MB22-MU-05	A5-MB22	Anodonta	Live	N	80	22.5				>59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-09	A5-MB21	Anodonta	Live	N	62	11				>59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-01	A5-MB21	Anodonta	Live	N	61	11	6	6	65.5	>59	all HHRA and BERA analytes	Yes	Yes	
A5		F	A5-MB22-MU-03	A5-MB22	Anodonta	Live	N	71	16				>59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-06	A5-MB21	Anodonta	Live	N	60	8.5				>59	all HHRA and BERA analytes			
A5		F	A5-MB21-MU-17	A5-MB21	Anodonta	Live	N	73	16.5				>59	all HHRA and BERA analytes			
A5		F	A5-MB24-MU-09	A5-MB24	Anodonta	Live	N	63	13.5				>59	all HHRA and BERA analytes			

Area	sub area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Delayed Cooler Sample?	Length (mm)	Estimated Tissue Weight (g)	Composite Number	Number of indviduals in composite	Sample Mass	Size Class (mm)	Recommended Analyses (30 g)	Sufficient mass for BERA and HHRA? (30 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (60 g)	Comments
EPA Preferred Option - Two size classes (≤40 mm and >40 mm), which also separates beach and dive, and a separate Corbicula composite																	
A6	beach	S	A6-MB01-MU-13	A6-MB01	Anodonta sp.	Live	N	29	0.7	1	28	30.25	≤40	all HHRA and BERA analytes	Yes	No	
A6	beach	S	A6-MB01-MU-17	A6-MB01	Anodonta sp.	Live	N	29	1.05				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB07-MU-01	A6-MB07	Anodonta sp.	Live	N	30	0.8				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-07	A6-MB01	Anodonta sp.	Live	N	35	1.7				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB07-MU-05	A6-MB07	Anodonta sp.	Live	N	30	1.5				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB03-MU-04	A6-MB03	Anodonta sp.	Live	N	39	1.5				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB05-MU-02	A6-MB05	Anodonta sp.	Live	N	33	1				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-11	A6-MB01	Anodonta sp.	Live	N	31	0.9				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB03-MU-06	A6-MB03	Anodonta sp.	Live	N	32	1				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB05-MU-01	A6-MB05	Anodonta sp.	Live	N	33	1.2				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-01	A6-MB01	Anodonta sp.	Live	N	35	1.5				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-04	A6-MB01	Anodonta sp.	Live	N	32	1				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB07-MU-09	A6-MB07	Anodonta sp.	Live	N	29	1.6				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB07-MU-06	A6-MB07	Anodonta sp.	Live	N	31	1.8				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB08-MU-05	A6-MB08	Anodonta sp.	Live	N	25	0.5				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB08-MU-04	A6-MB08	Anodonta sp.	Live	N	31	0.95				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB05-MU-04	A6-MB05	Anodonta sp.	Live	N	35	1.1				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB08-MU-02	A6-MB08	Anodonta sp.	Live	Y	30	1				≤40	all HHRA and BERA analytes			Delayed Cooler Sample
A6	beach	S	A6-MB01-MU-06	A6-MB01	Anodonta sp.	Live	N	27	0.5				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB03-MU-05	A6-MB03	Anodonta sp.	Live	N	40	2				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB09-MU-06	A6-MB09	Anodonta sp.	Live	N	29	1.05				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-10	A6-MB01	Anodonta sp.	Live	N	27	0.55				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB08-MU-03	A6-MB08	Anodonta sp.	Live	Y	29	1				≤40	all HHRA and BERA analytes			Delayed Cooler Sample
A6	beach	S	A6-MB08-MU-07	A6-MB08	Anodonta sp.	Live	Y	26	0.65				≤40	all HHRA and BERA analytes			Delayed Cooler Sample
A6	beach	S	A6-MB01-MU-02	A6-MB01	Anodonta sp.	Live	N	29	1				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-18	A6-MB01	Anodonta sp.	Live	N	30	1				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB08-MU-01	A6-MB08	Anodonta sp.	Live	Y	31	1				≤40	all HHRA and BERA analytes			Delayed Cooler Sample
A6	beach	S	A6-MB08-MU-06	A6-MB08	Anodonta sp.	Live	Y	27	0.7				≤40	all HHRA and BERA analytes			Delayed Cooler Sample
A6	beach	S	A6-MB01-MU-20	A6-MB01	Anodonta sp.	Live	N	32	1.35	2	28	29	≤40	all HHRA and BERA analytes	Probably enough	No	
A6	beach	S	A6-MB09-MU-03	A6-MB09	Anodonta sp.	Live	N	33	1.5				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-08	A6-MB01	Anodonta sp.	Live	N	30	0.75				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-19	A6-MB01	Anodonta sp.	Live	N	30	0.9				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-12	A6-MB01	Anodonta sp.	Live	N	31	0.8				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB09-MU-01	A6-MB09	Anodonta sp.	Live	N	33	1				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB09-MU-05	A6-MB09	Anodonta sp.	Live	N	31	1.25				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB09-MU-02	A6-MB09	Anodonta sp.	Live	N	32	1.5				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-21	A6-MB01	Anodonta sp.	Live	N	25	0.6				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB07-MU-10	A6-MB07	Anodonta sp.	Live	N	23	0.65				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB07-MU-02	A6-MB07	Anodonta sp.	Live	N	28	0.75				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB09-MU-04	A6-MB09	Anodonta sp.	Live	N	18	1.15				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB07-MU-03	A6-MB07	Anodonta sp.	Live	N	33	1.2				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-09	A6-MB01	Anodonta sp.	Live	N	29	1.1				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-14	A6-MB01	Anodonta sp.	Live	N	8	0.75				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB03-MU-02	A6-MB03	Anodonta sp.	Live	N	36	1.5				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-15	A6-MB01	Anodonta sp.	Live	N	29	0.85				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB03-MU-01	A6-MB03	Anodonta sp.	Live	N	38	1				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB03-MU-07	A6-MB03	Anodonta sp.	Live	N	32	1				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB07-MU-04	A6-MB07	Anodonta sp.	Live	N	34	1.65				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB01-MU-23	A6-MB01	Anodonta sp.	Live	N	30	1.15				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB07-MU-08	A6-MB07	Anodonta sp.	Live	N	31	1.55				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB05-MU-03	A6-MB05	Anodonta sp.	Live	N	28	0.45				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB03-MU-03	A6-MB03	Anodonta sp.	Live	N	35	1.5				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB09-MU-07	A6-MB09	Anodonta sp.	Live	N	29	1				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB07-MU-07	A6-MB07	Anodonta sp.	Live	N	27	1.35				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB09-MU-09	A6-MB09	Anodonta sp.	Live	N	24	0.25				≤40	all HHRA and BERA analytes			
A6	beach	S	A6-MB09-MU-10	A6-MB09	Anodonta sp.	Live	N	25	0.5				≤40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-07	A6-MB11	Anodonta	Live	N	41	3.5	3	13	53	>40	all HHRA and BERA analytes	Yes	No	
A6	dive	F	A6-MB11-MU-18	A6-MB11	Anodonta	Live	N	46	5.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-01	A6-MB11	Anodonta	Live	N	58	11.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-19	A6-MB11	Anodonta	Live	N	49	8.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-03	A6-MB11	Anodonta	Live	N	54	9.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-09	A6-MB11	Anodonta	Live	N	53	8				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-11	A6-MB11	Anodonta	Live	N	51	6.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB12-MU-03	A6-MB12	Anodonta	Live	N	59	10.5	4	6	52.5	>40	all HHRA and BERA analytes	Yes	No	
A6	dive	F	A6-MB11-MU-02	A6-MB11	Anodonta	Live	N	57	10				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-21	A6-MB11	Anodonta	Live	N	45	4.5				>40	all HHRA and BERA analytes			

Area	sub area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Delayed Cooler Sample?	Length (mm)	Estimated Tissue Weight (g)	Composite Number	Number of indviduals in composite	Sample Mass	Size Class (mm)	Recommended Analyses (30 g)	Sufficient mass for BERA and HHRA? (30 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (60 g)	Comments
A6	dive	F	A6-MB12-MU-02	A6-MB12	Anodonta	Live	N	62	11				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-13	A6-MB11	Anodonta	Live	N	48	6				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-05	A6-MB11	Anodonta	Live	N	56	10.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-15	A6-MB11	Anodonta	Live	N	50	6.5	5	12	90.0	>40	all HHRA and BERA analytes	Yes	Yes	
A6	dive	F	A6-MB11-MU-14	A6-MB11	Anodonta	Live	N	52	6.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-16	A6-MB11	Anodonta	Live	N	58	10				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB12-MU-01	A6-MB12	Anodonta	Live	N	64	11				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-17	A6-MB11	Anodonta	Live	N	46	5.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-10	A6-MB11	Anodonta	Live	N	52	7.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB12-MU-04	A6-MB12	Anodonta	Live	N	57	8				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-12	A6-MB11	Anodonta	Live	N	50	7				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-08	A6-MB11	Anodonta	Live	N	52	8.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-04	A6-MB11	Anodonta	Live	N	50	6.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-20	A6-MB11	Anodonta	Live	N	46	4.5				>40	all HHRA and BERA analytes			
A6	dive	F	A6-MB11-MU-06	A6-MB11	Anodonta	Live	N	55	8.5				>40	all HHRA and BERA analytes			
A6		S	A6-MB01-CL-01	A6-MB01	Corbicula fluminea	Live	N	12	0.25	6	53	48.0	NA	all HHRA and BERA analytes	Yes	No	Includes all live clams individually measured from A6. Dead individuals (n=2) excluded.
A6		S	A6-MB02-CL-01	A6-MB02	Corbicula fluminea	Live	N	13	0.25				NA	all HHRA and BERA analytes			
A6		S	A6-MB02-CL-02	A6-MB02	Corbicula fluminea	Live	N	11	0.25				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-01	A6-MB04	Corbicula fluminea	Live	N	24	3.11				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-02	A6-MB04	Corbicula fluminea	Live	N	22	2.50				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-03	A6-MB04	Corbicula fluminea	Live	N	21	2.20				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-04	A6-MB04	Corbicula fluminea	Live	N	21	1.95				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-05	A6-MB04	Corbicula fluminea	Live	N	15	0.95				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-06	A6-MB04	Corbicula fluminea	Live	N	17	1.25				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-07	A6-MB04	Corbicula fluminea	Live	N	15	0.90				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-08	A6-MB04	Corbicula fluminea	Live	N	15	1.00				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-09	A6-MB04	Corbicula fluminea	Live	N	14	0.70				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-10	A6-MB04	Corbicula fluminea	Live	N	12	0.55				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-11	A6-MB04	Corbicula fluminea	Live	N	15	1.00				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-12	A6-MB04	Corbicula fluminea	Live	N	3	0.60				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-13	A6-MB04	Corbicula fluminea	Live	N	13	0.60				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-14	A6-MB04	Corbicula fluminea	Live	N	15	0.90				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-15	A6-MB04	Corbicula fluminea	Live	N	15	0.85				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-16	A6-MB04	Corbicula fluminea	Live	N	14	0.75				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-17	A6-MB04	Corbicula fluminea	Live	N	14	0.80				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-18	A6-MB04	Corbicula fluminea	Live	N	12	0.40				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-19	A6-MB04	Corbicula fluminea	Live	N	13	0.50				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-20	A6-MB04	Corbicula fluminea	Live	N	14	0.65				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-21	A6-MB04	Corbicula fluminea	Live	N	15	0.80				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-22	A6-MB04	Corbicula fluminea	Live	N	15	0.85				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-23	A6-MB04	Corbicula fluminea	Live	N	13	0.65				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-24	A6-MB04	Corbicula fluminea	Live	N	14	0.65				NA	all HHRA and BERA analytes			
A6		S	A6-MB04-CL-25	A6-MB04	Corbicula fluminea	Live	N	13	0.45				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-01	A6-MB05	Corbicula fluminea	Live	N	20	2.10				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-03	A6-MB05	Corbicula fluminea	Live	N	20	1.90				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-04	A6-MB05	Corbicula fluminea	Live	N	23	2.45				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-05	A6-MB05	Corbicula fluminea	Live	N	17	1.80				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-06	A6-MB05	Corbicula fluminea	Live	N	15	1.05				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-07	A6-MB05	Corbicula fluminea	Live	N	16	1.15				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-08	A6-MB05	Corbicula fluminea	Live	N	16	0.80				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-09	A6-MB05	Corbicula fluminea	Live	N	16	1.05				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-10	A6-MB05	Corbicula fluminea	Live	N	14	0.65				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-11	A6-MB05	Corbicula fluminea	Live	N	14	0.85				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-12	A6-MB05	Corbicula fluminea	Live	N	14	0.80				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-13	A6-MB05	Corbicula fluminea	Live	N	15	0.95				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-14	A6-MB05	Corbicula fluminea	Live	N	12	0.80				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-15	A6-MB05	Corbicula fluminea	Live	N	12	0.65				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-16	A6-MB05	Corbicula fluminea	Live	N	13	0.65				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-17	A6-MB05	Corbicula fluminea	Live	N	13	0.70				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-18	A6-MB05	Corbicula fluminea	Live	N	13	0.50				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-19	A6-MB05	Corbicula fluminea	Live	N	14	0.65				NA	all HHRA and BERA analytes			
A6		S	A6-MB05-CL-20	A6-MB05	Corbicula fluminea	Live	N	13	0.55				NA	all HHRA and BERA analytes			
A6		S	A6-MB09-CL-01	A6-MB09	Corbicula fluminea	Live	N	14	0.55				NA	all HHRA and BERA analytes			
A6		S	A6-MB09-CL-02	A6-MB09	Corbicula fluminea	Live	N	13	0.50				NA	all HHRA and BERA analytes			
A6		S	A6-MB09-CL-03	A6-MB09	Corbicula fluminea	Live	N	12	0.50				NA	all HHRA and BERA analytes			
A6		S	A6-MB09-CL-04	A6-MB09	Corbicula fluminea	Live	N	9	0.10				NA	all HHRA and BERA analytes			

