

APPENDIX D

AQUATIC VEGETATION GROWTH ZONE DELINEATION



Appendix D: Aquatic Vegetation Growth Zone Delineation

Final Aquatic Baseline Ecological Risk
Assessment—Upper Columbia River

PREPARED FOR
Teck American Incorporated

DATE
July 2026

REFERENCE
0812334

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ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
asl	above sea level
AVGZ	aquatic vegetation growth zone
BERA	baseline ecological risk assessment
CSM	conceptual site model
ft	foot/feet
mm	millimeter(s)
OU	operable unit
RM	river mile
SAV	submerged aquatic vegetation
Site	Upper Columbia River site
TAI	Teck American Incorporated
UCR	Upper Columbia River
USGS	United States Geological Survey

1. INTRODUCTION

The Aquatic Baseline Ecological Risk Assessment (BERA) for the Upper Columbia River (UCR) site (hereafter, the Site)¹ includes an evaluation of potential risks to aquatic plants and the animals (e.g., fish, birds, and mammals) that feed on them. As such, the estimates of exposure to chemicals of potential concern and chemicals of interest are limited to the areas in which aquatic plants are likely to grow. Due to the annual water level fluctuations in the lacustrine reaches of the UCR that result from reservoir operations at the Grand Coulee Dam, the areas conducive to aquatic macrophyte establishment and growth are limited due to water fluctuations and light penetration. The areas where aquatic plants are likely to grow have been defined in the lacustrine area of the UCR (Operable Unit [OU] 2) by the National Park Service (Sytsma and Miller 2008) and are defined as the aquatic vegetation growth zone (AVGZ). Less is known about where aquatic plants may be found in the riverine portion of the UCR (OU 1), but it is expected that the AVGZ is limited to areas where water velocities and sediment substrate can support the establishment of aquatic plant communities. This appendix describes how the AVGZ was delineated in OUs 1 and 2 for use in the Aquatic BERA.

¹ As per the June 2, 2006, Settlement Agreement for Implementation of Remedial Investigation and Feasibility Study at the Upper Columbia River Site (referred to herein as the UCR Site or Site), the Site consists of 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, from the U.S.-Canada border to Grand Coulee Dam, and all suitable areas in proximity to such contamination necessary for implementation of the response actions (Remedial Investigation and Feasibility Study) described therein (USEPA 2006).

2. DELINEATION OF AQUATIC VEGETATION GROWTH ZONE

Due to the different factors that influence aquatic plant community establishment in OU 1 and OU 2, and differing data, the AVGZ was delineated using different methods in the two OUs. Methods for each OU are described below.

2.1 OU 1

OU 1 includes free-flowing and transitional reaches of the Columbia River and is less influenced than OU 2 by water level fluctuations due to Grand Coulee Dam operations. In free-flowing rivers, a variety of factors can limit the distribution and species composition of submerged macrophyte communities including: flood disturbances (scouring and deposition), high-flow velocity that results in mechanical damage to plant parts, limited light due to depth or turbidity that restricts photosynthesis, low temperature reducing growth, availability of nutrients impacting growth and reproduction, coarse sediment textures that limit rooting success, and anaerobic conditions in sediments resulting in toxicity due to high concentrations of reduced iron and manganese (Barko et al. 1986; Bornette et al. 2008).

To estimate where aquatic plants are likely to grow in OU 1, the AVGZ was delineated for this Aquatic BERA based on observations of submerged aquatic vegetation (SAV) during 2018 and 2019 for the 2019 Phase 3 Sediment Study (TAI 2020a,b). During the facies mapping, high-resolution data were collected to identify and map sediment grain size fractions and texture of the UCR sediment bed throughout OU 1. While the sediment facies mapping approach was developed to identify areas with substrate based on a sediment texture triangle with axes for percent sand and fines (grain sizes ≤ 2 millimeters [mm]); percent gravels (grain sizes between 2 and 64 mm); and percent cobbles and boulders (grain sizes ≥ 64 mm), data were also collected to map areas that were predominantly mud or had dense SAV that prevented observation of sediment facies.

Areas mapped with SAV in 2018 and 2019 are assumed to exhibit the physical and chemical characteristics favored by aquatic vegetation. Recognizing that the areas where SAV was found represent a “snapshot in time,” and that it is possible there are some changes in locations of aquatic vegetation from year to year, an additional sediment facies category, mud, was added to provide a conservative estimate of where aquatic vegetation might be found in OU 1. The areas identified as “SAV” and “mud” were considered as reasonable proxies for the AVGZ as these locations have low estimated mean current velocities (i.e., less than 0.5 foot per second, Figure 1-2 in TAI 2020b), and include fine-grained sediments that enhance rooting potential and are in more sheltered areas of OU 1; all of these characteristics likely favor the establishment of aquatic plant communities.² Additionally, there were areas that could not be mapped during the facies mapping as the boat could not access them due to dense vegetation or the area having been too shallow. Therefore, these unmapped, shallow areas are conservatively assumed to be AVGZ.

To confirm that vegetation is likely to occur within the SAV and mud facies polygons, underwater imagery taken during the 2018–2019 sediment facies mapping was evaluated to confirm the

² While mixed material with mud (mFm and mCm) was also identified in the facies mapping, it was not identified for inclusion in the delineation of the AVGZ since these facies have higher estimated current velocities and only account for approximately 0.7 percent of OU 1.

facies that were associated with observed SAV. At the 42 stations in OU 1 that had underwater imagery where aquatic vegetation was identified (TAI 2020a), either "SAV" or "mud" facies overlapped with 38 of those stations (90 percent).

While there is uncertainty due to annual variability in flow conditions, the inclusion of mud and areas that were too shallow to be mapped along with the dense vegetation layer adds a level of conservatism in predicting where aquatic plants have the potential to grow in OU 1. The AVGZ designations derived for OU 1 are illustrated in Map D-1, Tiles 1 through 15, along with the "dense vegetation"³ and "mud" facies polygons that create the AVGZ polygons. The "dense vegetation" areas in OU 1 cover approximately 1.19 square kilometers (or 5.1 percent of the sediment facies area mapped) in OU 1, the "mud" areas add 2.46 square kilometers (or 10.6 percent of the sediment facies area mapped; TAI 2020b), and the shallow areas add 4.07 square kilometers (or 52.8 percent of the mapped AVGZ) to the area defined as the AVGZ in OU 1.

Based on the above process, discrete sediment, porewater, and surface water sample locations located within a mud, unmapped due to shallow depth, or dense vegetation polygons were designated as being within the AVGZ for OU 1. For the 2009–2011 Beach Sediment Study and 2015 Bossburg Flat Sediment and Soil Study, which collected sediment samples using composite sampling methods, the entire area that was sampled was mapped as a polygon. If any portion of the sampled polygon was within an AVGZ polygon, then the composited sample was considered to be within the AVGZ. Sample locations and the AVGZ polygons are presented in Maps 3-1 and 3-2 of Volume 1.

2.2 OU 2

The National Park Service has delineated the AVGZ for Lake Roosevelt based on elevation of the riverbed in four study areas upstream of Grand Coulee Dam and in the southern portion of the lake, which spanned from Hanson Harbor to Moccasin Bay (Sytsma and Miller 2008). Each year, the drawdown beginning in January (and any additional late summer drawdowns) generally retards the ability of macrophytes to establish (Black et al. 2003). Based on the management of the reservoir water level throughout the year, the National Park Service has defined the AVGZ as the elevation range from 1,260 feet to 1,280 feet above sea level (asl), at which water depth is shallow enough for light to reach the sediment yet deep enough to remain watered during the growing season (Sytsma and Miller 2008). Sytsma and Miller (2008) confirmed that most aquatic plants occur above 1,268 feet asl and none occur below 1,263 feet asl.

Based on the confirmation of elevation data as a marker for aquatic plant growth, the range of 1,260 to 1,280 feet asl was used to identify the AVGZ for sediment, porewater, and surface water sampling locations in OU 2 within the Aquatic BERA (Map D-1, Tiles 16 through 43). Consistent with OU 1 above, composited samples from the 2009–2011 Beach Sediment Study were considered to be within the AVGZ if any portion of the sampled polygon was within an AVGZ polygon.

³ Areas classified as "SAV" in TAI (2020b) are renamed with "dense vegetation" in the sediment facies layer used in the BERA.

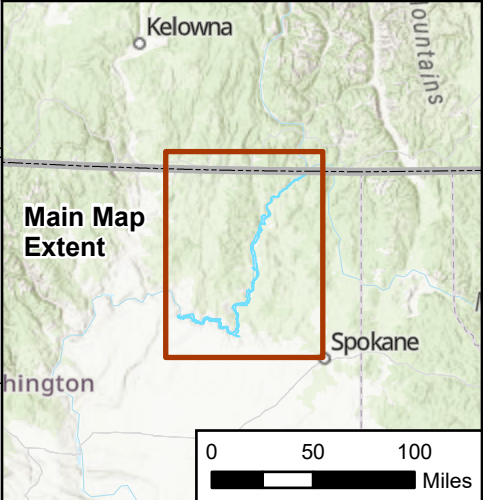
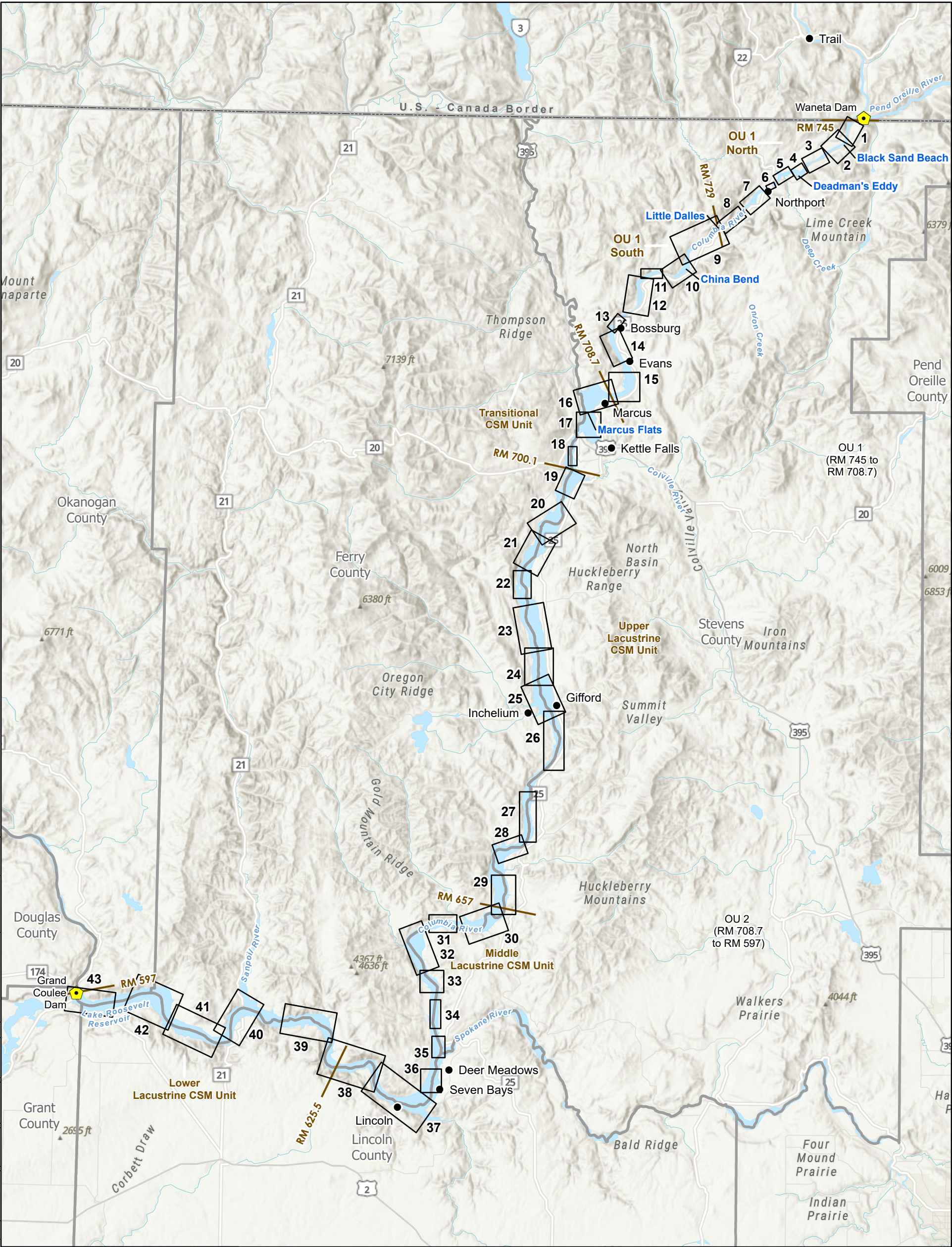
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MAPS

FILE: M:\US\Projects\IS-UT\Tech\0493486_Teck_Upper Columbia River\Maps\Aquatic BERA\Appendix D\Appendix D.aprx | REVISED: 02/16/2026 | SCALE: 1:491,040 when printed at 11x17