Area	sub area	Spring or Fall? (S/F)	Organism ID	Location ID	Species	Health	Delayed Cooler Sample?	Length (mm)	Estimated Tissue Weight (g)	Composite Number	Number of indviduals in composite	Sample Mass	Size Class (mm)	Recommended Analyses (30 g)	Sufficient mass for BERA and HHRA? (30 g)	Sufficient mass for BERA and HHRA EPA split or field rep? (60 g)	Comments
EPA Preferred Option - Two size classes (≤60 mm and >60 mm) with no spatial subdivision																	
SR	north	S	SR-MB09-MU-06	SR-MB09	Western pearlshell	Live	N	47.20	5.00	1	9	40.15	≤60	all HHRA and BERA analytes	Yes	No	
SR	north	F	SR-MB34-MU-10	SR-MB34	Western pearlshell	Live	N	51.50	6.50				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-02	SR-MB34	Western pearlshell	Live	N	44.00	4.25				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB38-MU-01	SR-MB38	Western pearlshell	Live	N	36.90	2.00				≤60	all HHRA and BERA analytes			
SR	south	S	SR-MB01-MU-02	SR-MB01	Western pearlshell	Live	N	29.40	1.25				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB38-MU-02	SR-MB38	Western pearlshell	Live	N	45.70	5.50				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-03	SR-MB34	Western pearlshell	Live	N	57.50	8.00				≤60	all HHRA and BERA analytes			
SR	north	S	SR-MB09-MU-01	SR-MB09	Western pearlshell	Live	N	21.50	0.65				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-01	SR-MB34	Western pearlshell	Live	N	48.30	7.00				≤60	all HHRA and BERA analytes			
SR	north	S	SR-MB09-MU-07	SR-MB09	Western pearlshell	Live	N	54.10	7.50	2	8	42.85	≤60	all HHRA and BERA analytes	Yes	No	
SR	north	S	SR-MB09-MU-04	SR-MB09	Western pearlshell	Live	N	29.20	1.05				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-12	SR-MB34	Western pearlshell	Live	N	57.60	10.00				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-04	SR-MB34	Western pearlshell	Live	N	56.60	11.00				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB35-MU-02	SR-MB35	Western pearlshell	Live	N	40.90	3.00				≤60	all HHRA and BERA analytes			
SR	north	S	SR-MB04-MU-01	SR-MB04	Western pearlshell	Live	N	46.40	5.05				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB41-MU-01	SR-MB41	Western pearlshell	Live	N	40.50	4.00				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB42-MU-01	SR-MB42	Western pearlshell	Live	N	26.50	1.25				≤60	all HHRA and BERA analytes			
SR	north	S	SR-MB09-MU-05	SR-MB09	Western pearlshell	Live	N	44.40	4.25	3	9	32.95	≤60	all HHRA and BERA analytes	Yes	No	
SR	south	S	SR-MB01-MU-01	SR-MB01	Western pearlshell	Live	N	21.50	0.55				≤60	all HHRA and BERA analytes			
SR	south	S	SR-MB01-MU-03	SR-MB01	Western pearlshell	Live	N	43.80	4.20				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB35-MU-01	SR-MB35	Western pearlshell	Live	N	42.60	4.00				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB36-MU-01	SR-MB36	Western pearlshell	Live	N	37.60	3.00				≤60	all HHRA and BERA analytes			
SR	north	S	SR-MB09-MU-02	SR-MB09	Western pearlshell	Live	N	25.00	0.70				≤60	all HHRA and BERA analytes			
SR	north	S	SR-MB09-MU-03	SR-MB09	Western pearlshell	Live	N	28.30	1.15				≤60	all HHRA and BERA analytes			
SR	south	S	SR-MB01-MU-04	SR-MB01	Western pearlshell	Live	N	55.00	5.10				≤60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-11	SR-MB34	Western pearlshell	Live	N	58.50	10.00				≤60	all HHRA and BERA analytes			
SR	north	S	SR-MB03-MU-01	SR-MB03	Western pearlshell	Live	N	74.90	16.00	4	3	53	>60	all HHRA and BERA analytes	Yes	No	
SR	north	F	SR-MB36-MU-02	SR-MB36	Western pearlshell	Live	N	68.70	16.00				>60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-14	SR-MB34	Western pearlshell	Live	N	74.00	21.00				>60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-06	SR-MB34	Western pearlshell	Live	N	73.50	20.00	5	3	62	>60	all HHRA and BERA analytes	Yes	Yes	
SR	north	F	SR-MB34-MU-07	SR-MB34	Western pearlshell	Live	N	74.60	19.50				>60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-15	SR-MB34	Western pearlshell	Live	N	79.10	22.00				>60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-13	SR-MB34	Western pearlshell	Live	N	66.50	13.50	6	4	67	>60	all HHRA and BERA analytes	Yes	Yes	
SR	north	F	SR-MB34-MU-09	SR-MB34	Western pearlshell	Live	N	73.30	20.00				>60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-05	SR-MB34	Western pearlshell	Live	N	63.70	14.00				>60	all HHRA and BERA analytes			
SR	north	F	SR-MB34-MU-08	SR-MB34	Western pearlshell	Live	N	75.50	19.50				>60	all HHRA and BERA analytes			

Section 5:
TAI's response dated 1/12/17

Kessel Cristy SPOK

From: McCaig Kris SPOK
Sent: Thursday, January 12, 2017 9:24 AM
To: Buelow, Laura
Cc: Marilyn Gauthier (Marilyn.Gauthier@ch2m.com); Shaun.Roark@ch2m.com; Stifelman, Marc; thayer@srcinc.com; Cerise, Kathryn; Enos Dave SPOK; Kessel Cristy SPOK; John Toll; Nancy Judd (NancyJ@windwardenv.com); Berit Bergquist (BeritB@windwardenv.com); Kate McPeek; Dina Johnson (DLJohnson@ramboll.com)
Subject: RE: Benthic invert memo
Attachments: 01-12-17_Draft Final BMI compositing response to EPA_LBuelow.pdf

Hi Laura,

Please see the attached in response to the memo and your follow up email from January 9. Let us know if you would like to discuss.

Thanks,

Kris

Kris McCaig
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Teck American Incorporated
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eMail: Kris.McCaig@teck.com
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From: Buelow, Laura [mailto:Buelow.Laura@epa.gov]
Sent: Wednesday, December 21, 2016 11:55 AM
To: McCaig Kris SPOK <Kris.McCaig@teck.com>
Cc: Marilyn Gauthier (Marilyn.Gauthier@ch2m.com) <Marilyn.Gauthier@ch2m.com>; Shaun.Roark@ch2m.com; Stifelman, Marc <Stifelman.Marc@epa.gov>; thayer@srcinc.com; Cerise, Kathryn <Cerise.Kathryn@epa.gov>
Subject: Benthic invert memo

Kris,

Please see the attached memo describing how we developed the composites for the BMI study. We also have been discussing our other 2 action items.

Our initial thought is that the reference locations may be useful for the BERA, however we are still working on a write up for that. It won't be to you until the new year.

For the human health analysis of Corbicula, we believe since we don't have data to say otherwise, we should err on the side of inclusion and analyze the composite for all HH analytes.

Just to let you know my schedule, I will be in through Friday morning and then out of the office until January 4.

Laura Buelow, Ph.D.
Project Manager
U.S. Environmental Protection Agency

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TAI Response to EPA's Comments on Final Compositing Approach 01-12-17

EPA reviewed TAI's draft final compositing plan approach (submitted on October 27, 2016) for crayfish and mussels collected from the UCR in the spring and fall of 2016. EPA's revised version of the draft final compositing plan was sent to TAI on December 7, 2016. Upon receipt of the revised plan, TAI prepared a list of questions for EPA for clarification of the approach; these questions were discussed in a conference call with TAI and EPA on December 12, 2016. At that time, TAI requested a written description from EPA on the rationale for its approach, which was received by TAI on December 21, 2016. A follow up email from EPA was received by TAI on January 9, 2017 regarding reference locations for the baseline ecological risk assessment (Buelow 2017).

This response presents TAI's comments on EPA's revised plan and rationale. As discussed below, TAI has substantial concerns about the size-based compositing approach. Also, as discussed below, TAI remains concerned about how data for crayfish components collected from the two reference areas would be used in the BERA. TAI is willing to analyze all crayfish components from these reference areas but it does not accede to the representativeness of these data for use in the BERA unless EPA provides sound, detailed technical justification for their use, subject to TAI's review and agreement. In addition, TAI provides a recommendation for analysis of clams and mussels in Area 6.

Size-based Compositing Approach

TAI has three substantive concerns with the size-based compositing approach: 1) the approach deviates from the quality assurance project plan (QAPP), 2) it will contribute to bias and uncertainty in exposure assessments, and 3) the proposed evaluation of size/contaminant correlation is inappropriate.

Deviation from the QAPP

EPA's approach contradicts the previous iteration of the compositing plan (dated July 22, 2016), which focused on creating composites representing locations within sampling areas, consistent with the QAPP. The QAPP states that "six composite samples *from different locations* [italics added] within each sampling area will be collected," with these composites "ideally representing unique locations within each sampling area" (see Section B1.1 of the QAPP). EPA's revised approach selects organisms for distribution among composites primarily based on size (crayfish weight or mussel length) of the organism rather than by spatial location within a sampling area. Analysis by size was not called for in the QAPP, nor does the QAPP include any indication that size would be considered as part of the compositing plan beyond ensuring that composite samples had sufficient mass (Exponent et al. 2016).

EPA's memo notes that "the sample collections were not designed to assess the size/concentration relationships," but that size-weighted averages might be used to calculate exposure concentrations for humans and wildlife. It is not clear how the size-weighted averages would be used, given that there is not currently any information about size preference for human consumption of mussels or crayfish from the UCR, as noted in EPA's memo. Further, it is unknown whether crayfish weighing more or less than 38 grams or mussels measuring more or less than 40, 47, 53, 59, 60, 68, 70, or 76 millimeters would even be representative of relevant size class preferences should such information become available in the future. In the absence of this exposure information for size-dependent consumption preferences, the best approach for characterizing the exposure media is to estimate the concentration that is most likely to be consumed based on what is most likely to be found. This approach for characterizing exposure is written into the QAPP, which was designed to incorporate all sizes of organisms found.

Bias and Uncertainty in Exposure Estimates

The QAPP called for six composite samples for each tissue type in each sampling area because EPA and TAI considered six composite samples to be enough for calculating the 95th percentile of the uncertainty distribution on the mean (95 UCL). Creating composites by size class will increase the variability of the chemical tissue concentrations among the analyzed samples within an area (if all six composites for mussels or crayfish are used together). The size variability will inflate the uncertainty about the mean, so the 95 UCL estimate will be more uncertain and biased high. In addition, the samples proposed by EPA are a mix of single organisms and composites. If data from all six of the analyzed samples for an area are used together to generate a 95 UCL, the larger organisms analyzed individually will have a greater influence on the mean than they would have if they were a part of composite samples. This also would add uncertainty and bias to the 95 UCL estimate for the area.

Although there is no information to support consumption by different size classes, the proposed compositing scheme is also problematic if the data are to be used to estimate concentrations for different size classes. As noted above, for mussels, a consistent set of size classes has not been applied across the six sample areas and single reference area. And, in some cases, EPA proposes compositing based on four different, but somewhat overlapping, size classes within the same area (i.e., mussels in areas 1 and 4). This would hinder the estimation of a concentration for a particular size class. There will also not be enough results from composite and/or individual samples in a size class to estimate the 95 UCL by size class to the intended level of reliability indicated in the QAPP; therefore it would be necessary to use the maximum concentration of the composites within a size class to represent an exposure point concentration instead of the 95 UCL. Thus, data generated by EPA's size based compositing scheme would contribute to uncertainty in risk estimates, even if size based on consumption information were available.

Inappropriate Size/contaminant Correlation Evaluation

In the technical memorandum provided by EPA on December 21, 2016 (Explanation of Recommended Benthic Macroinvertebrate Compositing Plan), EPA includes its rationale for size class grouping. We have concerns about the utility for the RI/FS of EPA's desire for "information about a correlation between size and contaminant concentrations" and the ability of the proposed approach to address this new area of inquiry.

EPA's compositing approach will not provide useful information about a correlation between size and contaminant concentrations in that it would result in composites that include widely different amounts of tissue from the different organisms in the composite. For example, EPA's crayfish composite 4 for Area 3 contains a 1 g crayfish and a 28 g crayfish (in addition to other organisms). There is not sufficient mass to create composites with equal sized homogenates from each crayfish (or mussel) contributing to the composite. Hence that sample will be highly influenced by the larger individuals in the composite and the composite would not be useful for evaluating a relationship between size and contaminant concentration. In the TAI compositing proposal, each composite is intended to represent what could be eaten by people or wildlife based on what is available for collection in that area, without attempting to make inferences about different exposures depending on crayfish or mussel size. Thus, for use in the human health and ecological risk assessments, the wide variation in sizes within the TAI proposed composites is acceptable.

EPA's memorandum cites guidance (USEPA 2000) as supporting rationale for compositing by size. However, the guidance is for setting fish advisories, based on the presumption that advisories might be specific to particular size classes and a goal of comparing composites for a particular species over a wide geographic area. These are not the objectives of the current UCR BMI tissue study. In addition, other aspects of this guidance are not followed in EPA's memorandum, as follows:

- EPA's guidance for fish advisories states "Ideally, for fish or shellfish, the total length (or size) of the smallest individual in any composite sample should be no less than 75 percent of the total, length (or size) of the largest individual in the composite sample."
- EPA's guidance uses length rather than weight for size class divisions
- EPA's guidance recommends that composites should be created using equal weights (g) of homogenized tissue from each fish in the composite.

In summary, the study was not designed to provide useful information about a correlation between size and contaminant concentrations, nor will EPA's compositing approach provide useful information about such a correlation. Further, in documenting its rationale, EPA has selectively accepted and ignored pieces of a guidance document and has applied guidance *for a different purpose than what the guidance document was written to serve*. This undermines the sampling design process that EPA and TAI followed, creates ambiguity about study objectives, and adds uncertainty to the data that will be generated by analyzing the composites.

Reference Area Analyses

The EPA-approved QAPP states that results from the reference areas are only for use in the HHRA. Only the stomach minus carapace component of crayfish needs to be analyzed to provide data for the HHRA. EPA's revised compositing plan also calls for analysis of the remainder of the crayfish (i.e., whole body minus stomach and carapace). Those data would not be used in the HHRA and so they are unnecessary to meet the objectives defined in the QAPP. The BERA work plan states that if there are unacceptable risks to aquatic-dependent wildlife based on the dietary model,[1] then chemical concentrations in the sediment and surface waters will be compared to background; a tissue background comparison was not discussed (Parametrix et al. 2011). EPA is proposing the additional analyses so that the data would be available if an evaluation of background using crayfish tissue were to be performed for the BERA (Buelow 2017).

TAI agrees to analyze the whole body minus stomach and carapace for the crayfish samples collected from the Sanpoil River and Buffalo Lake. TAI does not agree that it would be appropriate to use Sanpoil River and Buffalo Lake as background areas for evaluating ecological risk. Appropriateness would need to be evaluated prior to using these data in the BERA. EPA indicates that reference areas should match the site in all aspects except contamination, and should reflect overall environmental conditions that can reasonably be expected in the site area (USEPA 1994). Both the Sanpoil River and Buffalo Lake have different characteristics than the UCR, specifically related to water flow rates and depths, but they also may differ in relation to water quality parameters (e.g., temperature) and habitat structure. EPA guidance recommends that a preferable reference location would be higher in the drainage system and located as close to the site as possible (USEPA 1994).

Area 6 Mussels and Clams

EPA's revised compositing approach includes 5 mussel samples and 1 clam sample for Area 6, for a total of 6 composite samples. TAI recommends that 6 mussel samples be analyzed rather than 5, so that a sufficient number of composite sample data are available for calculation of a mussel-only 95 UCL. Sufficient tissue is available to obtain at least 30 g of soft mussel tissue in each of 6 samples. It should be noted that clams were not identified as a data need in the QAPP and that TAI has concerns about the analysis of a single clam sample, which precludes the calculation of a 95 UCL. If this sample is used by EPA for human health risk calculations, TAI will evaluate the usefulness of this data point upon review of the HHRA.

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[1] Background comparisons for unacceptable risk to fish from dietary modeling were not specifically discussed in the work plan.

Conclusion

EPA's revised compositing scheme uses size similarity to assign organisms to composites. This deviates from the QAPP and will introduce uncertainty, error and bias into the dataset. We have discussed why EPA's proposed compositing approach will not be useful for addressing EPA's added inquiry about a correlation between size and contaminant concentrations. This is a significant technical concern. TAI is equally concerned with the uncertainty that the compositing scheme would add to exposure estimates.

With this compositing plan EPA reversed course and deviated from its approved QAPP. Our principal concern is that this type of practice, if unchecked, will undermine the rigor, objectivity and defensibility of the RI/FS.

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Section 6:
EPA’s response dated 1/26/17

Kessel Cristy SPOK

Subject: FW: BMI response
Attachments: BMI Composites - Response to TAI 2017.01.26.pdf

From: Buelow, Laura [mailto:Buelow.Laura@epa.gov]
Sent: Thursday, January 26, 2017 2:15 PM
To: McCaig Kris SPOK <Kris.McCaig@teck.com>
Cc: Shaun.Roark@ch2m.com; Marilyn Gauthier (Marilyn.Gauthier@ch2m.com) <Marilyn.Gauthier@ch2m.com>
Subject: BMI response

Kris,

Here is our response to TAI's response on the BMI composites. Please let me know if you would like to discuss. I would be happy to set up a webinar if you'd like.

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Response to TAI Comments on EPA Recommended Compositing Approach for Benthic Macroinvertebrate Tissue - DRAFT

PREPARED FOR:	Laura Buelow/EPA Marc Stifelman/EPA
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This memorandum presents responses to Teck American Inc.'s (TAI) comments on EPA's suggested approach to compositing of the benthic macroinvertebrate (BMI) tissue samples (crayfish and mussels) collected for chemical analyses from the Upper Columbia River (UCR) Site in spring and fall of 2016. EPA's suggested approach was detailed in a technical memorandum (Explanation of Recommended Benthic Macroinvertebrate Compositing Plan), dated December 21, 2016. TAI's comments on the approach were described in memorandum dated January 12, 2017. The January TAI memorandum identified the following general concerns about the EPA's recommended approach:

- Size-based compositing of BMI tissue
- Analysis of crayfish from reference areas
- Inclusion of clam tissue in Area 6 composites

Background

EPA chose to explore approaches to compositing, including size-stratified compositing, after reviewing TAI's draft compositing approach (submitted on October 27, 2016), because it was apparent that the handling of BMI size and spatial distribution in composites could affect the outcome of the results, yet TAI's proposed approach had not fully accounted for these factors. In fact, TAI's proposed compositing approach deviated from the QAPP (Exponent 2016[1]) by attaining the targeted six composites per area by using multiple field replicates instead of using samples representing six unique sampling locations within each area. For mussels, field replicates were included in every sampling area; for crayfish, only in Area 4. The QAPP addressed the use of field replicates to evaluate variation of composite samples within an area, but they were to be used in addition to the composites created from six unique sampling locations (QAPP, Table A-3).

It would be inappropriate to include field replicates in the calculation of the exposure concentration (as 95 percent upper confidence limit on the mean [95 UCL]), because field replicates do not represent independent samples of the larger population in each area. Including the replicates in the exposure calculations would reduce the variability of the composite means for each area, introducing a low bias to the exposure point concentration (95 UCL), and underestimating human, fish, and wildlife exposure through BMI consumption. Instead of including the field replicates as individual samples in the 95 UCL

[1] Cited as TAI 2016a and 2016b in EPA's memo

calculation, the mean of the field replicates should be used to represent each collection location. In areas where all samples were collected from less than six locations, the sample size for these areas is less than six. For mussels in Areas 1 and 4, the sample size would be two; for Area 2, it would be three, and for Areas 3 and 5, the sample size would be four. In accordance with the QAPP, the maximum measured tissue concentration will be used to estimate exposure where there are two composite samples in an area (USEPA 1989). For the remaining samples with three or more values, the recommended value from ProUCL will be used to estimate the exposure point concentration.