Legend

- City/Town
- Major Dam
- Map Index Extents
- County Boundary

Main Map Extent

Scale

0 50 100 Miles

Scale

0 8 16 Miles

North Arrow

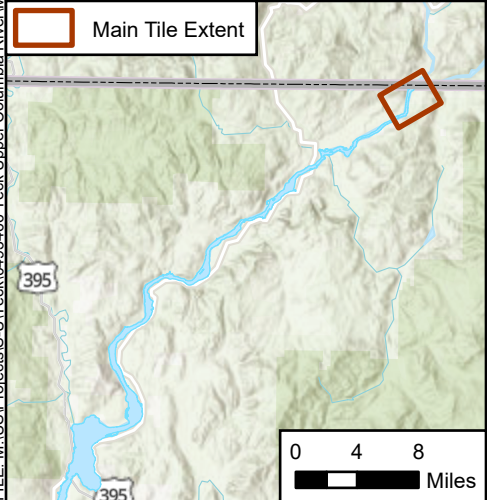
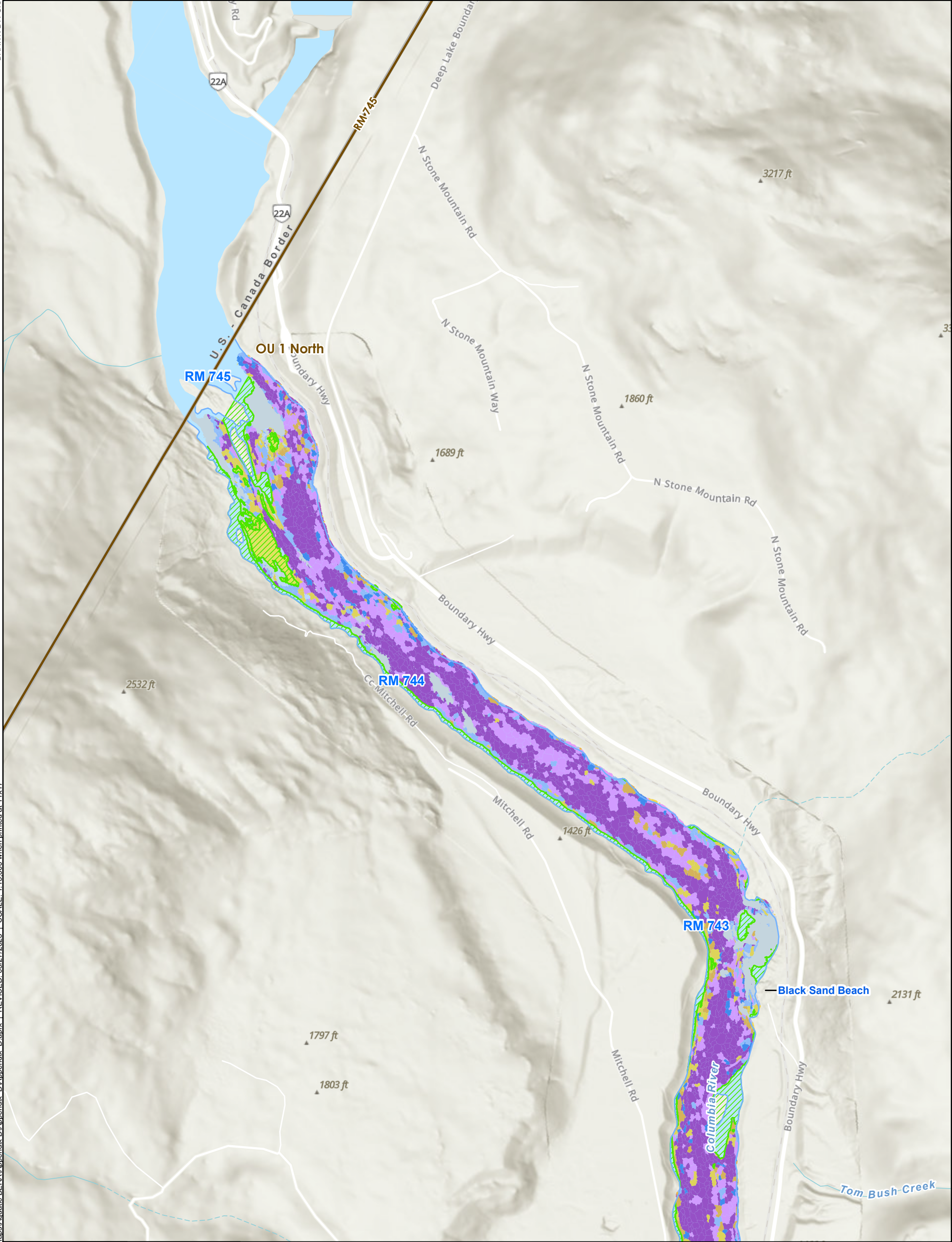
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Map D-1 Tile Index.

Identification of AVGZ

Final Aquatic BERA

Upper Columbia River, Washington



Legend

Columbia River Shoreline

AVGZ

Sediment Facies

Mud

Sand

Mixed Fines, Predominantly Mud

Mixed Fines, Predominantly Sand

Mixed Coarse with Mud

Mixed Coarse with Sand

Mixed Cobble /Boulder with Sand

Coarse

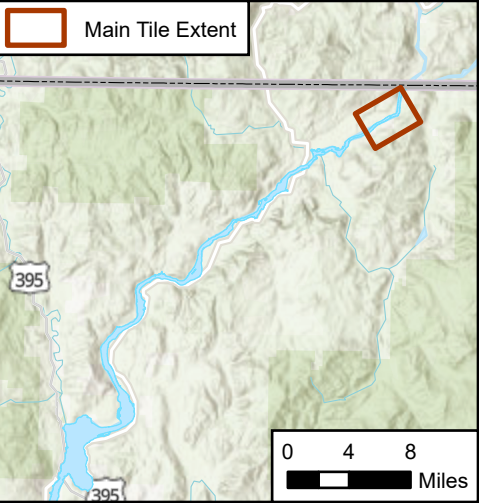
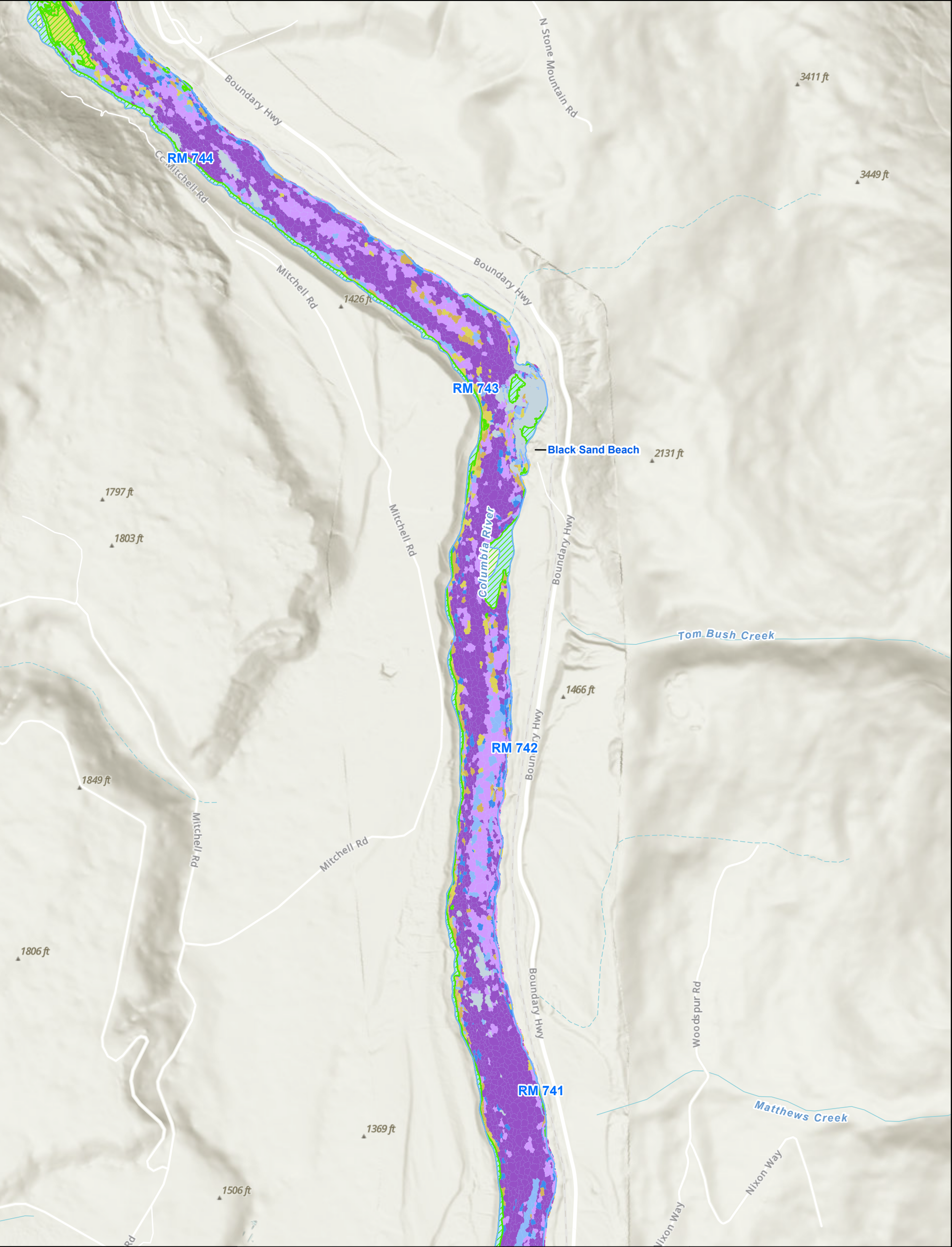
Gravel

Cobble/Boulder

Bedrock

0 820 1,640 Feet

Map D-1 Tile 1.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



Legend

Columbia River Shoreline

AVGZ

Sediment Facies

Mud

Sand

Mixed Fines, Predominantly Mud

Mixed Fines, Predominantly Sand

Mixed Coarse with Mud

Mixed Coarse with Sand

Mixed Cobble /Boulder with Sand

Coarse

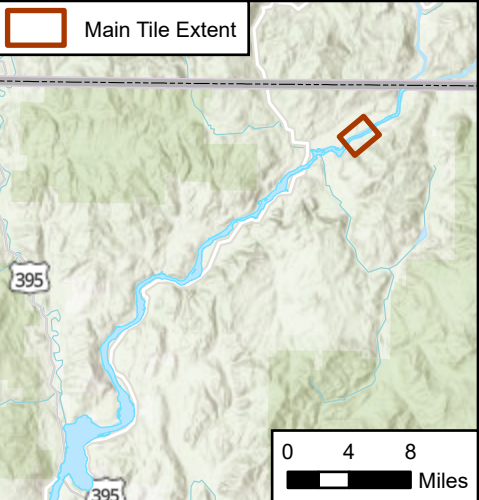
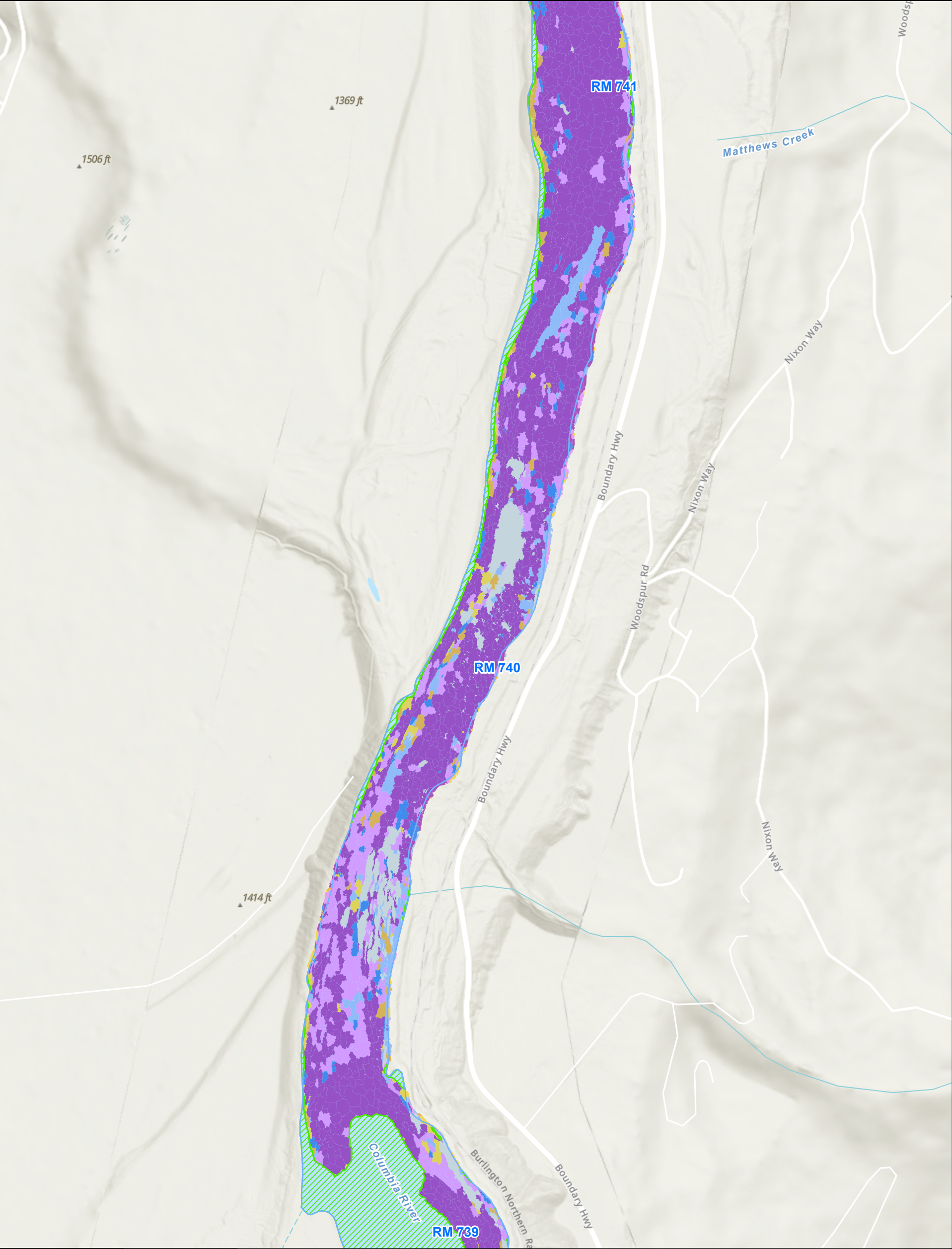
Gravel