Crayfish collected ranged from 1 gram (g) to 105 g and mussels collected ranged from 1 g to 70 g (field weight). The analytical result for a composite sample composed of unequal mass from each individual is the mass-weighted average concentration; larger individuals will have proportionately greater influence on the analytical result. The QAPP only considered the potential size range of signal crayfish samples collected in areas where BMI exposure would be considered in the HHRA (Areas 2, 5, 6). For legal collection of this native species the lower bound of the size range is 3.25 inches, and the QAPP suggests that signal crayfish will be 3.5 to 4 inches and will be 35 to 40 g wet weight (ww). If the relative size range was similar for all species/samples, size-weighting in composite samples would not be a major concern. Given the range of sizes actually collected, some consideration of size was considered desirable to avoid accidental bias and increased uncertainty.

EPA recognizes that there were practical and logistical constraints on obtaining the targeted number of sample locations, but it is nonetheless important that the compositing approach is technically sound. Given the range of individual sizes and the limited spatial representativeness (for mussels), EPA explored and proposed the use of size-stratified composite samples that were (except in Area 1) random with respect to collection location within areas.

Responses to TAI Comments

Responses to TAI comments are provided under the general topics of concern. Paragraph numbers were not included in TAI's January 12, 2017 memorandum, but were added here for organization of comments and responses.

Size-Based Compositing Approach

TAI listed three concerns with the size-based compositing approach. Each is discussed and addressed below.

1. "Deviation from QAPP"

<u>TAI Paragraph 1-1:</u> *"EPA's approach contradicts the previous iteration of the compositing plan (dated July 22, 2016), which focused on creating composites representing locations within sampling areas, consistent with the QAPP. The QAPP states that "six composite samples* from different locations *[italics added] within each sampling area will be collected," with these composites "ideally representing unique locations within each sampling area" (see Section B1.1 of the QAPP). EPA's revised approach selects organisms for distribution among composites primarily based on size (crayfish weight or mussel length) of the organism rather than by spatial location within a sampling area. Analysis by size was not called for in the QAPP, nor does the QAPP include any indication that size would be considered as part of the compositing plan beyond ensuring that composite samples had sufficient mass (Exponent et al. 2016)."*

<u>Response 1-1:</u> EPA recognizes that the QAPP did not address how variability in size among individual crayfish and mussels should be handled in assignment of individuals to composites. The QAPP was also not specific as to how the samples collected from each of the six locations or two seasons were to be distributed among composites, nor what should be done if all of the samples in an area came from only two locations instead of six.

Assuming a general similarity of size and number individuals at each location within areas, given six locations and six composite samples as stated in the QAPP, it would be possible to (1) randomly assign individuals to composites, (2) composite individuals together from each location, or (3) evenly distribute (spatially) individuals in composites such that each composite contained one individual from each location. If spatial variation affects tissue concentration more than size, gender, seasonal variation, or other factors, it is likely that the second approach would produce the most variable mean tissue concentrations and highest 95 UCL, whereas the third approach would produce the most similar means and the lowest 95 UCL. Random assignment to composites would presumably be most appropriate to represent BMI consumers. Similar options are available if there are only two locations to be distributed among six composite samples. This was not discussed in the QAPP, and therefore needed to be considered as the compositing approach was developed.

As noted above, TAI's proposed compositing preferentially combined individuals within locations rather than among locations, and any composites for which all individuals were from the same location within an area were referred to as "field replicates." This also deviates from the QAPP, in that field replicates described in the QAPP were to be in addition to the six composites using samples collected from unique locations. As described in the background section, inclusion of field replicates in the 95 UCL estimate will bias the estimate low.

<u>*TAI Paragraph 1-2:*</u> *"EPA's memo notes that* 'the sample collections were not designed to assess the size/concentration relationships,' *but that size-weighted averages might be used to calculate exposure concentrations for humans and wildlife. It is not clear how the size-weighted averages would be used, given that there is not currently any information about size preference for human consumption of mussels or crayfish from the UCR, as noted in EPA's memo. Further, it is unknown whether crayfish weighing more or less than 38 grams or mussels measuring more or less than 40, 47, 53, 59, 60, 68, 70, or 76 millimeters would even be representative of relevant size class preferences should such information become available in the future. In the absence of this exposure information for size-dependent consumption preferences, the best approach for characterizing the exposure media is to estimate the concentration that is most likely to be consumed based on what is most likely to be found. This approach for characterizing exposure is written into the QAPP, which was designed to incorporate all sizes of organisms found."*

<u>Response 1-2.</u> As stated in the background section, because the composite samples will be created using unequal masses, the analytical results (metals and other contaminant concentrations) for each composite will necessarily be size-weighted averages. Therefore, given the range from 1 g to 105 g and 1 g to 70 g for crayfish and mussels, respectively, the approach to allocating individuals into composites will affect the outcome of the analysis, whether by design or by accident. Other factors, including season of collection, species, and spatial variation, could affect the results and should be considered in composite assignment, regardless of the extent to which these factors were discussed in the QAPP.

We acknowledge that the size groups are not based on consumption preferences of humans or wildlife; rather they are intended to split the available individuals in each area into approximately equal size groupings. The exact break point for size categories was considered less important than getting a representative sample of relatively large and small individuals in each area. The results in each case should be considered a size-weighted average for the composite, rather than a value representing the average of a given size range. While this design may not be ideal, given the limitations on estimating UCLs where spatial representativeness is poor, the potential gain in information about the potential for size-based differences in concentration was judged to be worth any added complexity that results from stratifying by size.

We agree in principle that the best approach for characterizing the exposure is to "estimate the concentration that is most likely to be consumed based on what is most likely to be found." However, we strongly caution against assuming that the specific samples collected in each area accurately represent the population of crayfish and mussels that would be found by human or wildlife consumers. This is likely less an issue for crayfish, since crayfish were broadly collected in small numbers from many locations throughout each area. For mussels, however, it is questionable how accurately the collections from only two or three locations accurately represent the area-wide population. That is, the size distribution of the sampled mussels may not be representative of the range of sizes present in each area. For example, in Area 4 all mussels collected were greater than 10 g (estimated weight), whereas in Area 6 nearly all mussels collected were less than 10 g. While there could be some differences in the true size distribution in each area, it is more likely that the difference in size distribution of samples among areas is the result of sampling error, and that the true size distribution of mussels in each area is more similar than suggested by the samples. Similarly, crayfish greater than 85 g were collected in Areas 2 and 4, but not in any other areas. This is not an indication that crayfish greater than 85 g would not be found in the other areas.

There was insufficient existing information to determine *a priori* which factors are most likely to be associated with differences in concentrations among individuals, or to know what sizes or sample locations within each area would best represent crayfish or mussels consumed by humans, fish, and wildlife. We generally expect bioaccumulative compounds to be greater in larger, older individuals that have been exposed for a longer period of time. Variation in tissue concentrations could also result from spatial variation in sediment chemistry (e.g., metals, chlorinated organics, or total organic carbon) within each area. Given the lack of existing information, the composites should be created such that they provide the most information and best general characterization of potential consumption.

2. "Bias and Uncertainty in Exposure Estimates"

TAI Paragraph 2-1: "The QAPP called for six composite samples for each tissue type in each sampling area because EPA and TAI considered six composite samples to be enough for calculating the 95th percentile of the uncertainty distribution on the mean (95 UCL). Creating composites by size class will increase the variability of the chemical tissue concentrations among the analyzed samples within an area (if all six composites for mussels or crayfish are used together). The size variability will inflate the uncertainty about the mean, so the 95 UCL estimate will be more uncertain and biased high. In addition, the samples proposed by EPA are a mix of single organisms and composites. If data from all six of the analyzed samples for an area are used together to generate a 95 UCL, the larger organisms analyzed individually will have a greater influence on the mean than they would have if they were a part of composite samples. This also would add uncertainty and bias to the 95 UCL estimate for the area."

Response 2-1: We agree that calculating 95 UCLs for six samples representing two size classes could result in a 95 UCL that was biased high relative to a random assignment of the same individuals into six samples. We note that this high bias would only occur if there were a size/concentration relationship. However, as discussed above, the compositing scheme proposed by TAI would result in field replicates for mussels being included in each area to calculate 95 UCLs, which would result in a low bias to the 95 UCL, regardless of whether or not there was a size/concentration or location/concentration relationship.

EPA avoided including single-organism samples, but in a few cases it was necessary to obtain six samples representing the selected size/location groups.

TAI Paragraph 2-2: "Although there is no information to support consumption by different size classes, the proposed compositing scheme is also problematic if the data are to be used to estimate concentrations for different size classes. As noted above, for mussels, a consistent set of size classes has not been applied across the six sample areas and single reference area. And, in some cases, EPA proposes compositing based on four different, but somewhat overlapping, size classes within the same area (i.e., mussels in areas 1 and 4). This would hinder the estimation of a concentration for a particular size class. There will also not be enough results from composite and/or individual samples in a size class to estimate the 95 UCL by size class to the intended level of reliability indicated in the QAPP; therefore it would be necessary to use the maximum concentration of the composites within a size class to *represent an exposure point concentration instead of the 95 UCL. Thus, data generated by EPA's size-based compositing scheme would contribute to uncertainty in risk estimates, even if size based on consumption information were available."*

Response 2-2: As noted above and stated specifically in the EPA's December 21, 2016, BMI Compositing Memo, "because the actual sizes of individuals (e.g., mean) in each size class is variable, comparisons of concentrations within or among areas for either size class could be misleading. That is, comparisons of concentrations among areas may still need to consider average size of individuals in each sample." The size ranges were never intended to represent a specific size range. The split among sizes in each location was an attempt to optimize representation of large and small individuals in the samples. Comments on the calculating the 95 UCL and associated uncertainty were addressed in Responses 1-1 and 2-1.

TAI is correct that if there is a correlation between size and metal concentration, the 95 UCL of the composite mean metals concentration in each area would be higher using a size-stratified approach (as proposed by EPA) than using a random or uniform size approach, but only if other patterns (i.e., spatial or seasonal) are relatively unimportant. If there is no relationship between size and concentration, it would not matter.

3. "Inappropriate Size/Contaminant Correlation Evaluation"

TAI Paragraph 3-1: In the technical memorandum provided by EPA on December 21, 2016 (Explanation of Recommended Benthic Macroinvertebrate Compositing Plan), EPA includes its rationale for size class grouping. We have concerns about the utility for the RI/FS of EPA's desire for "information about a correlation between size and contaminant concentrations" and the ability of the proposed approach to address this new area of inquiry.

Response 3-1. Concern noted.

TAI Paragraph 3-2: EPA's compositing approach will not provide useful information about a correlation between size and contaminant concentrations in that it would result in composites that include widely different amounts of tissue from the different organisms in the composite. For example, EPA's crayfish composite 4 for Area 3 contains a 1 g crayfish and a 28 g crayfish (in addition to other organisms). There is not sufficient mass to create composites with equal sized homogenates from each crayfish (or mussel) contributing to the composite. Hence that sample will be highly influenced by the larger individuals in the composite and the composite would not be useful for evaluating a relationship between size and contaminant concentration. In the TAI compositing proposal, each composite is intended to represent what could be eaten by people or wildlife based on what is available for collection in that area, without attempting to make inferences about different exposures depending on crayfish or mussel size. Thus, for use in the human health and ecological risk assessments, the wide variation in sizes within the TAI proposed composites is acceptable.

Response 3-2: We recognize that the BMI sample collections were not designed to allow calculation of a correlation coefficient for size and contaminant concentration, and we also recognize that in some cases there may be limited power to detect differences among large and small sizes. The intent of the size-stratification is to determine whether there is evidence that some chemicals are at greater or lesser concentration in larger or smaller organisms. In Area 3, all but three crayfish were smaller than 38 g. Despite the range of samples included in the composites, the EPA's small size crayfish samples in Area 3 had mean mass of 13, 15, 14, and 18 g, whereas the large crayfish samples were 48 g (mean of 2 individuals) and 46 g (single individual). It is likely that substantial size/concentrations relationships would be evident using EPA's approach, especially when considering data across all areas.

The mean mass of each composite in TAI's approach was 19, 17, 14, 28, 12, and 18 g. The mean mass of crayfish in all areas (including only those selected for inclusion in TAI analyses) is 34 g. In calculating an estimate of exposure concentration in Area 3, consideration should be given to whether the small average size of crayfish collected in Area 3 is representative of crayfish that would be consumed, on average, from this location.

<u>TAI Paragraph 3-3:</u> *EPA's memorandum cites guidance (USEPA 2000) as supporting rationale for compositing by size. However, the guidance is for setting fish advisories, based on the presumption that advisories might be specific to particular size classes and a goal of comparing composites for a particular species over a wide geographic area. These are not the objectives of the current UCR BMI tissue study. In addition, other aspects of this guidance are not followed in EPA's memorandum, as follows:*

- *EPA's guidance for fish advisories states "Ideally, for fish or shellfish, the total length (or size) of the smallest individual in any composite sample should be no less than 75 percent of the total, length (or size) of the largest individual in the composite sample."*
- *EPA's guidance uses length rather than weight for size class divisions*
- *EPA's guidance recommends that composites should be created using equal weights (g) of homogenized tissue from each fish in the composite.*

<u>Response 3-3</u>: We are familiar with this USEPA (2000) guidance, and recognize that the objectives of the BMI sampling are not necessarily consistent with the objectives of the fish contaminant monitoring programs. Incidentally, the use of length rather than weight (second bullet above) is hardly relevant to this discussion since length and weight are typically strongly correlated. However, if it had been possible to predict *a priori* the size categories of BMI that were present and could be collected in the UCR, we would have recommended considering elements of USEPA (2000), particularly the first and third bullets above. If these recommendations could have been followed, the resulting data set would be useful for making comparisons of concentrations in biota among sampling areas, and developing more robust models of size/concentration relationships, which would be more useful in dietary exposure models for BMI consumers whose size preferences are understood.

<u>TAI Paragraph 3-4:</u> *In summary, the study was not designed to provide useful information about a correlation between size and contaminant concentrations, nor will EPA's compositing approach provide useful information about such a correlation. Further, in documenting its rationale, EPA has selectively accepted and ignored pieces of a guidance document and has applied guidance for a different purpose than what the guidance document was written to serve. This undermines the sampling design process*

<u>Response 3-4</u>: As discussed in multiple response above, we do not agree that EPA's size-stratified compositing approach will not be informative about potential correlations of size and concentration. We recognize that the study design limits the strength of the comparison. The statement in the EPA BMI Compositing Memo EPA was "EPA (2000) guidance on compositing samples for chemical analyses, which is used to establish fish consumption advisories, recommends against having large size discrepancies of individuals within composites." Clearly, TAI recognizes the shortcomings of having a large size range within composites, given the statement in *TAI Paragraph 3-2* above.

Reference Area Analyses

<u>TAI</u>: *The EPA-approved QAPP states that results from the reference areas are only for use in the HHRA. Only the stomach minus carapace component of crayfish needs to be analyzed to provide data for the HHRA. EPA's revised compositing plan also calls for analysis of the remainder of the crayfish (i.e., whole body minus stomach and carapace). Those data would not be used in the HHRA and so they are unnecessary to meet the objectives defined in the QAPP. The BERA work plan states that if there are unacceptable risks to aquatic-dependent wildlife based on the dietary model,[1] then chemical concentrations in the sediment and surface waters will be compared to background; a tissue background comparison was not discussed (Parametrix et al. 2011). EPA is proposing the additional*

analyses so that the data would be available if an evaluation of background using crayfish tissue were to be performed for the BERA (Buelow 2017).

TAI agrees to analyze the whole body minus stomach and carapace for the crayfish samples collected from the Sanpoil River and Buffalo Lake. TAI does not agree that it would be appropriate to use Sanpoil River and Buffalo Lake as background areas for evaluating ecological risk. Appropriateness would need to be evaluated prior to using these data in the BERA. EPA indicates that reference areas should match the site in all aspects except contamination, and should reflect overall environmental conditions that can reasonably be expected in the site area (USEPA 1994). Both the Sanpoil River and Buffalo Lake have different characteristics than the UCR, specifically related to water flow rates and depths, but they also may differ in relation to water quality parameters (e.g., temperature) and habitat structure. EPA guidance recommends that a preferable reference location would be higher in the drainage system and located as close to the site as possible (USEPA 1994).

Response: This is acceptable to EPA

Clams (*Corbicula*) in Area 6

TAI: "EPA's revised compositing approach includes 5 mussel samples and 1 clam sample for Area 6, for a total of 6 composite samples. TAI recommends that 6 mussel samples be analyzed rather than 5, so that a sufficient number of composite sample data are available for calculation of a mussel-only 95 UCL. Sufficient tissue is available to obtain at least 30 g of soft mussel tissue in each of 6 samples. It should be noted that clams were not identified as a data need in the QAPP and that TAI has concerns about the analysis of a single clam sample, which precludes the calculation of a 95 UCL. If this sample is used by EPA for human health risk calculations, TAI will evaluate the usefulness of this data point upon review of the HHRA."

Response: The TAI-proposed composites of mussels in Area 6 include two composites collected in spring, which consist of many small mussels less than 2 g each (except for two larger mussels from fall locations MB11 and MB12, which were 11.5 and 8 g respectively). Composites 3 through 6 are composed entirely of larger mussels from MB11 and MB12, which appear to be essentially the same location. The validity of a 95 UCL calculated from these six samples as representative of mussels throughout Area 6 is highly questionable.

The EPA-proposed composites also grouped the small (≤40 millimeter [mm]) and large (>40 mm) mussels, but into five composites, with a sixth proposed composite made up of Corbicula. A simple approach of using a 95 UCL would be no more valid for these samples than for those proposed by TAI, but the EPA approach makes a clean break between small and large sizes, and randomly assigns mussels to composites based on location.

References

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Section 7:
TAI’s response dated 2/10/17

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February 10, 2017

File No.: 01-773180-000

Dr. Laura Buelow
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825 Jadwin Avenue, Suite 210
Richland, WA 99352

VIA ELECTRONIC MAIL ONLY

Subject: Upper Columbia River Remedial Investigation and Feasibility Study (UCR RI/FS) – Benthic Macroinvertebrate Tissue Study Sample Compositing Plan

Dear Dr. Buelow:

The final EPA-approved BMI study QAPP Addendum specified that Teck American Incorporated (TAI) would develop the specific compositing plan for crayfish and mussels in consultation with EPA, TAI worked diligently with EPA over the course of several months to do just that. Specifically, the draft BMI compositing plan submitted for EPA's review on October 27, 2016 was developed based on EPA's interim compositing plan dated July 22, 2016.

EPA has changed course on the compositing approach, as reflected in its technical memorandum dated December 21, 2016. TAI responded with our technical concerns about EPA's new approach in our memorandum dated January 21, 2017. We received EPA's response to that memorandum dated January 26, 2017. Notwithstanding EPA's January 26, 2017 response, we continue to have concerns that EPA's new approach will compromise the study DQOs and unnecessarily increase uncertainty in EPC estimates. The purpose of this response is to reply to EPA's January 26, 2017 response, document our ongoing concerns, and urge that EPA re-consider these concerns.

Issue 1: EPA incorrectly states that the October 27, 2016 compositing approach, which reflected TAI's consultation with EPA, deviates from the QAPP.

EPA Comment, p. 1, 1st paragraph of Background Section: "*TAI's proposed compositing approach deviated from the QAPP (Exponent 2016) by attaining the targeted six composites per area by using multiple field replicates instead of using samples representing six unique sampling*

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locations within each area. For mussels, field replicates were included in every sampling area; for crayfish, only in Area 4. The QAPP addressed the use of field replicates to evaluate variation of composite samples within an area, but they were to be used in addition to the composites created from six unique sampling locations."

TAI Objection: EPA's assertion that TAI's compositing approach deviated from the QAPP is incorrect. The QAPP did not require that samples be collected from unique locations, although that was a target. As described in the field sampling plan (FSP) for mussel collection, after reconnaissance of the entire shoreline area of the site, an extensive search of 12 of the most promising different beach locations within each sampling area was conducted in an attempt to collect mussels from different areas. For crayfish, traps were placed throughout each area for a total of at least 90 trap nights in each area. As stated in the FSP regarding mussel sampling: "*…ideally each composite sample will be collected from a separate beach area, although this may change depending on the availability of mussels in the sampling area."* EPA field oversight provided confirmation that the effort was sufficient per the QAPP for each area. In some areas, the target of collecting samples from six unique locations was simply not achievable due to limited occurrence of mussels, despite meeting EPA's required level of effort.

In cases where the target of six different locations was not met, samples collected from the same beach were identified in the October 2016 compositing plan as both independent samples from the population of mussels available for people or wildlife to consume, and as samples that could be used for the purpose of evaluating variability among organisms at the same location. While these samples have been identified as "field replicates" in compositing spreadsheets, they should be considered independent samples that are representative of what is most likely to be found by consumers because of the extensive sampling effort that thoroughly covered the shoreline within each of the sampling areas. EPA has previously agreed that multiple samples could be composited from the same beach and yet not considered field replicates as stated in its July 22, 2016 interim compositing plan: "*EPA would like to clarify that field replicates are not required and were only expected (potentially) as additional samples of similar tissues from the same beach. Replicates are not needed if multiple samples are already proposed from tissues collected at the same beach – in which case the samples can be used to infer variability among organisms at the same location."*

The QAPP did not specify how the samples collected within each area would be composited, but instead stated that the approach would be determined in consultation with EPA based on a number of considerations: "*The specific compositing plan for crayfish (i.e., which specific samples will go into which composite) will be determined in consultation with EPA following the completion of sampling and will be determined based on the number of crayfish collected, their size (i.e., sample mass available for analysis), and locations where they were collected. The specific compositing plan for mussels will also be determined in consultation with EPA, and will be based on the number of mussels collected, the specific sampling locations (within the*

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sampling areas) where they were collected, and the elevations at which they were collected." Details of the compositing plan, particularly those related to spatial representativeness of the composites, were not specified in the QAPP beyond the general considerations mentioned in the text quoted above. Therefore, TAI's recommended approach, developed in consultation with EPA, does not reflect a deviation from the QAPP.

In summary, we strenuously object to EPA's assertion that the October 27, 2016 draft plan deviates from the QAPP because it is inaccurate.

Issue 2: EPA is incorrect that the mussel sample collection effort, which was overseen by EPA, was not representative.

<u>EPA comments (pp. 3-4, Response to 1-2):</u> "*We agree in principle that the best approach for characterizing the exposure is to "estimate the concentration that is most likely to be consumed based on what is most likely to be found." However, we strongly caution against assuming that the specific samples collected in each area accurately represent the population of crayfish and mussels that would be found by human or wildlife consumers. This is likely less an issue for crayfish, since crayfish were broadly collected in small numbers from many locations throughout each area. For mussels, however, it is questionable how accurately the collections from only two or three locations accurately represent the area-wide population...While there could be some differences in the true size distribution in each area, it is more likely that the difference in size distribution of samples among areas is the result of sampling error and that the true size distribution of mussels in each area is more similar than suggested by the samples."* EPA also refers to the "*limited spatial representativeness*" for mussels on the second page of its response memorandum.