Cobble/Boulder

Bedrock

0 870 1,740 Feet

Map D-1 Tile 2.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



Legend

— Columbia River Shoreline

▨ AVGZ

Sediment Facies

■ Mud

■ Sand

■ Mixed Fines, Predominantly Mud

■ Mixed Fines, Predominantly Sand

■ Mixed Coarse with Mud

■ Mixed Coarse with Sand

■ Mixed Cobble /Boulder with Sand

■ Coarse

■ Gravel

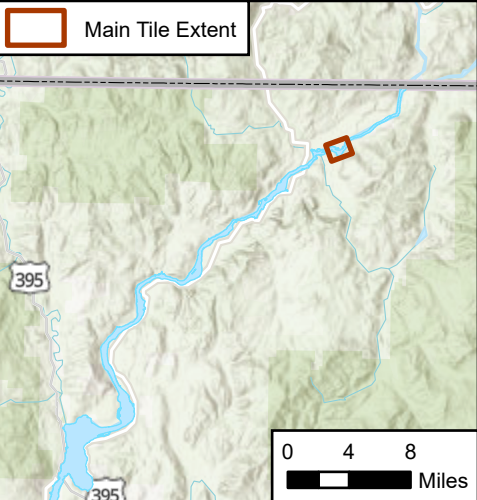
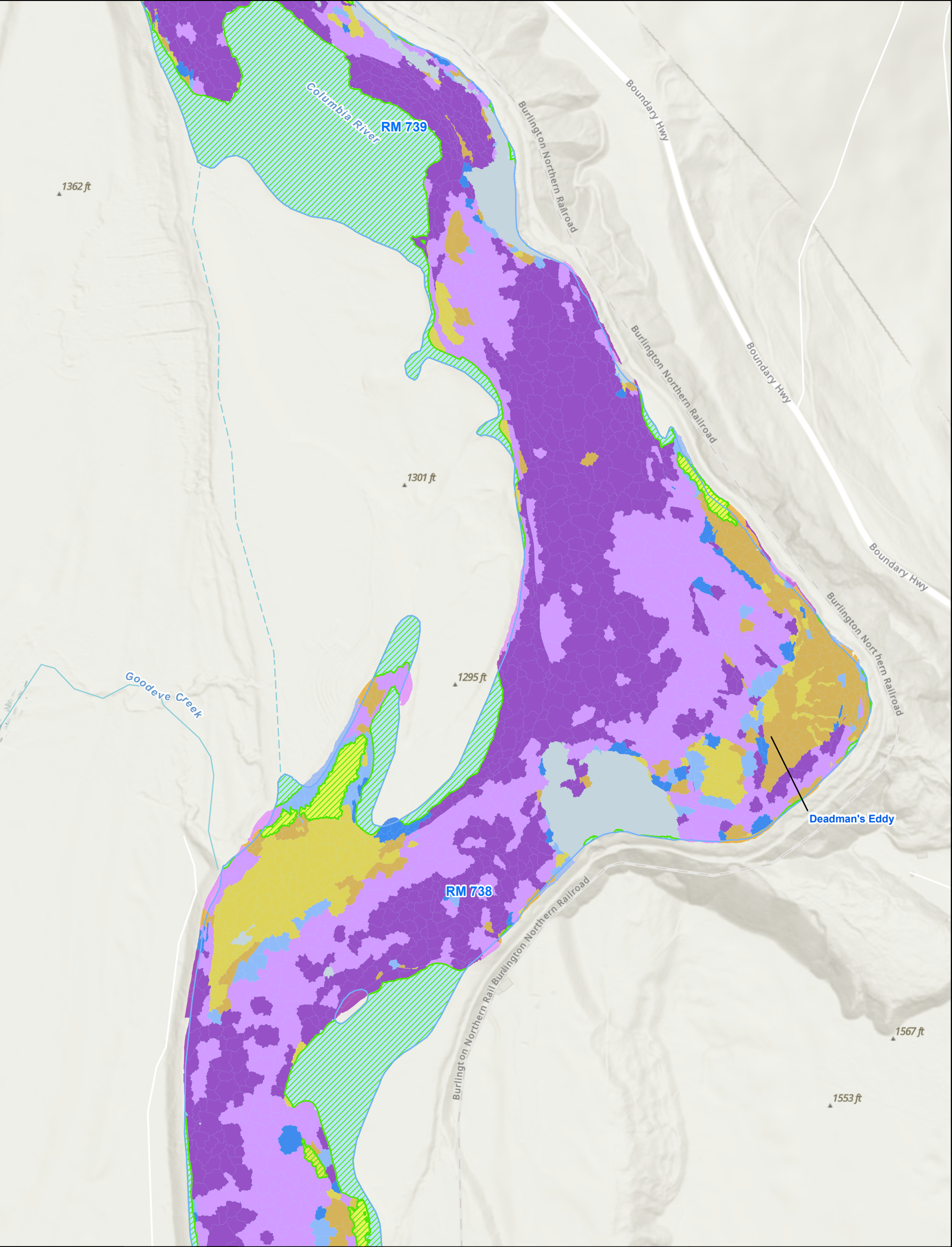
■ Cobble/Boulder

■ Bedrock

0 525 1,050 Feet

N

Map D-1 Tile 3.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



Legend

— Columbia River Shoreline

▨ AVGZ

Sediment Facies

■ Dense Vegetation

■ Mud

■ Sand

■ Mixed Fines, Predominantly Mud

■ Mixed Fines, Predominantly Sand

■ Mixed Coarse with Sand

■ Mixed Cobble /Boulder with Sand

■ Coarse

■ Gravel

■ Cobble/Boulder

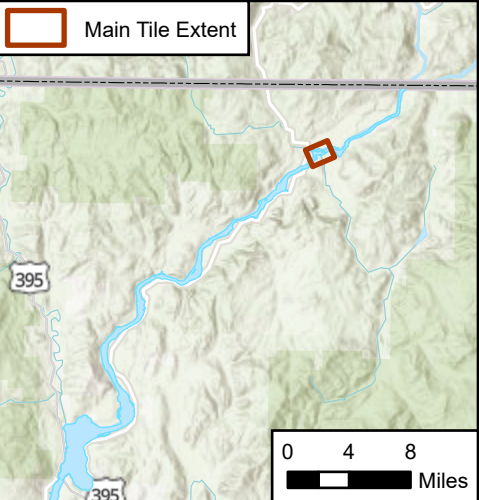
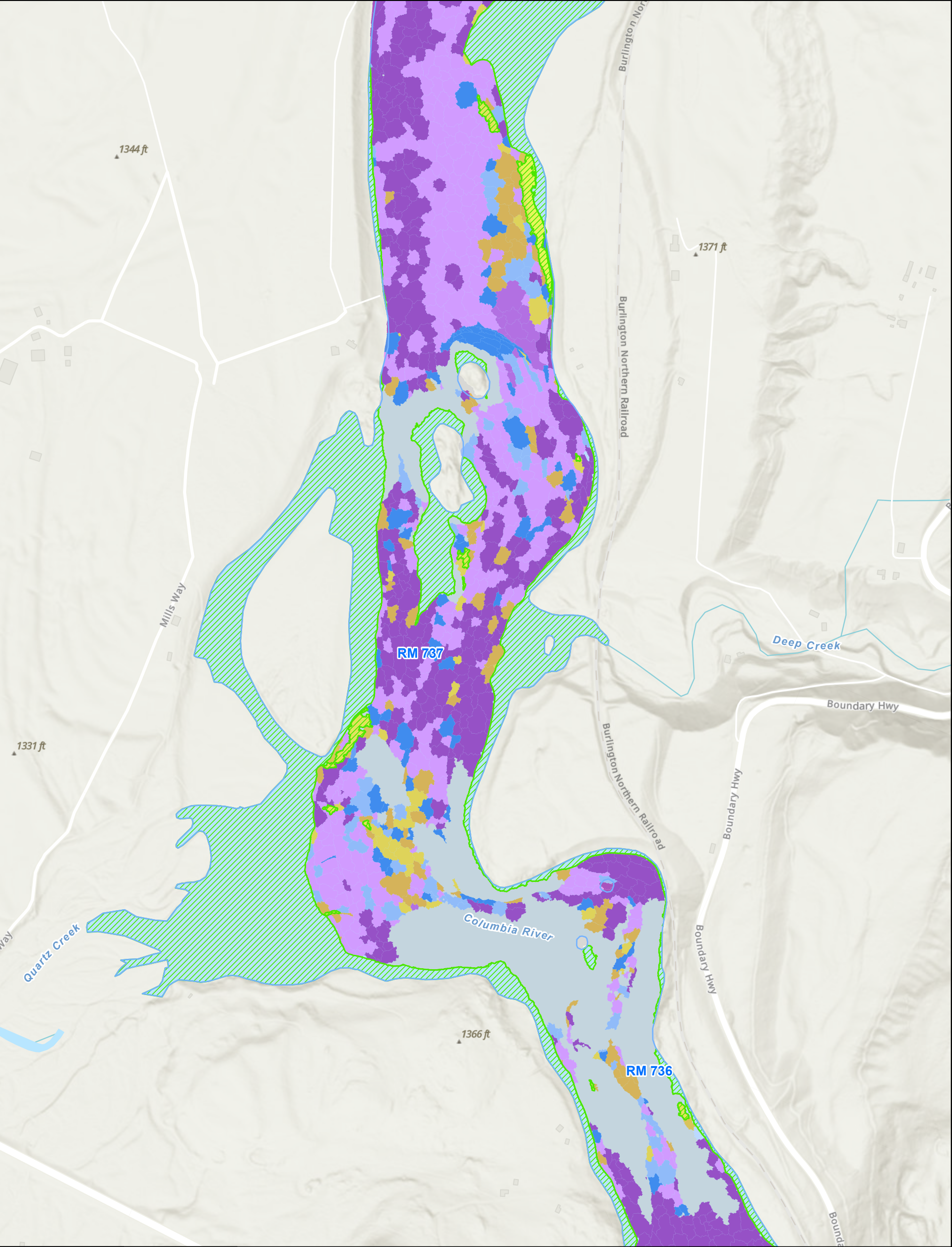
■ Bedrock

0 370 740 Feet

0 4 8 Miles

N

Map D-1 Tile 4.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



Legend

- | | |
|---------------------------------|---------------------------------|
| Columbia River Shoreline | Mixed Coarse with Mud |
| AVGZ | Mixed Coarse with Sand |
| Sediment Facies | Mixed Cobble /Boulder with Mud |
| Dense Vegetation | Mixed Cobble /Boulder with Sand |
| Mud | Coarse |
| Sand | Gravel |
| Mixed Fines, Predominantly Mud | Cobble/Boulder |
| Mixed Fines, Predominantly Sand | Bedrock |

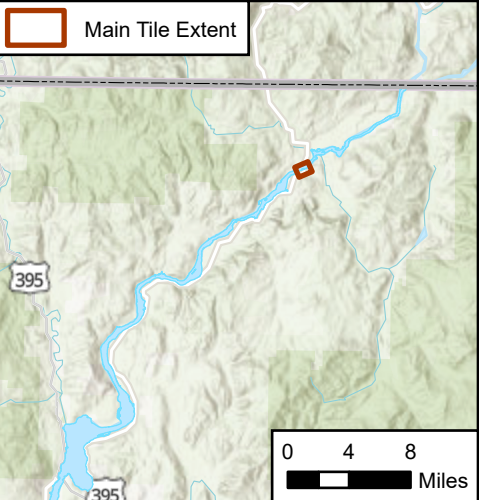
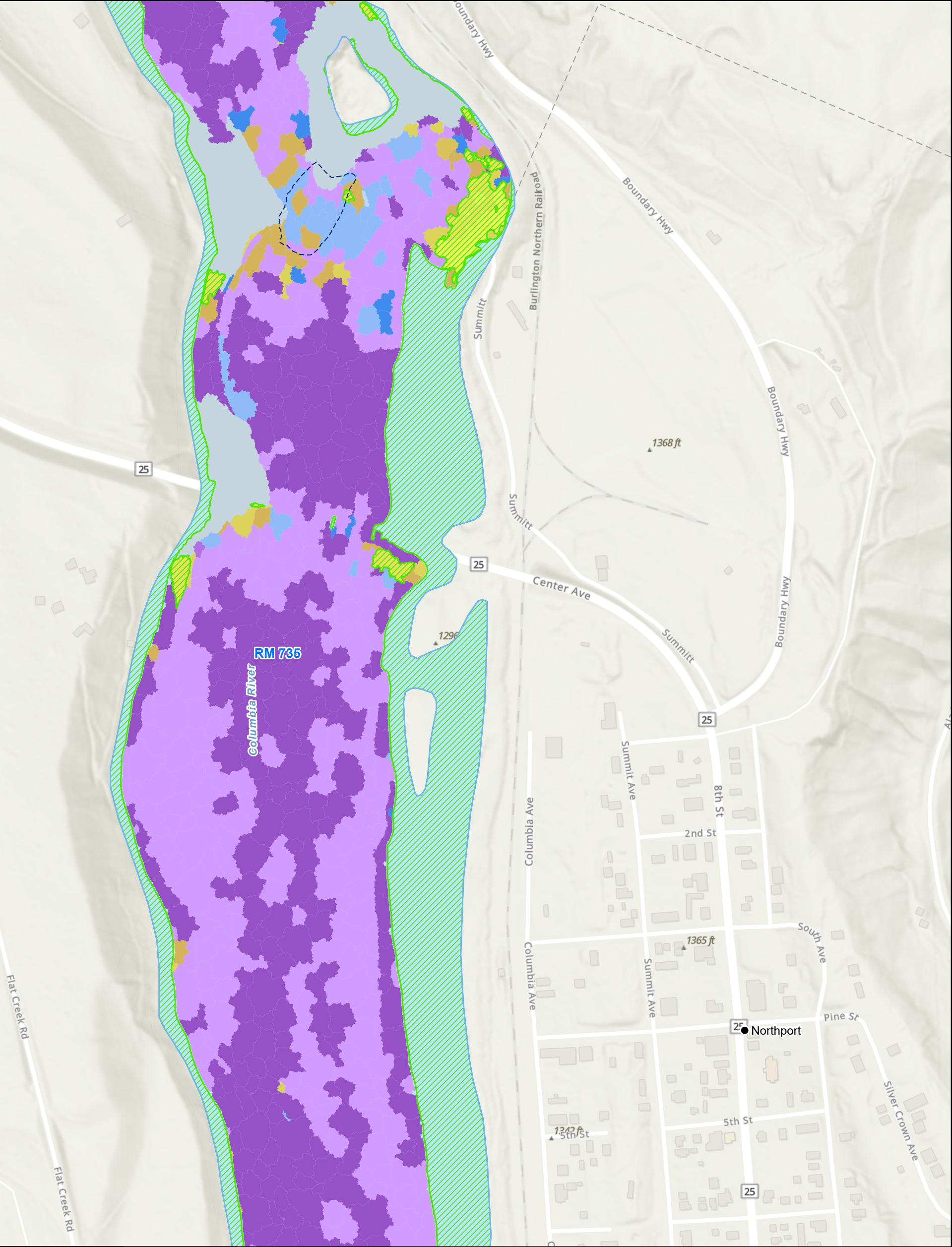