<u>TAI Objection</u>: The mussel sampling effort did not result in a limited spatial representation of the population that would likely be found by human or wildlife consumers on the UCR beaches. An extensive sampling level of effort throughout each of the areas to collect mussels during two different seasons was conducted with EPA agreement and under its oversight. There is no valid reason to doubt that the organisms that were collected represent the distribution of organisms available for people or wildlife to consume. For example, beach sampling for mussels was conducted based on an on-water reconnaissance of the entire shoreline of each sampling area, followed by detailed searches conducted at 12 beaches in each area during each event. Because of this site-wide effort and the collection of every mussel that was encountered on all of the beaches surveyed, EPA's assertion that the samples collected are not representative of the distribution of mussel populations accessible to people or wildlife along the shoreline at the time of sampling is demonstrably wrong. EPA's current speculation that sampling error resulted in a misrepresentation of the size distribution of mussels is insupportable.

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Issue 3: EPA's new, size-based compositing approach is not based on actual consumption practices and would increase uncertainty in the EPC calculations

TAI has substantial concerns that EPA's proposed compositing approach and EPC calculation methods will compromise the study DQOs. Step 2 of the DQOs states: "*Consistent with EPA's level of effort technical memorandum (USEPA 2013), the primary goal of this study is to collect data to delineate and characterize the levels of chemicals in tissues of representative mussel and crayfish taxa from the Site. The data will be used in the evaluation of potential risk to humans and aquatic-dependent, invertivorous wildlife*." This is consistent with EPA's statement in its January 26, 2017 memo that the "*composites should be created such that they provide the most information and best general characterization of potential consumption*."

EPA's proposed approach for compositing does not accomplish the goal of delineating and characterizing representative tissue concentrations that might be consumed. Rather, the size-stratified compositing scheme artificially segregates the collected tissue into arbitrary size classes, the creation of which were not informed by human or wildlife consumption practices and are highly unlikely to reflect the reality of such practices. While EPA's January 26, 2017 memo acknowledges that EPA's size-stratified compositing scheme can result in high bias, which is unacceptable in and of itself, EPA also fails to acknowledge that using size-stratified samples will increase uncertainty in the resulting EPC estimates. That is seriously problematic because the primary goal of the study – to delineate and characterize representative tissue concentrations - would be compromised.

At this late juncture after sampling is completed, EPA is introducing an unplanned study objective of exploring size-concentration relationships at the expense of the existing approved study DQOs. In contrast, the compositing approach developed by TAI in consultation with EPA is aligned with the intended use of the data as specified by the DQO process to characterize chemical concentrations in mussel and crayfish tissue consumed by humans and wildlife.

In addition, EPA's January 26, 2017 memo states that samples from the same location should be considered only as replicates and averaged, and these location means should be used to estimate the EPC. In the case of Area 1, this approach will result in significant loss of information and bias in the EPC estimate. EPA's size-based stratification compositing scheme results in mussel composites being aggregated into two discrete locations for Area 1. Following EPA's location averaging approach, the EPC for Area 1 would be the maximum of the two location means. Depending on which mean represents the maximum, samples collected and analyzed from one of the two locations (either a beach or a dive site) would not be part of the calculation of an Area 1 EPC even though they represent what was found using an aggressive reconnaissance of the entire shoreline and twelve beach surveys or a combination of underwater camera reconnaissance and diving. This means that, at a minimum, 32.5%, and potentially as much as 62.5% of the mussels collected from Area 1 would not be considered in the EPC estimate for Area 1.

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The effect of using EPA's proposed approach for compositing and calculation of EPCs, rather than the approach developed by TAI in consultation with EPA, is that the area EPCs will be less robust.

We look forward to resolving these issues as soon as possible and moving forward with analysis of the samples collected during the 2016 field sampling efforts. Should you have any questions please give me a call at 509-623-4501.

Sincerely,
Teck American Incorporated

Kris R. McCaig

Kris R. McCaig
Manager, Environment and Public Affairs

cc: Dave Enos, Teck American Incorporated
Cristy Kessel, Teck American Incorporated
Dr. John Toll, Windward Environmental LLC
Dina Johnson, Ramboll Environ

Section 8:
EPA’s response to Teck dated 3/10/17

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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March 10, 2017

Kris McCaig
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RE: Benthic Macroinvertebrate Compositing Plan

Dear Ms. McCaig,

Attached are EPA's responses regarding the approach to compositing benthic macroinvertebrate (BMI) tissue samples (crayfish and mussels) collected for chemical analyses from the Upper Columbia River (UCR) Site in spring and fall of 2016. EPA continues to believe that a compositing plan which includes size stratification will reduce uncertainty and it will produce useful information about potential differences among sizes of BMI. EPA acknowledges that an interim plan was agreed to based on spring sampling to guide collection of fall sampling. However, when information comes to light that causes us to reexamine the overall sample collection and, as a result, an opportunity arises to revise the plan to allow for the best interpretation of results, it is prudent to make such a revision.

If TAI chooses to pursue its proposed approach to compositing, instead of adopting that proposed by EPA, TAI should be aware that EPA may not accept combining all results for each area into a single EPC, and that there may be a greater likelihood that additional sampling will need to be conducted if the results of the analyses show evidence of potentially important differences among locations within areas or among composites composed of organisms with different size distributions.

Sincerely,

Laura C. Buelow
Project Manager

cc: Dan Audet, U.S. Department of Interior (electronic)
Patti Bailey, Confederated Tribes of the Colville Reservation (electronic)
Randy Connolly, Spokane Tribe of Indians (electronic)
John Roland, Washington Department of Ecology (electronic)

Response to February 10, 2017, TAI Comments on EPA Recommended Compositing Approach for Benthic Macroinvertebrate Tissue - DRAFT

PREPARED FOR:	Laura Buelow/EPA Marc Stifelman/EPA
PREPARED BY:	Shaun Roark/CH2M
DATE:	March 9, 2017
DOCUMENT CONTROL NUMBER:	0083-02005

This memorandum is the fifth in a series of communications between EPA and Teck American Inc. (TAI) regarding the approach to compositing benthic macroinvertebrate (BMI) tissue samples (crayfish and mussels) collected for chemical analyses from the Upper Columbia River (UCR) Site in spring and fall of 2016.

This memorandum presents brief responses to TAI's February 10, 2017 comments on EPA's January 26, 2017 memorandum, in which EPA responded to TAI's January 12, 2017 comments on EPA's suggested approach to compositing. EPA's suggested approach was detailed in a technical memorandum (Explanation of Recommended Benthic Macroinvertebrate Compositing Plan), dated December 21, 2016.

Background

As discussed in EPA's January 26, 2017 responses, EPA chose to explore approaches to compositing, including size-stratified compositing, after reviewing TAI's draft compositing approach (submitted on October 27, 2016), out of concern that BMI size and spatial distribution in composites could affect the outcome of the results. The size distribution of samples collected was much broader than had been expected when the QAPP (Exponent 2016[1]) was developed, and, for mussels, the spatial distribution was less than had been targeted. It is appropriate to consider these factors in developing composites.

TAI's proposed compositing approach attained the targeted six composites per area by incorporating multiple field replicates instead of using samples representing six unique sampling locations within each area. The inclusion of field replicates in the calculation of the exposure concentration (as 95 percent upper confidence limit on the mean [95 UCL]) may lead to downward bias because field replicates do not represent independent samples of the larger population in each area. This could potentially underestimate human, fish, and wildlife exposure through BMI consumption. Instead of including the field replicates as individual samples in the 95 UCL calculation, the mean of the field replicates should be used to represent each collection location. In areas where all samples were collected from less than six locations, the sample size for these areas is less than six. For mussels in Areas 1 and 4, the sample size would be two; for Area 2, it would be three, and for Areas 3 and 5, the sample size would be four. In accordance with the QAPP, the maximum measured tissue concentration will be used to estimate exposure where there are two composite samples in an area (USEPA 1989). For the remaining samples

[1] Cited as TAI 2016a and 2016b in EPA's memo

with three or more values, the recommended value from ProUCL should be used to estimate the exposure point concentration.

Responses to TAI Comments

TAI objections to three overarching issues were identified in TAI's February 10, 2017 memo. EPA's responses to each issue are detailed in the sections that follow.

"EPA incorrectly states that the October 27, 2016 compositing approach, which reflected TAI's consultation with EPA, deviates from the QAPP."

EPA Response: EPA recognizes TAI's effort to collect mussels from as many locations as practicable and does not consider TAI's lack of success collecting mussels from six locations a deviation from the QAPP. The QAPP deviation referred to in EPA's January 26, 2017 memorandum is specifically related to TAI's proposed inclusion of field replicates in the 95 UCL exposure point calculation for the sampling areas.

EPA recognizes that neither the large disparity of organism size nor the potential to have many spatial replicates with few unique locations were considered when the QAPP was developed. EPA disagrees with the inclusion of spatial replicates as independent samples for estimating the 95 UCL for each area on the basis that doing so is statistically inappropriate. EPA continues to assert that size-stratified compositing approach would be informative and would not have more uncertainty than the TAI's October 27, 2016 recommended approach.

Issue 2: "EPA is incorrect that the mussel sample collection effort, which was overseen by EPA, was not representative."

EPA Response: A comparison of the size distributions of mussels collected within and among the six areas is suggests that the sample size distributions collected may not fully represent the distribution of sizes that could be collected or consumed by humans or wildlife over the course of multiple years. For example, in Area 4, only larger mussels were collected. It is unlikely that smaller sized mussels would never be found in Area 4, given that larger individuals of the same species are abundant. Therefore, it is not unreasonable to consider that mussel consumption in Area 4 would include some smaller individuals. In addition, collections from Areas 1, 2, 3, and 6 have an abundance of small spring-collected mussels; these small sizes are absent from collections from Areas 4 and 5. Fall samples (dive collections) rarely include the smaller-sized mussels. Small mussels are typically more abundant from the spring (non-dive) samples. In many cases, large mussels are absent from spring (non-dive) collections. This suggests a method bias. Within Area 6, all fall samples (which are all dive-collected) are larger than all spring (non-dive) samples.

Issue 3: "EPA's new, size-based compositing approach is not based on actual consumption practices and would increase uncertainty in the EPC calculations."

EPA Response: EPA has concluded that a size-stratified approach will accomplish the study goals without increasing uncertainty relative to TAI's proposed approach and will provide usable information about potential differences among sizes of BMI. There was a wide range of sizes of crayfish and mussels collected and there was inconsistency of sizes collected with different methods, between seasons, and among sampling areas. Therefore, given the current lack of information about sizes of mussels and crayfish consumed by wildlife and humans, a size-stratified compositing approach is appropriate because it will allow inference about whether size matters in estimating exposure to consumers of crayfish and mussels.

EPA is remains concerned that the compositing scheme proposed by TAI would result in field replicates for mussels being included in each area to calculate 95 UCLs, which may result in a low bias to the 95 UCL, regardless of whether or not there was a size/concentration or location/concentration relationship.

With regard to Area 1 samples, TAI's comment points to the difficulty making inference about the entire population at Area 1, given the available samples (i.e., the lack of representativeness of the samples given the variable size and limited spatial distribution). TAI's comment describes EPA's proposed approach, but we note that, like EPA, TAI had proposed to aggregate mussels at Area 1 into samples from the same two discrete locations. In fact, TAI had proposed a pair of *size-stratified* samples from A1-MB05, which were nearly identical to EPA's proposed size-stratified composites. TAI proposed four non-size-stratified *field replicates* from A1-MB43, whereas EPA had proposed stratifying by size the four replicates from A1-MB43 into two small-size and two large-size composites.