0 390 780 Feet

Map D-1 Tile 5.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



ERM



Legend

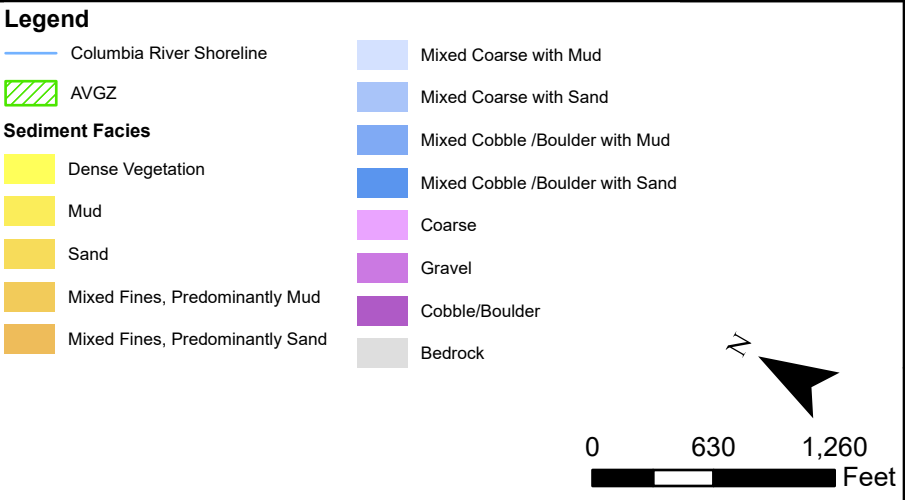
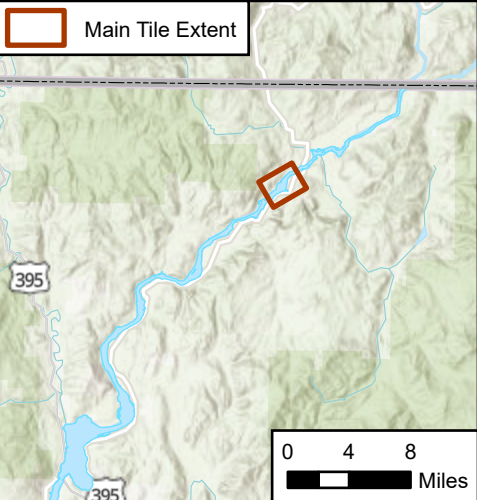
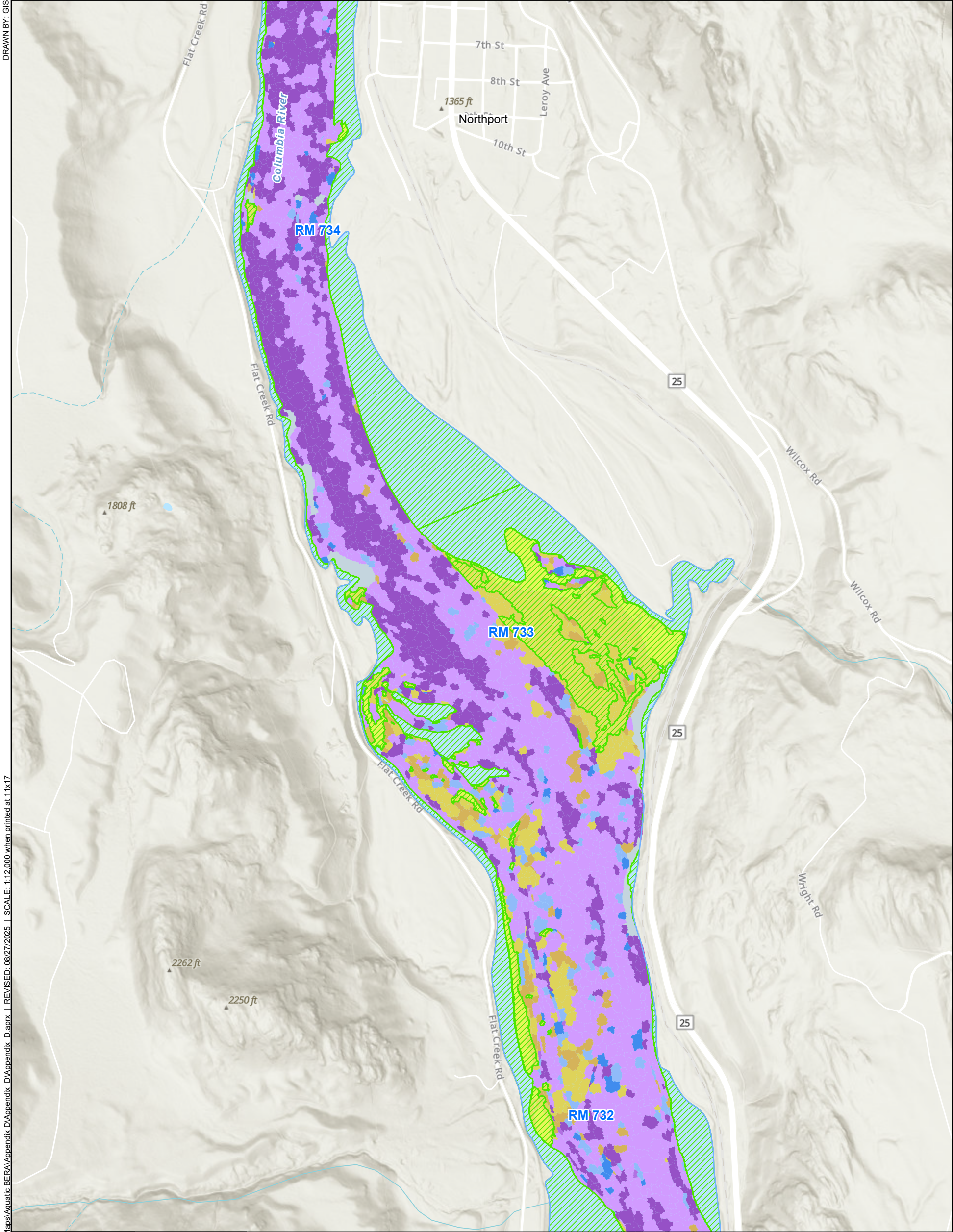
- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ

Sediment Facies

- Dense Vegetation
- Mud
- Sand
- Mixed Fines, Predominantly Mud
- Mixed Fines, Predominantly Sand
- Mixed Coarse with Mud
- Mixed Coarse with Sand
- Mixed Cobble /Boulder with Sand
- Coarse
- Gravel
- Cobble/Boulder
- Bedrock

0 230 460 Feet

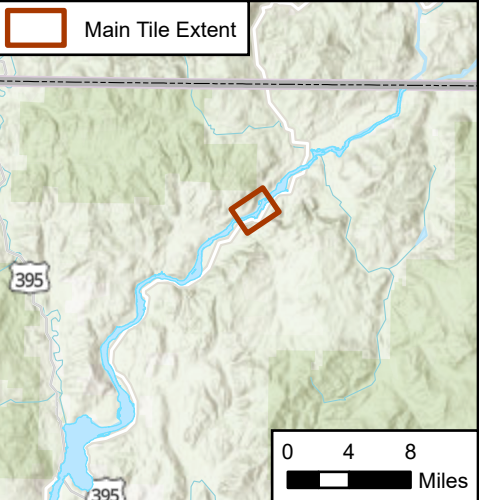
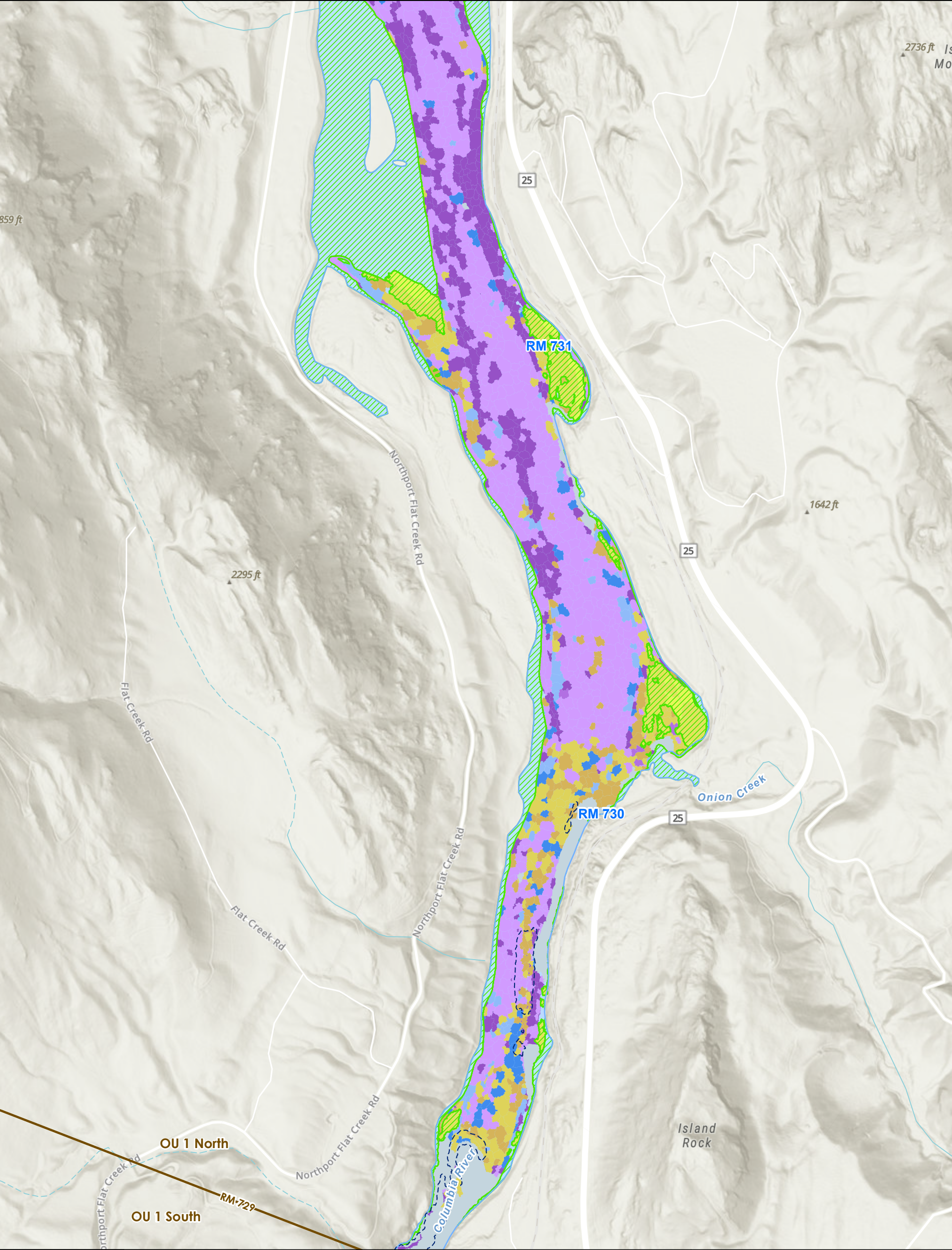
Map D-1 Tile 6.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



Map D-1 Tile 7.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington

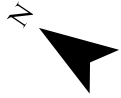


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Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ
- Sediment Facies**
- Dense Vegetation
- Mud
- Sand
- Mixed Fines, Predominantly Mud
- Mixed Fines, Predominantly Sand
- Mixed Coarse with Mud
- Mixed Coarse with Sand
- Mixed Cobble/Boulder with Sand
- Coarse
- Gravel
- Cobble/Boulder
- Bedrock

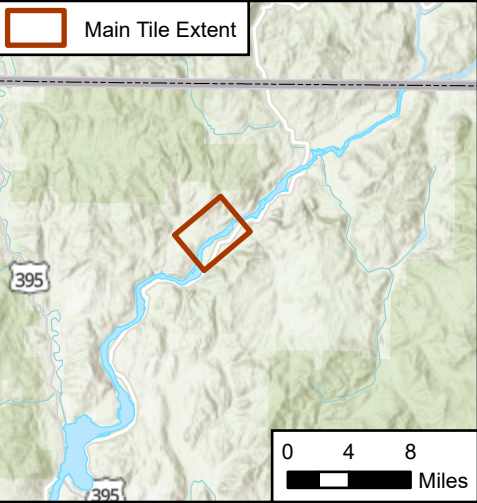
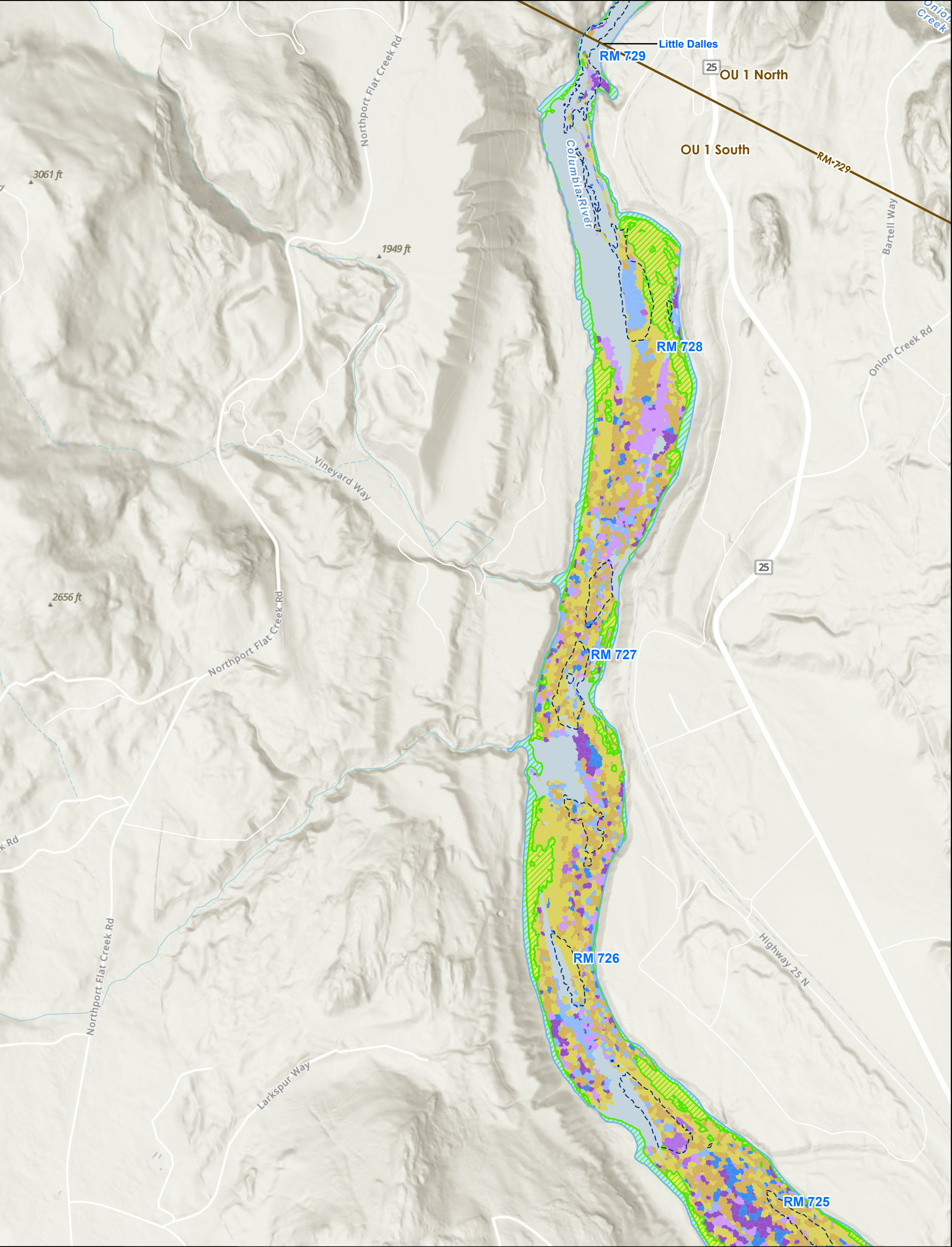


0 630 1,260 Feet

Map D-1 Tile 8.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



ERM



Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- ▨ AVZ

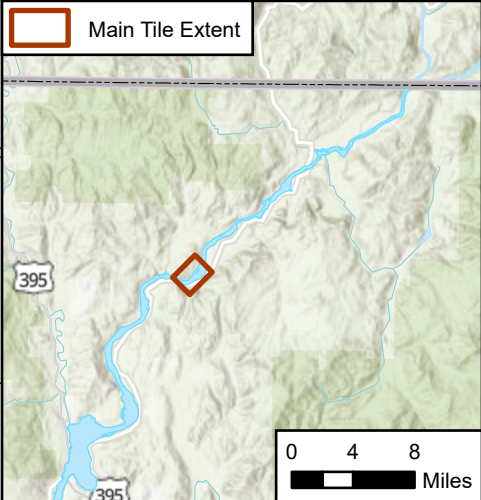
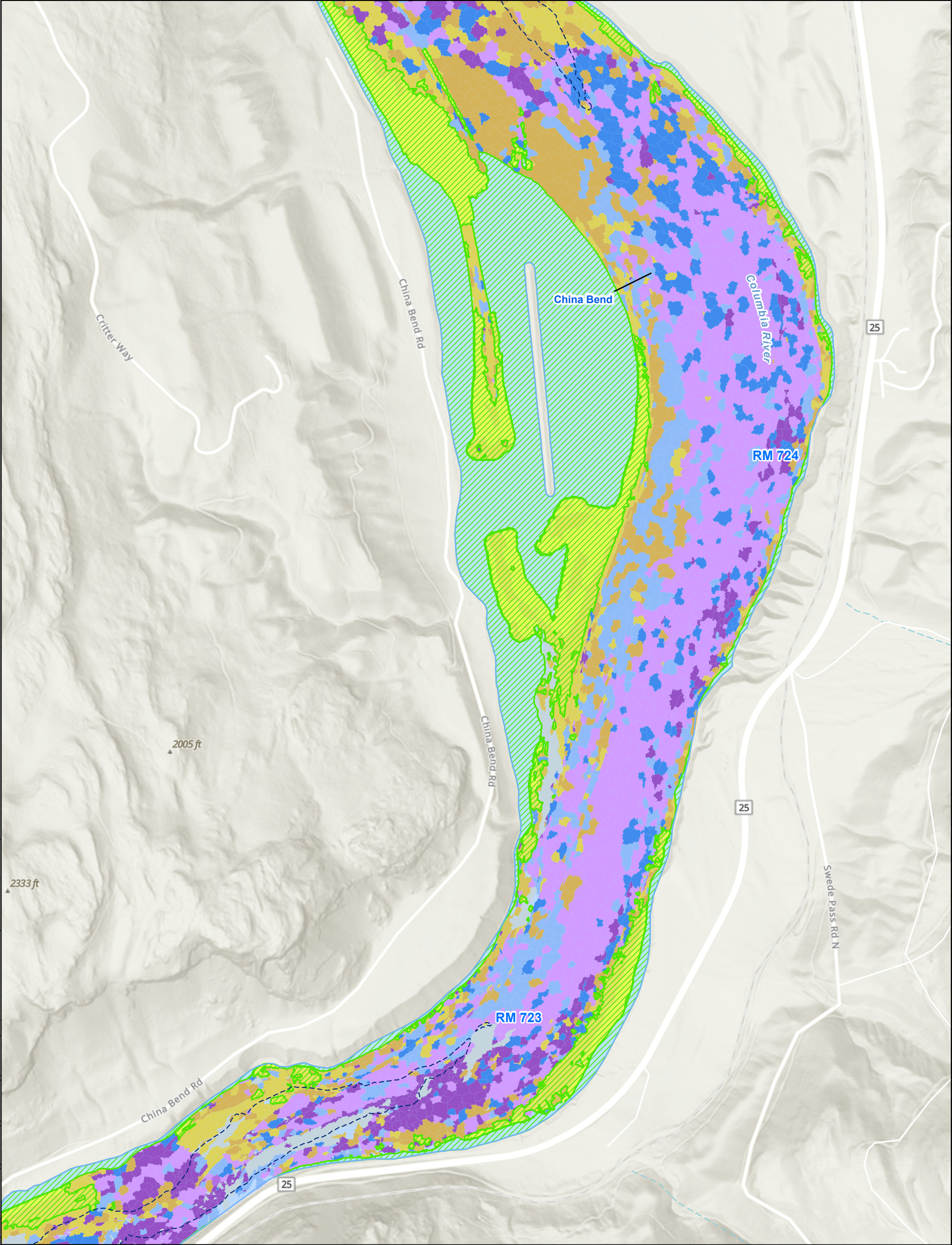
Sediment Facies

- Dense Vegetation
- Mud
- Sand
- Mixed Fines, Predominantly Mud
- Mixed Fines, Predominantly Sand
- Mixed Coarse with Mud
- Mixed Coarse with Sand
- Mixed Cobble /Boulder with Sand
- Coarse
- Gravel
- Cobble/Boulder
- Bedrock

0 1,000 2,000 Feet

Map D-1 Tile 9.
Identification of AVZ
Final Aquatic BERA
Upper Columbia River, Washington

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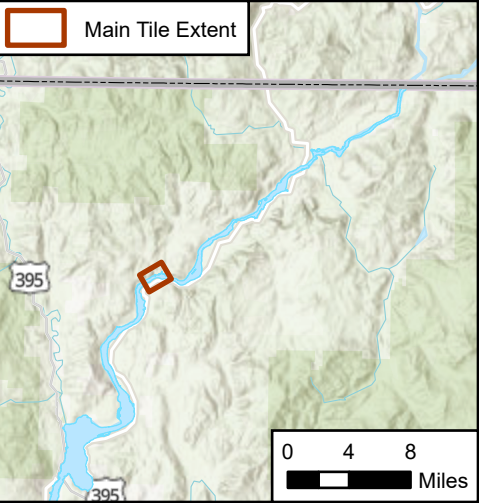
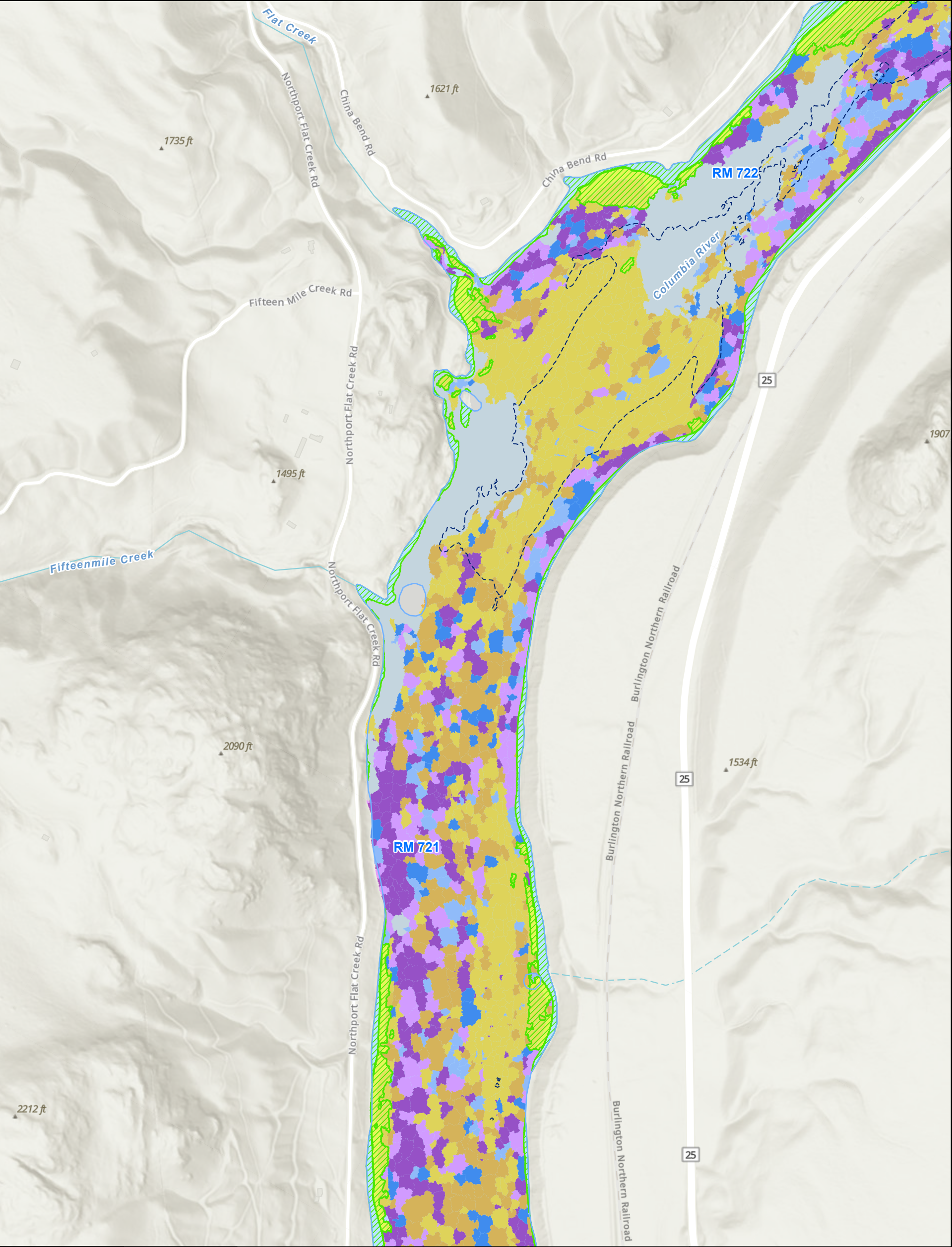


Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVZ
- Sediment Facies**
- Dense Vegetation
- Mud
- Sand
- Mixed Fines, Predominantly Mud
- Mixed Fines, Predominantly Sand
- Mixed Coarse with Mud
- Mixed Coarse with Sand
- Mixed Cobble /Boulder with Mud
- Mixed Cobble /Boulder with Sand
- Coarse
- Gravel
- Cobble/Boulder
- Bedrock

0 525 1,050 Feet

Map D-1 Tile 10.
Identification of AVZ
Final Aquatic BERA
Upper Columbia River, Washington



Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ
- Sediment Facies**
- Dense Vegetation
- Mud
- Sand
- Mixed Fines, Predominantly Mud
- Mixed Fines, Predominantly Sand
- Mixed Coarse with Mud
- Mixed Coarse with Sand
- Mixed Cobble /Boulder with Sand
- Coarse
- Gravel
- Cobble/Boulder
- Bedrock

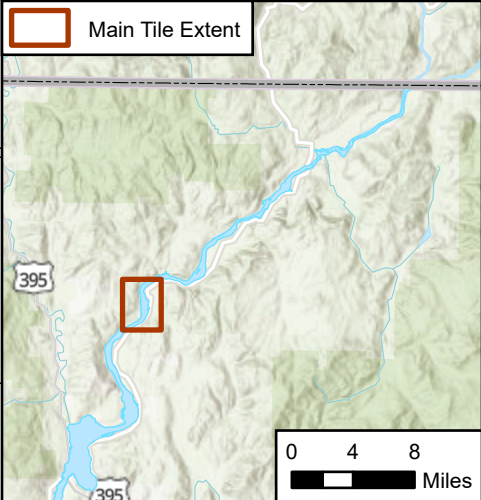
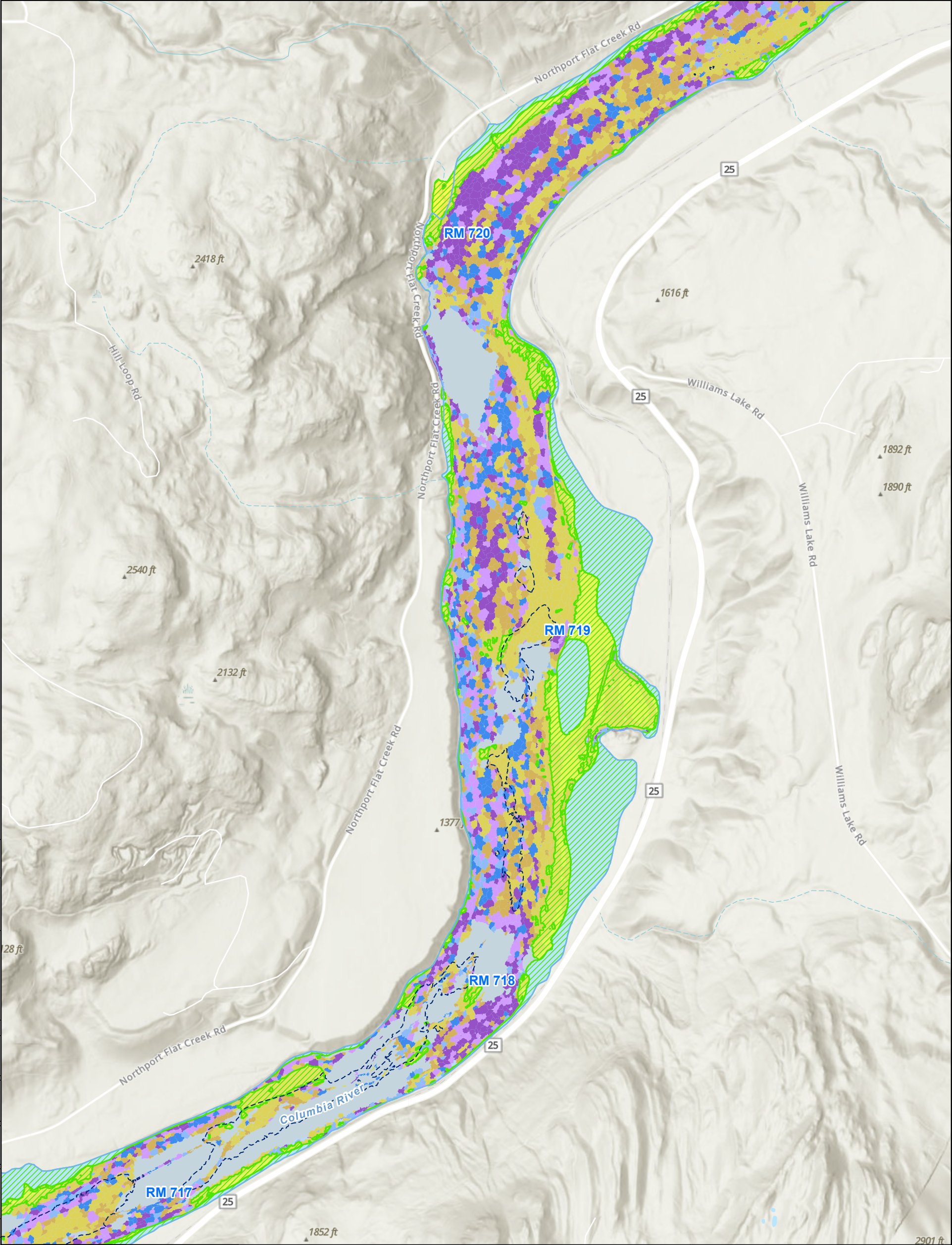
0 420 840 Feet

Map D-1 Tile 11.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



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Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ

Sediment Facies

- Dense Vegetation
- Mud
- Sand
- Mixed Fines, Predominantly Mud

- Mixed Fines, Predominantly Sand
- Mixed Coarse with Mud
- Mixed Coarse with Sand
- Mixed Cobble /Boulder with Sand
- Coarse
- Gravel
- Cobble/Boulder
- Bedrock