References

Exponent, HDR, Parametrix, Cardwell, Windward, Environ R. 2016. Upper Columbia River. Final. Quality assurance project plan for the macroinvertebrate tissue study. Prepared for Teck American Incorporated. Exponent; HDR; Parametrix, Inc.; Cardwell Consulting, LLC; Windward Environmental LLC; and Ramboll Environ.

Parametrix, Exponent, HydroQual, Integral, Cardwell. 2011. Upper Columbia River baseline ecological risk assessment work plan. Prepared for Teck American Incorporated. Parametrix, Inc., Bellevue, WA; Exponent, Bellevue, WA; HydroQual, Mahwah, NJ; Integral Consulting Inc., Seattle, WA; Cardwell Consulting LLC, Corvallis, OR.

Teck American Inc. (TAI). 2016a. Final Upper Columbia River Quality Assurance Project Plan for the Macroinvertebrate Tissue Study. Prepared by Exponent and HDR.

Teck American Inc. (TAI). 2016b. Final Upper Columbia River Quality Assurance Project Plan for the Macroinvertebrate Tissue Study, Addendum No. 1. Prepared by Windward.

USEPA 1989. Risk assessment guidance for superfund (RAGS); Volume I: Human health evaluation manual (HHEM), (Part A); Interim Final. Washington, DC, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency. 1, Part A.

Section 9:

TAI's final letter to proceed dated 3/23/17

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March 23, 2017

File No.: 01-773180-000

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VIA ELECTRONIC MAIL ONLY

Subject: Upper Columbia River Remedial Investigation and Feasibility Study (UCR RI/FS) – Benthic Macroinvertebrate Tissue Study Sample Compositing Plan

Dear Dr. Buelow:

Thank you for your letter dated March 10, 2017 with the attached responses regarding the approach to compositing benthic macroinvertebrate (BMI) tissue samples (crayfish and mussels) collected for chemical analyses from the Upper Columbia River (UCR) Site in spring and fall of 2016. This letter is to inform you that Teck American Incorporated (TAI) has decided to implement the October 27, 2016 compositing plan we developed in consultation with EPA and based on EPA's interim compositing plan dated July 22, 2016, instead of adopting that proposed by EPA in December 2016.

In addition, TAI would like to provide brief but important responses to assertions made in the attachment to your March 10, 2017 letter. We regret the protracted nature of this final composting plan discussion as our intention throughout the process has been to carry through the sampling and compositing plan we worked collaboratively with EPA and its consultants on since the approval of the quality assurance project plan (QAPP) in April 2016, and completion of the second sampling effort in fall 2016. We hesitate to further prolong this recent discussion, but we feel the need to challenge some of EPA's assertions for the record. Please find below quotations from EPA's memorandum followed by our response. These are organized by "Background" and "Response to TAI Comments" consistent with EPA's memorandum.

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Background

"The size distribution of samples collected was much broader than had been expected when the QAPP (Exponent 2016[1]) was developed, and, for mussels, the spatial distribution was less than had been targeted. It is appropriate to consider these factors in developing composites."

There was no discussion of expectations of size ranges for either crayfish or mussels in the original QAPP, nor was this discussed during planning meetings as a concern or consideration for inclusion in the QAPP. The QAPP did include an estimated size based on unpublished United States Fish and Wildlife Service data to determine how many organisms would need to be collected to obtain sufficient mass for chemical analyses. For mussels, neither TAI nor EPA team members brought forth information on expected size for inclusion in the QAPP. The EPA-approved QAPP Addendum assumed a 5 g weight per mussel as a conservative estimate for the number needed to obtain sufficient mass because we did not want to have to send divers down more than was necessary.

At the time the QAPP Addendum for fall sampling was approved, all parties had access to information about the average and range of organism sizes from the spring sampling. This information could have been used to establish size distribution expectations for the fall sampling effort, but EPA did not choose to establish these expectations. Therefore, EPA's statement that the size distribution of samples collected was much broader than had been expected when the QAPP was developed is incorrect.

The table below presents data on the sizes of crayfish and mussels collected during both the spring and fall sampling (excluding dead organisms):

Organism	Season	Average Length (mm)	Length Range (mm)	Average Weight (g)	Weight Range (g)	Count
Crayfish (both species)	spring	85.2 ± 20.2	35 – 122	28.6 ± 18	1 - 75	112
Crayfish (both species)	Fall	83.4 ± 22.8	32 – 129	35.6 ± 26	1 - 105	86
Mussels (*Anodonta*)	Spring	45.5 ± 20.8	8 – 92	13.3 ± 16.7	0.5 - 70	131
Mussels (*Anodonta*)	Fall	62.9 ± 10.7	40 – 93	26.2 ± 12.5	5 - 65	133

The size ranges for crayfish were similar in both spring and fall. For mussels, a larger range of sizes was collected in spring than in fall (i.e., organisms collected in spring ranged from 8 to 92 mm, whereas in fall all organisms were ≥40 mm).

Mussels collected in the fall were on the larger end of the size range compared to those collected in the spring. Fall sampling was conducted using different methods than spring sampling (divers were deployed in the fall). If there was concern that the EPA divers did not collect small mussels

1 Cited as TAI 2016a and 2016b in EPA's memo

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during the sampling program, EPA should have directed the divers to look for smaller organisms. It did not, suggesting that EPA was comfortable with the fact that the fall sampling tended to yield organisms toward the larger end of the size range of mussels gathered in the spring. One can speculate that the divers, who were given mass targets, might have tended to collect larger mussels because they would be easier to see and collect in a timely manner.

"TAI's proposed compositing approach attained the targeted six composites per area by incorporating multiple field replicates instead of using samples representing six unique sampling locations within each area."

We continue to disagree with the characterization of these samples as field replicates, as mussels were collected where people and wildlife could collect them, consistent with the QAPP data quality objectives (as discussed in our previous memos). TAI initially had concerns about diving for mussel collection, particularly given potential safety issues. EPA continued to promote this approach and was in full consultation during the selection of the dive sites, even though there were often only one or two locations identified per sampling area (Areas 1,2, and 4).

Response to TAI comments

"The QAPP deviation referred to in EPA's January 26, 2017 memorandum is specifically related to TAI's proposed inclusion of field replicates in the 95 UCL exposure point calculation for the sampling areas."

As discussed in TAI's memo to EPA dated February 10, 2017, the proposed inclusion of all composite samples from each sampling area into the 95 UCL exposure point calculation for that area is not a deviation from the QAPP. Field replicates were not defined in the QAPP and TAI disagrees that these samples are necessarily field replicates. Therefore, the proposal to include these as independent samples in the exposure point calculations is not a deviation from the QAPP.

"***For example, in Area 4, only larger mussels were collected. It is unlikely that smaller sized mussels would never be found in Area 4, given that larger individuals of the same species are abundant. Therefore, it is not unreasonable to consider that mussel consumption in Area 4 would include some smaller individuals."***

"***Small mussels are typically more abundant from the spring (non-dive) samples. In many cases, large mussels are absent from spring (non-dive) collections. This suggests a method bias."***

"With regard to Area 1 samples, TAI's comment points to the difficulty making inference about the entire population at Area 1, given the available samples (i.e., the lack of representativeness of the samples given the variable size and limited spatial distribution)."

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Because the sampling design was not intended to answer questions about size distribution of organisms, the data from the BMI study do not support the broad conclusions presented by EPA about the likelihood of finding different sized mussels in different areas and over different seasons. EPA's statements regarding lack of representativeness of the organism sizes collected during sampling imply that the goal of the BMI study was to answer questions about relative abundance of different sized mussels throughout the entire system (i.e. in all deep, shallow, and draw-down areas). However, the goal of the BMI study was to characterize potential exposures for the human health and baseline ecological risk assessment. As discussed in our February 10, 2017 letter, the extensive sampling effort that thoroughly covered the shoreline within each of the sampling areas resulted in collection of mussel samples that are representative of what is most likely to be found by consumers, thereby supporting the overall goal of the BMI study.

"EPA continues to assert that size-stratified compositing approach would be informative and would not have more uncertainty than the TAI's October 27, 2016 recommended approach."

"EPA has concluded that a size-stratified approach will accomplish the study goals without increasing uncertainty relative to TAI's proposed approach and will provide usable information about potential differences among sizes of BMI."

"Therefore, given the current lack of information about sizes of mussels and crayfish consumed by wildlife and humans, a size-stratified compositing approach is appropriate because it will allow inference about whether size matters in estimating exposure to consumers of crayfish and mussels."

EPA has provided no support for their conclusion that a size-stratified approach will accomplish the study goals without increasing uncertainty relative to TAI's proposed approach. It is unclear how size stratified data would be useful for the human health risk assessment for the UCR, since EPA has not provided any information on the basis for their proposed size class or the consumption of different sizes of mussels or crayfish.

Regarding the more general question of whether size is related to concentration of bioaccumulative chemicals, as discussed our previous communications, this study was not designed to address that question.

In summary, changing the approach agreed upon during the collaborative process by applying limitations on data usability and creating new study goals is troubling to TAI, particularly when justification for the revised approach has not been clearly presented by EPA.

We look forward to moving forward with analysis of the samples collected during the 2016 field sampling efforts. Should you have any questions please give me a call at 509-623-4501.

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Sincerely,
Teck American Incorporated

Kris R. McCaig

Kris R. McCaig
Manager, Environment and Public Affairs

cc: Dave Enos, Teck American Incorporated
Cristy Kessel, Teck American Incorporated
Dr. John Toll, Windward Environmental LLC
Dina Johnson, Ramboll Environ

APPENDIX C

CALCULATION METHODS

Appendix C Calculation Methods

This appendix describes the methods used to calculate whole-body crayfish tissue concentrations and methods to generate latitude and longitude coordinates for composite samples collected for the 2016 benthic macroinvertebrate study.

CALCULATION OF CRAYFISH WHOLE-BODY TISSUE CONCENTRATIONS

Crayfish samples from sampling areas associated with the human health risk assessment were divided into two separate tissue types for chemical analyses: 1) stomach and carapace, and 2) whole body minus stomach and carapace (referred to herein as "partial body"). The baseline ecological risk assessment requires the use of whole-body concentrations. Therefore, results for the individual tissue types were used to calculate whole-body crayfish concentrations based on the fraction of the whole-body mass represented by each tissue type.

Whole-body crayfish tissue concentrations were calculated using the following equation:

$$C_{WB} = (C_{PB} \times f_{PB}) + (C_{SC} \times f_{SC})$$

Where:

C_{WB}	=	calculated whole-body tissue concentration (mg/kg ww)
C_{PB}	=	partial body tissue concentration (mg/kg ww)
f_{PB}	=	fraction of whole-body weight that is partial body
C_{SC}	=	stomach and carapace tissue concentration (mg/kg ww)
f_{SC}	=	fraction of whole-body weight that is stomach and carapace

For calculated whole-body concentrations that include a non-detected value for one tissue type, the non-detected value was represented in the calculation by one-half the detection limit. In cases where both tissue types are non-detected values, the full detection limits were included in the calculation, and the final value was flagged as a non-detected result (U-qualified). Calculated concentrations are reported to three significant figures.