0 840 1,680 Feet

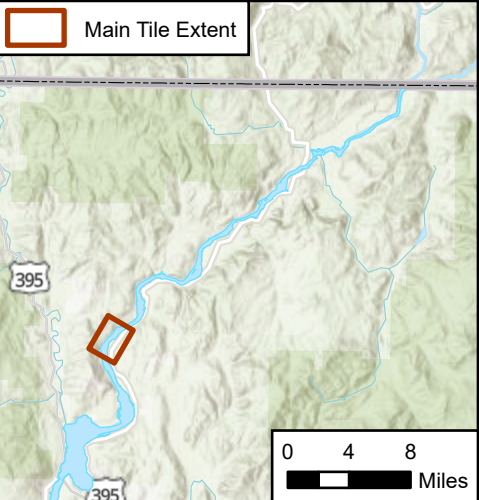
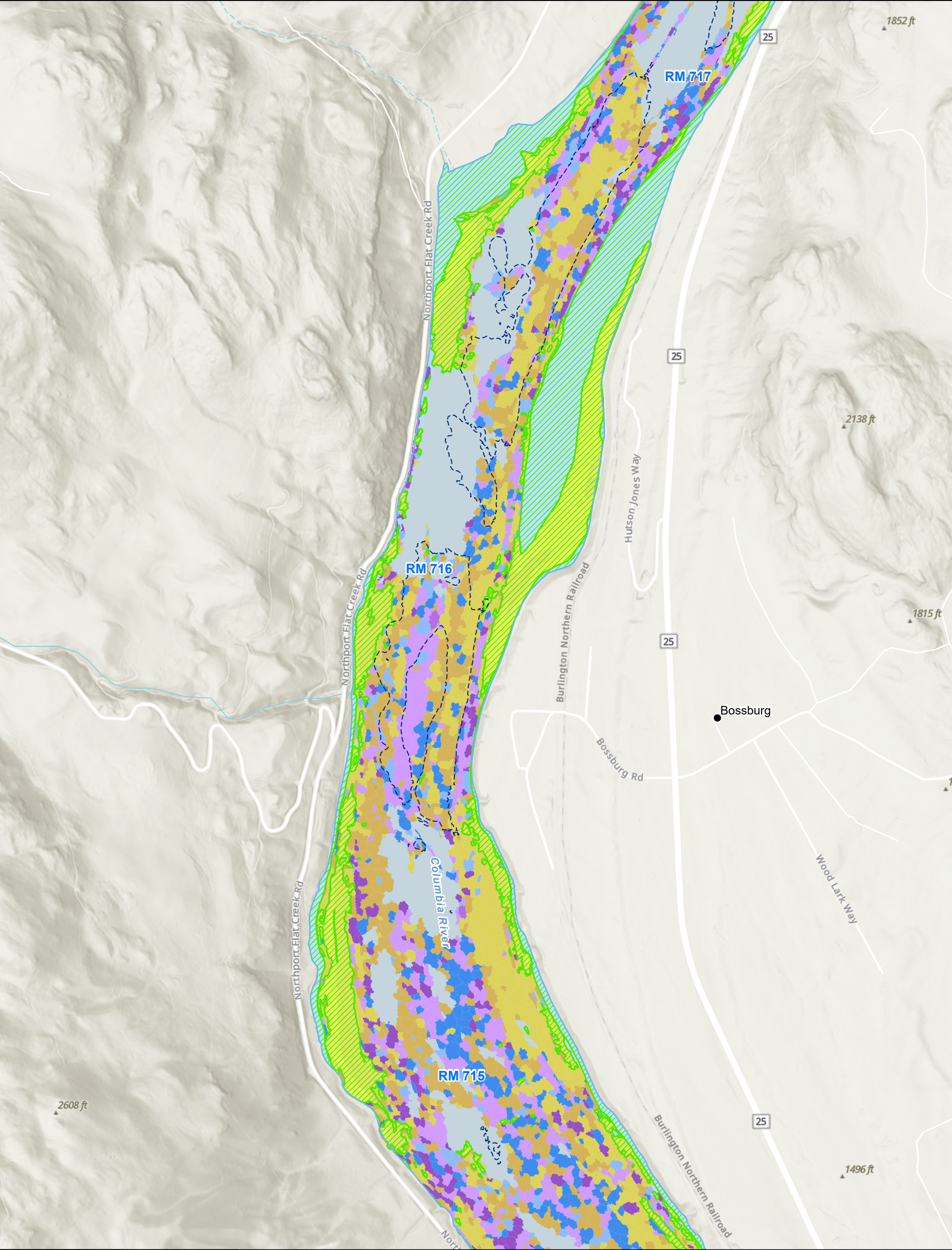
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Map D-1 Tile 12.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



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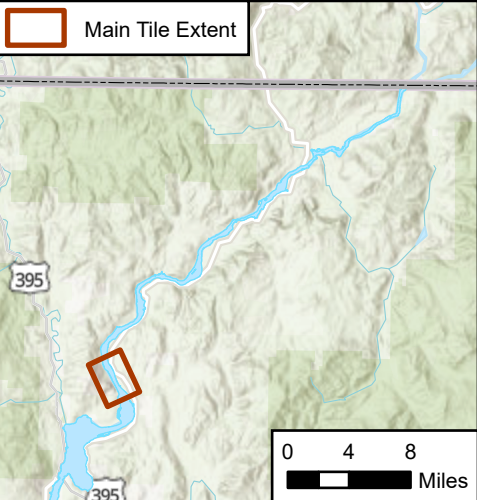
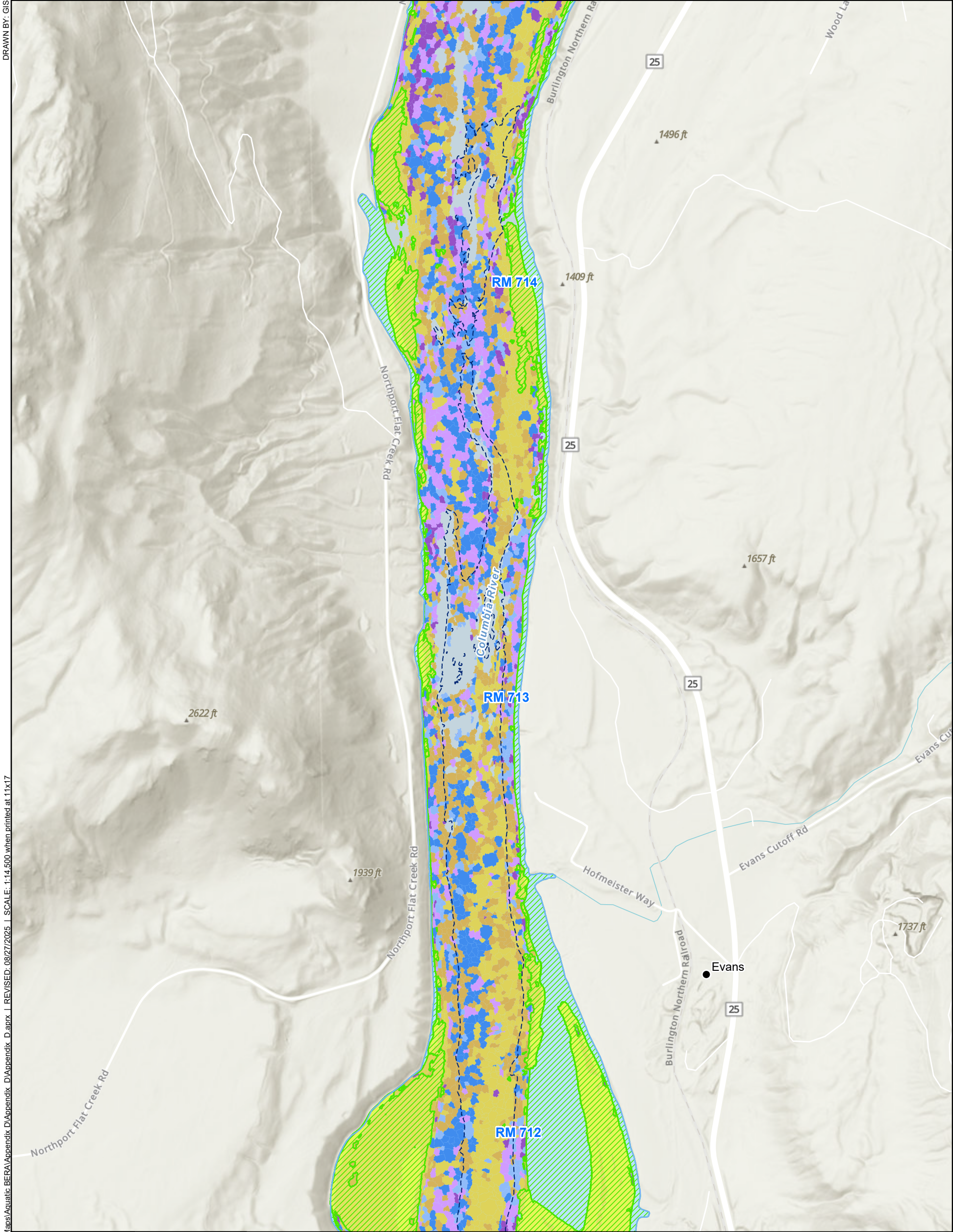
Legend

- City/Town
- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ
- Sediment Facies**
- Dense Vegetation
- Mud
- Sand
- Mixed Fines, Predominantly Mud
- Mixed Fines, Predominantly Sand
- Mixed Coarse with Mud
- Mixed Coarse with Sand
- Mixed Cobble /Boulder with Mud
- Mixed Cobble /Boulder with Sand
- Coarse
- Gravel
- Cobble/Boulder
- Bedrock

0 630 1,260 Feet

Map D-1 Tile 13.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington

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Main Tile Extent

UCR Shallow/Deep Partition (1,210 ft amsl)

Columbia River Shoreline

AVGZ

Sediment Facies

Dense Vegetation

Mud

Sand

Mixed Fines, Predominantly Mud

Mixed Fines, Predominantly Sand

Mixed Coarse with Mud

Mixed Coarse with Sand

Mixed Cobble /Boulder with Mud

Mixed Cobble /Boulder with Sand

Coarse

Gravel

Cobble/Boulder

Bedrock

0

4

8

Miles

0

760

1,520

Feet

N

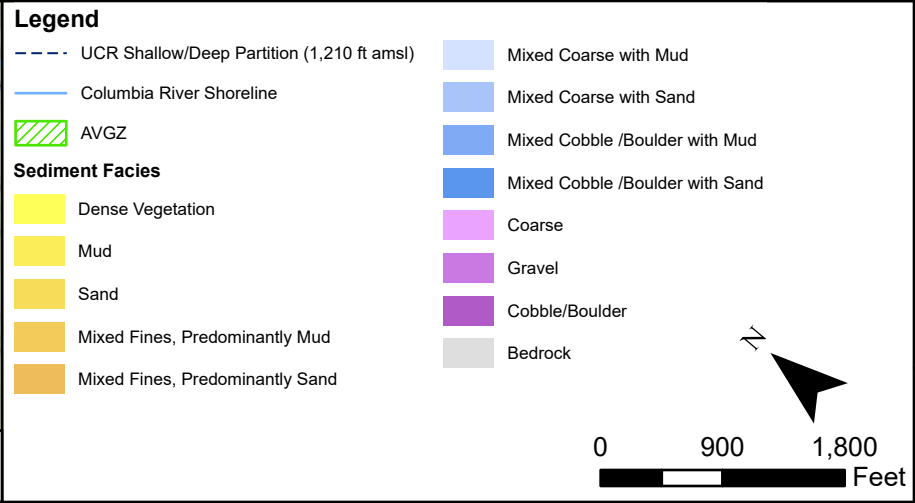
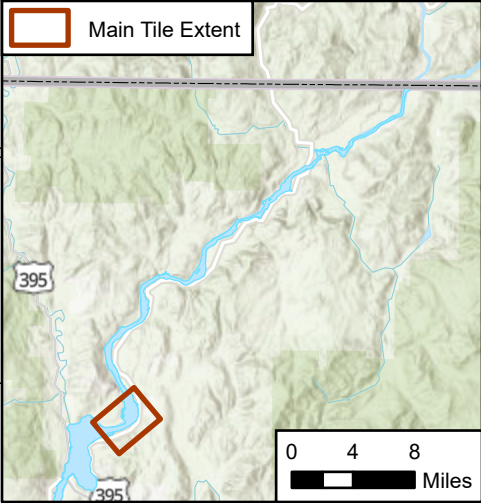
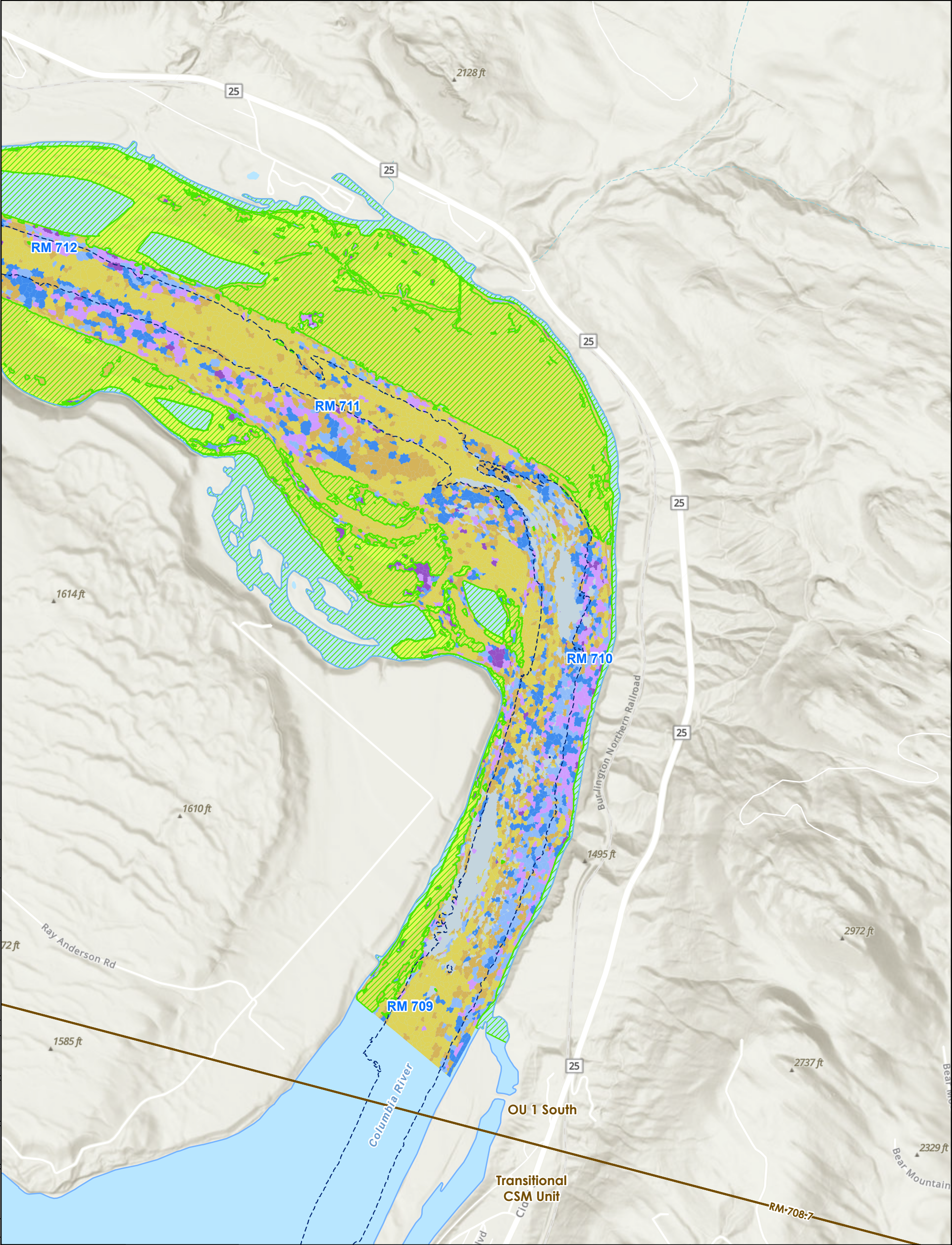
Map D-1 Tile 14.