CALCULATION OF COMPOSITE CENTROID COORDINATES

The coordinates for composite mussel, clam, and crayfish samples represent the centroid of the individual locations from which the composite sample was created. The methods used to generate these centroid coordinates are described in detail below. Names of the specific tools that were used from the ESRI ArcGIS 10.5.1 [Basic] toolbox are indicated.

1. Coordinates were plotted using GCS_WGS_1984 (WKID: 4326) and the event layer was exported as a feature class using that coordinate system.

2. The Project tool was used to project the feature class into NAD_1983_UTM_Zone_11N (WKID: 26911) using the default datum conversion. This was necessary for accurate distance measurements in the analysis.
3. For mussel and clam transects, the Mean Center tool was used on the begin/end coordinates for each transect to derive its centerpoint. The centerpoint coordinates were used as the single-point locations for those samples.
4. For composites made up of samples from a single location, Universal Transverse Mercator (UTM) coordinates for that location were used for the composite centroid.
5. The locations used in composite samples representing multiple locations were identified and the ET GeoWizards Perpendiculars to Polylines tool was used on the identified locations and the river centerline (i.e., the US Geological Survey National Hydrography Dataset centerlines for the Columbia and Sanpoil rivers) to generate a line feature class representing the shortest distance to the centerline. This line feature class included the direction from each location to the river centerline.
6. Stations (points) along the river centerline at 1-meter-intervals were generated using the ET GeoWizards Station Points tool.
7. The centerline position for each component location was established by using the Spatial Join tool to associate each distance/direction line for each multi-location composite to the nearest 1-meter-interval centerline station; this centerline position was then used to calculate and plot the calculated composite centroids. The 1-meter interval is sufficiently precise for this study; there is negligible difference in distance/direction when measuring from each multi-location composite to the two closest 1-meter-interval centerline stations.
8. The composite identification (ID) and sample (location) ID for each component sample was used to derived the information required to calculate composite centroids by:
    a. Adding (from the table of spatially joined distance/direction line attributes) the river centerline station number, direction, and distance.
    b. Calculating for each composite the average station number, direction, and distance, weighted by the number of samples per location.
9. The weighted average station numbers were used to identify the 1-meter-interval centerline stations for positioning the composite centroids. The weighted average directions and distances were joined to the centerline stations feature class (creating a subset of the centerline stations for the next step).

Reverse direction angles (±180°) were calculated to get the direction from the centerline station to the calculated centroid.

10. The ET GeoWizards Lines from Points Direction and Distance tool was used on the centerline stations subset, with the weighted average direction (reversed) and distance as inputs, to generate a line feature class representing the lines from the river centerline to the calculated centroids. If the distance put the end of a line on land, the line was trimmed to the shoreline.
11. The To-nodes were pulled from the calculated centroid lines and the coordinates were calculated.

APPENDIX D

CHANGE REQUEST FORMS

Change Request Form
Upper Columbia River Macroinvertebrate Tissue Study

Page: 1 of 2 | Change No: 1

CHANGE REQUEST

Modify the boundary of Study Sampling Area 5.

Applicable Reference:

Macroinvertebrate Tissue Study QAPP page B-2, Table A7-1, Appendix A Map A8, and Table A1.

Description of Change:

The boundary of Study Sampling Area 5 will be expanded to the north and to the west to allow the sampling technicians to search potentially more suitable areas for mussell collection and crayfish trapping (see attached map for illustration of new sampling boundary for Area 5). The Cultural Resources Working Group (CRWG) has been consulted and is in agreement with this change.

Reason for Change:

The central portion of the sample area is too shallow to set crayfish traps (see the topography in QAPP Appendix A map A8). Expanding the trapping area to the west into the river, may be more suitable area to set crayfish traps. Also, on May 2, 2016 the sampling technicians search the entire beach in Sampling Area 5 for mussels and did not collect samples. Areas to the north of existing Sampling Area 5 may be more suitable for mussel collection.

Impact on Present and Completed Work:

None

Requested By: Jennifer Pretare (AECOM Project Manager) — Date: 5/2/2016

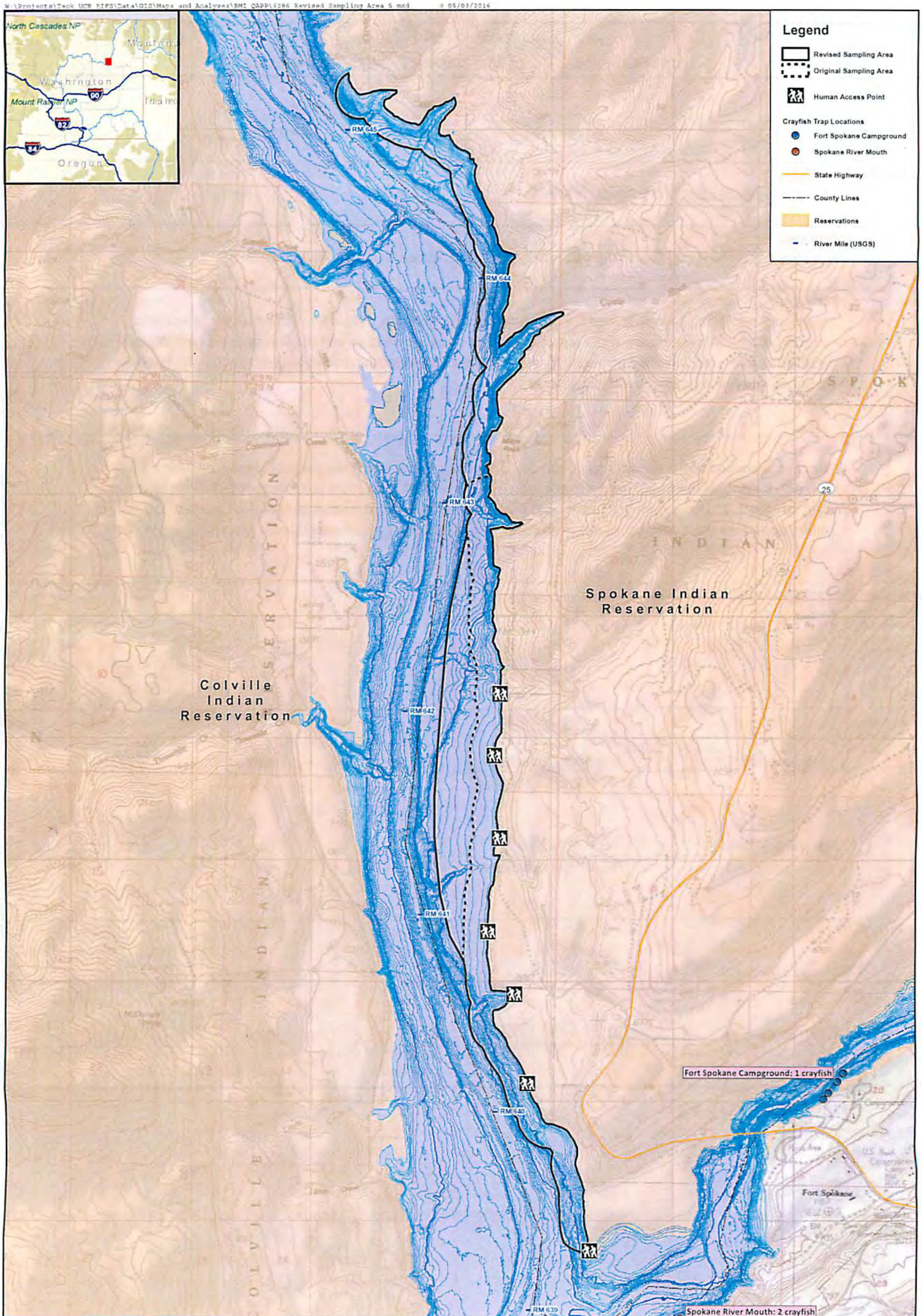
Acknowledged By: Kris McCaig (Teck Project Manager) — Date: 5/2/2016

APPROVAL

Teck Project Manager: Kris McCaig — Date: 5/3/16

EPA Project Manager: Dustin Bott — Date: 5/9/16

W:\Projects\Teck UCR RIFS\Data\GIS\Maps and Analyses\BMI QAPP\6286 Revised Sampling Area 5.mxd 05/03/2016



Windward environmental LLC

0 0.35 0.7 Km

0 0.35 0.7 Miles

N

DRAFT

Revised Boundaries for Sampling Area 5

Upper Columbia River, WA

Change Request Form
Upper Columbia River Macroinvertebrate Tissue Study

Page: 1 of 1 Change No: 2

CHANGE REQUEST

Check crayfish traps once per day instead of twice per day.

Applicable Reference:

SOP4 Crayfish Tissue Sample Collection; Deployment of Crayfish Traps, #8.

Description of Change:

Crayfish traps are being checked in the morning, and then redeployed immediately or later in the day as the field team moves through the sample area.

Reason for Change:

With mussel samplers and crayfish samplers using the same research vessel, there typically is not enough time to check crayfish traps in both the morning and evening. Nighttime work is not occurring due to health and safety considerations.

Impact on Present and Completed Work:

None

Requested By: Jennifer Pretare (AECOM Project Manager) Date: 5/2/2016

Acknowledged By: Kris McCaig (Teck Project Manager) Date: 5/2/2016

APPROVAL

Teck Project Manager: Kris McCaig Date: 5/3/16

EPA Project Manager: Durton Batt Date: 5/9/16

Change Request Form
Upper Columbia River Macroinvertebrate Tissue Study

Page: 1 of 1 Change No: 3

CHANGE REQUEST

Extension of the 180 day holding time listed on Table A7-3 of the QAPP for metals to 1 year.

Applicable Reference:

Table A7-3 of the QAPP

Description of Change:

Extension of the hold times is technically acceptable since there are no real established metals holding times in tissues that have been frozen to -20C.

Reason for Change:

180 day holding time for metals was inadvertently listed in Table A7-3 of the QAPP as there are no real established holding times in tissues that have been frozen.

Impact on Present and Completed Work:

None

Requested By: Dave Enos (Analytical Chemistry Laboratory Coordinator) Date: 7/7/2017

Acknowledged By: Kris McCaig (Teck Project Manager) Date: 7/7/2017

APPROVAL

Teck Project Manager: Kris McCaig Date: 7/7/2017

EPA Project Manager: [signature] Date: 7-10-17

Change Request Form

Upper Columbia River Macroinvertebrate Tissue Study Addendum

Page: 1 of 1

Change No: 1

CHANGE REQUEST

Modify the sample labelling nomenclature.

Applicable Reference:

QAPP Addendum, Section A4.2.6

Description of Change:

Revise the "sample type code" from "MCA" to "MB" for mussel samples and from "CTA" to "CT" for crayfish samples.

Reason for Change:

Field computers for the sampling team were inadvertently programmed to be consistent with the Spring 2016 QAPP labelling system, rather than matching the updated Fall 2016 QAPP Addendum. AECOM's numbering scheme creates a new 'crayfish trap location number' or 'mussel beach transection location number' greater than the numbers (and therefore unique) used in the spring, but uses the same nomenclature in every other way.

Impact on Present and Completed Work:

None. Logbooks, sample identification numbers, chain of custody paper work, and field data are all consistent with the Spring 2016 labelling system. No changes to existing documentation would need to be made.

Requested By: Jennifer Pretare (AECOM Project Manager) Date: 9/21/2016

Acknowledged By: Kris McCaig (Teck Project Manager) Date: 9/23/16

APPROVAL

Principal Investigator: [signature] Date: 9/23/16

Teck Project Manager: Kris McCaig Date: 9/26/16

EPA Project Manager: Dustin Bott Date: 9/27/16