Identification of AVZ

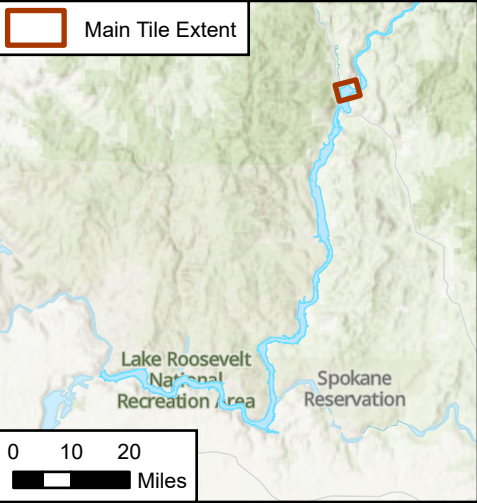
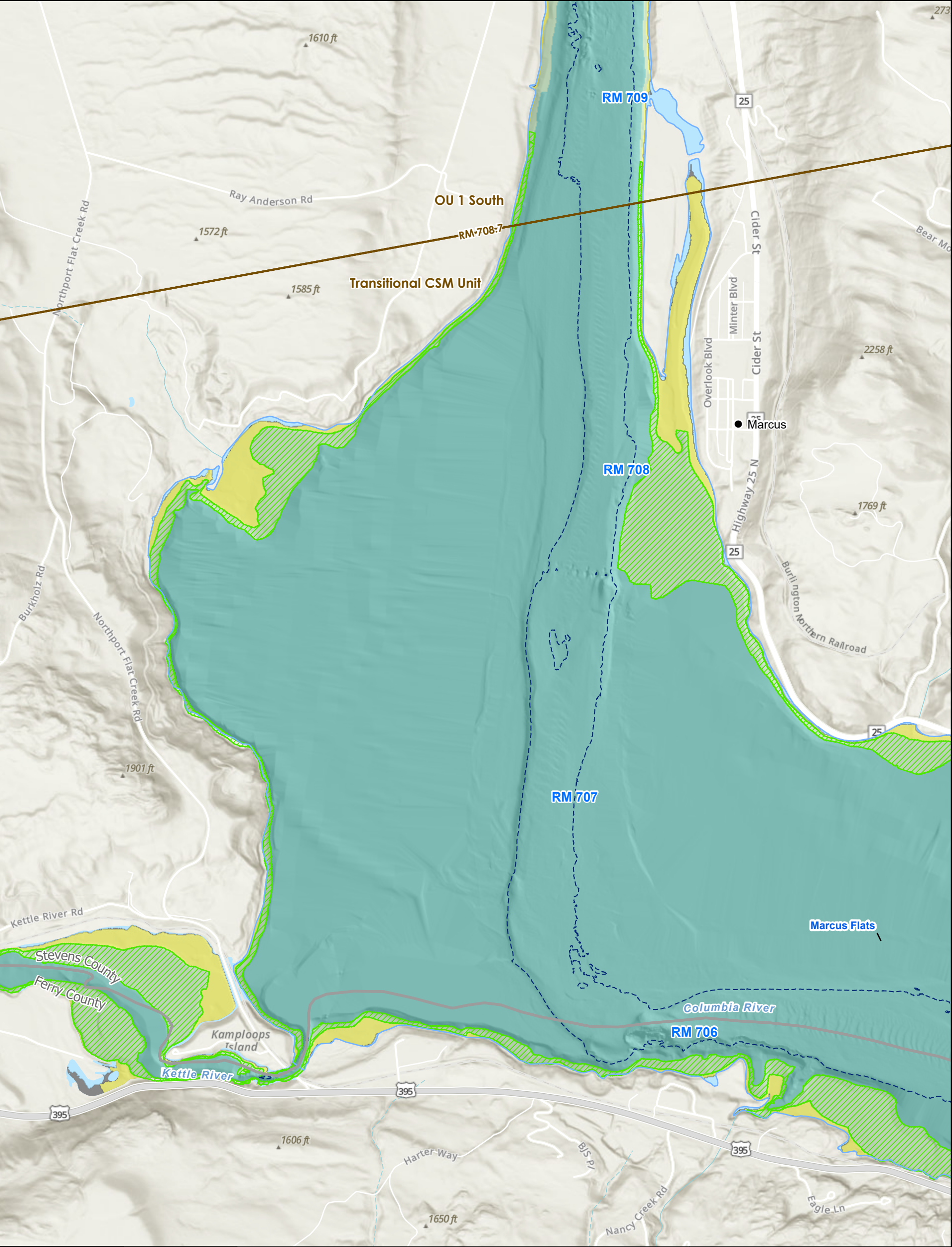
Final Aquatic BERA

Upper Columbia River, Washington

ERM



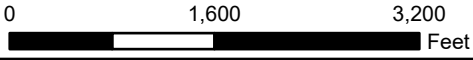
Map D-1 Tile 15.
Identification of AVZ
Final Aquatic BERA
Upper Columbia River, Washington



Main Tile Extent

Legend

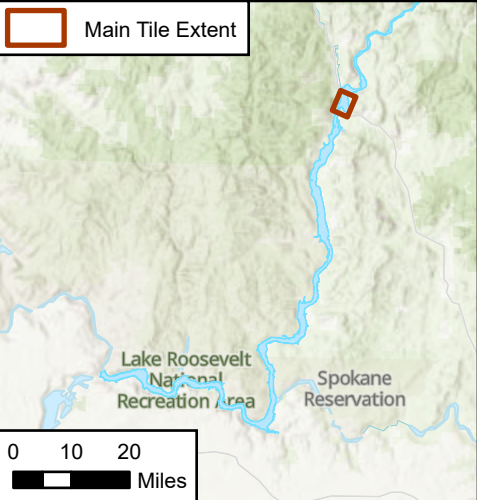
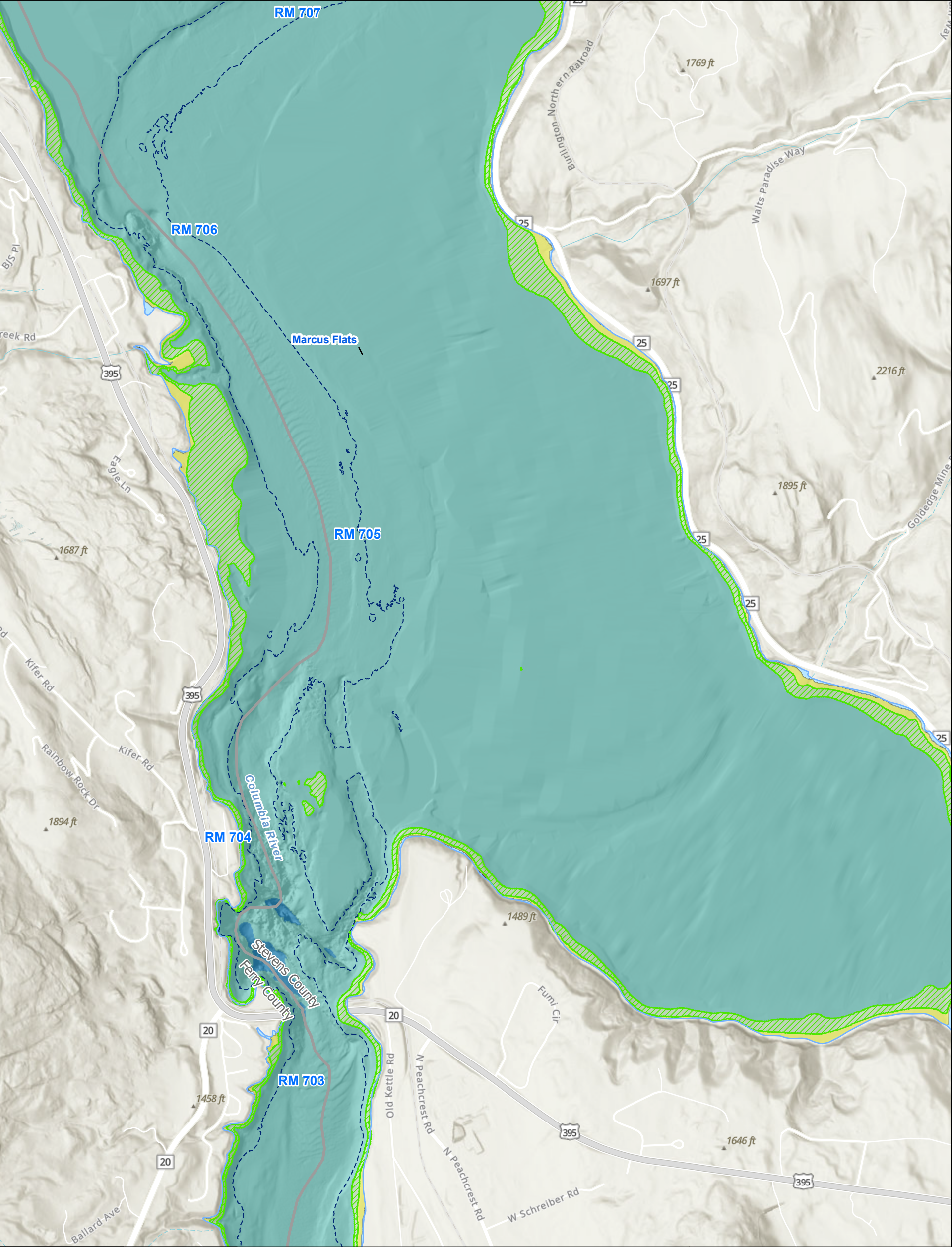
- City/Town
- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVZ
- County Boundary
- Elevation (ft amsl)
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74



Map D-1 Tile 16.
Identification of AVZ
Final Aquatic BERA
Upper Columbia River, Washington



ERM



Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ
- County Boundary

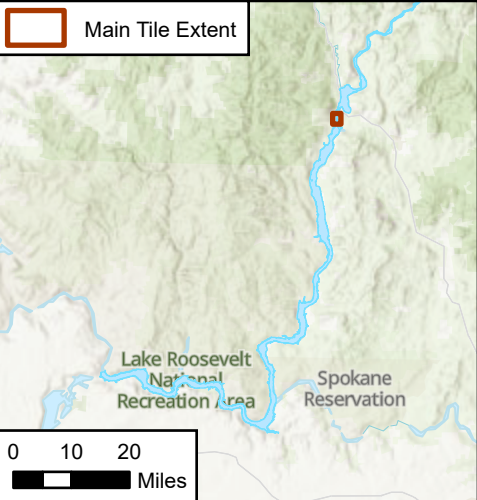
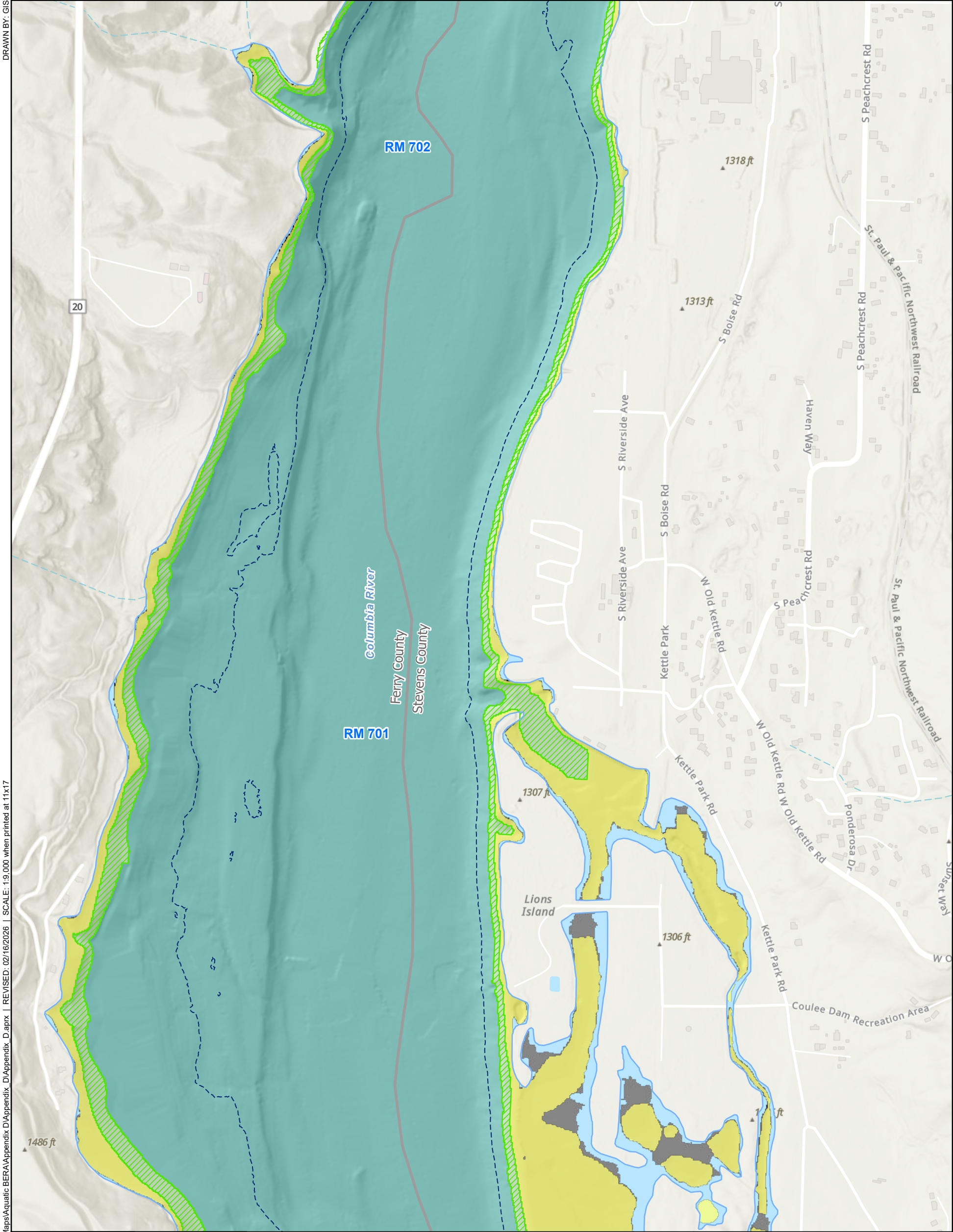
Elevation (ft amsl)

- 868.72–1,000
- 1,000–1,100
- 1,100–1,260
- 1,260–1,280
- 1,280–1,696.74

0 10 20 Miles

0 1,600 3,200 Feet

Map D-1 Tile 17.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ
- County Boundary

Elevation (ft amsl)

- 868.72–1,000
- 1,000–1,100
- 1,100–1,260
- 1,260–1,280
- 1,280–1,696.74

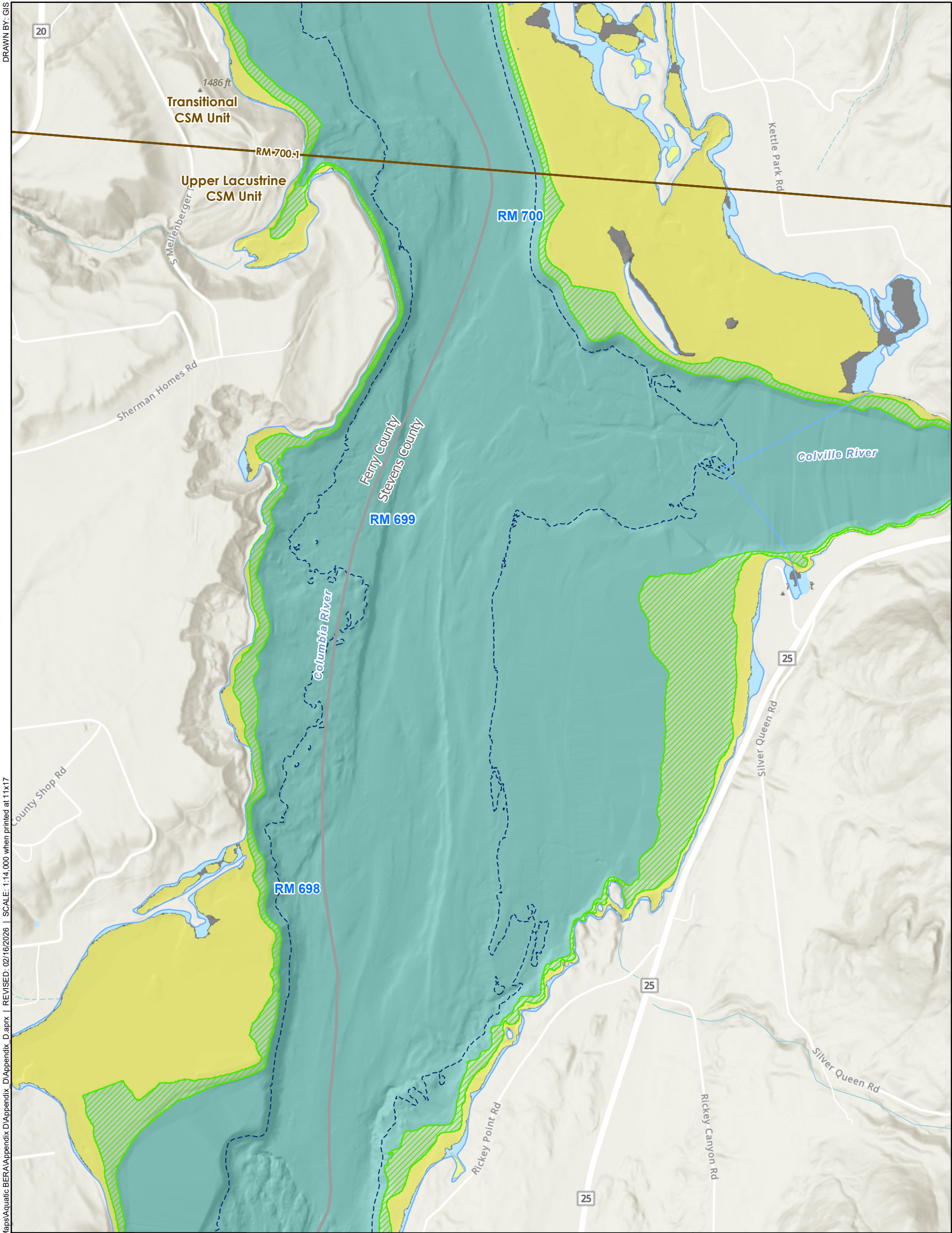
0 810 1,620 Feet

N

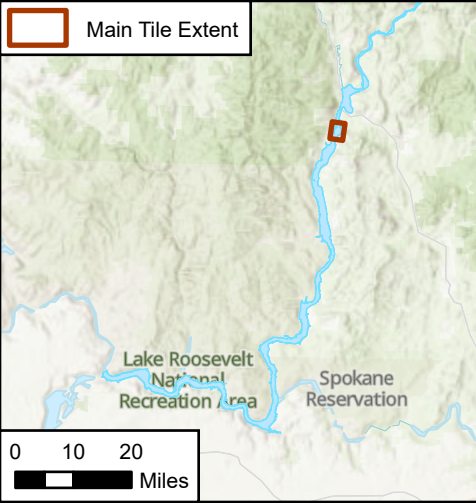
Map D-1 Tile 18.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



ERM



Main Tile Extent



Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- ▨ AVGZ
- ▭ County Boundary
- Elevation (ft amsl)**
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74



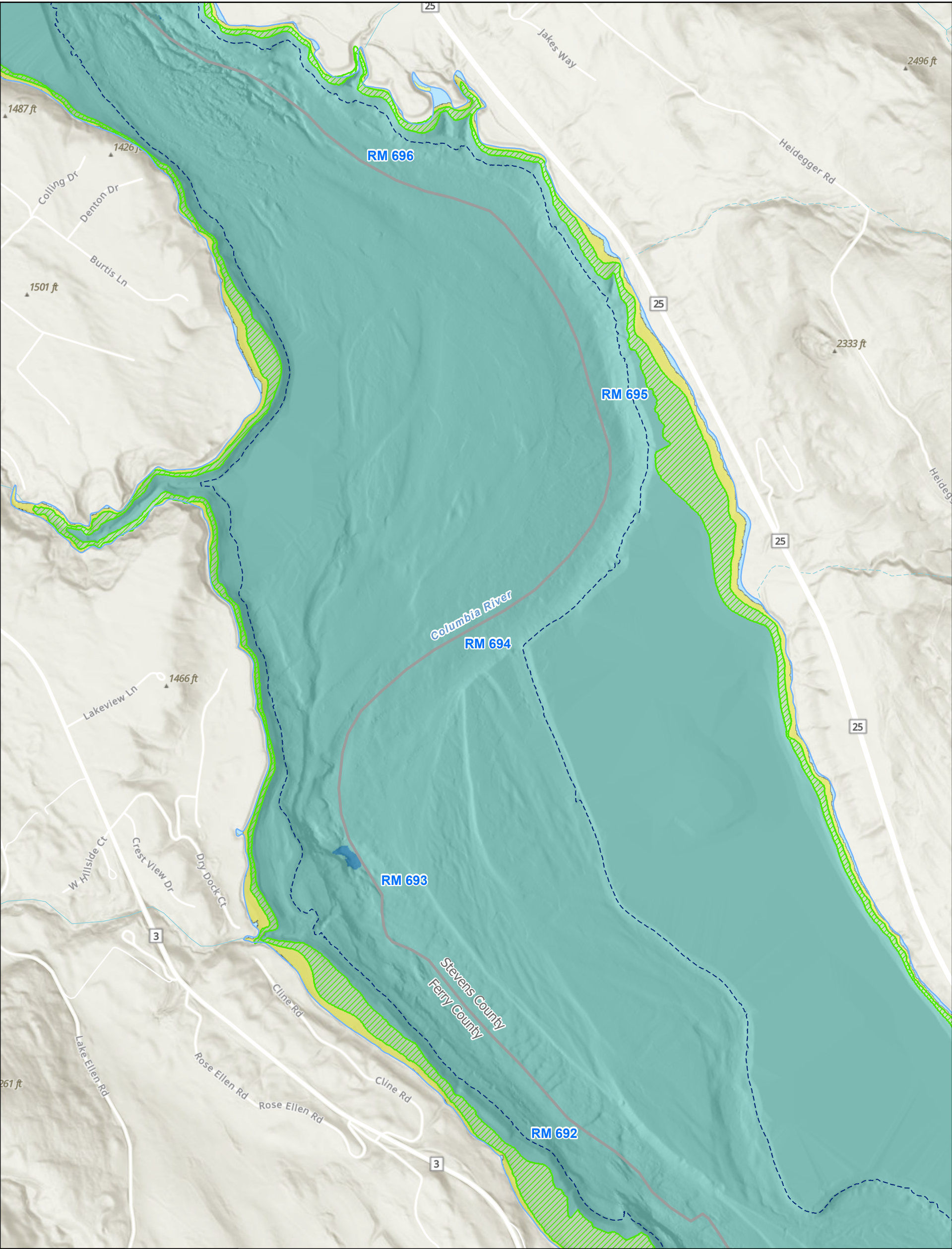
0 1,250 2,500 Feet

Map D-1 Tile 19.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington

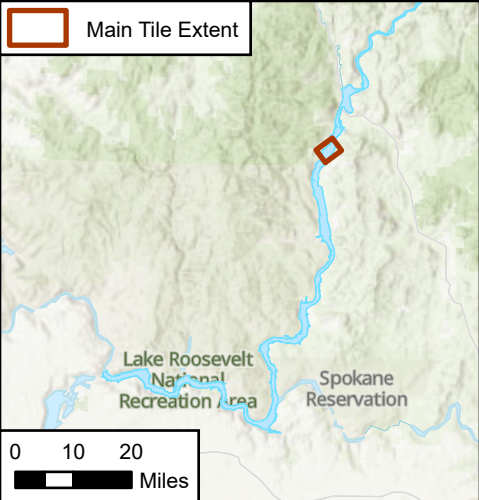


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FILE: M:\US\Projects\S-UI\Tech\0499466 Tech Upper Columbia River\Maps\Aquatic BERA\Appendix D.aprx | REVISED: 08/27/2025 | SCALE: 1:17,000 when printed at 11x17

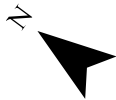


Main Tile Extent



Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- ▨ AVGZ
- ▭ County Boundary
- Elevation (ft amsl)**
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74

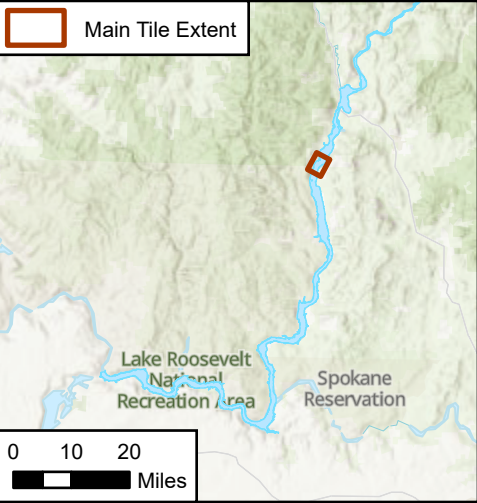
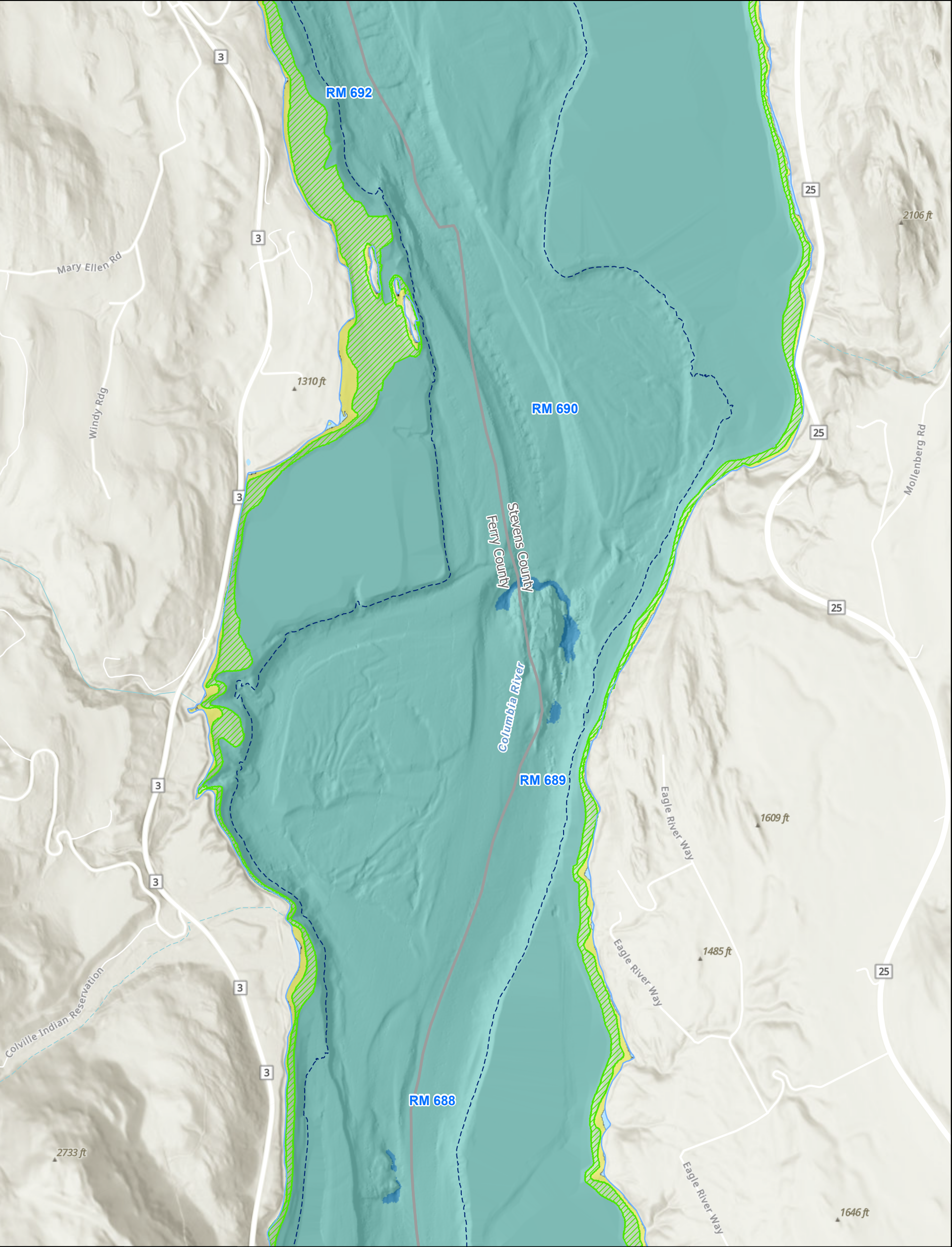


0 1,500 3,000 Feet

Map D-1 Tile 20.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



ERM



Main Tile Extent

Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVZ
- County Boundary
- Elevation (ft amsl)
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74

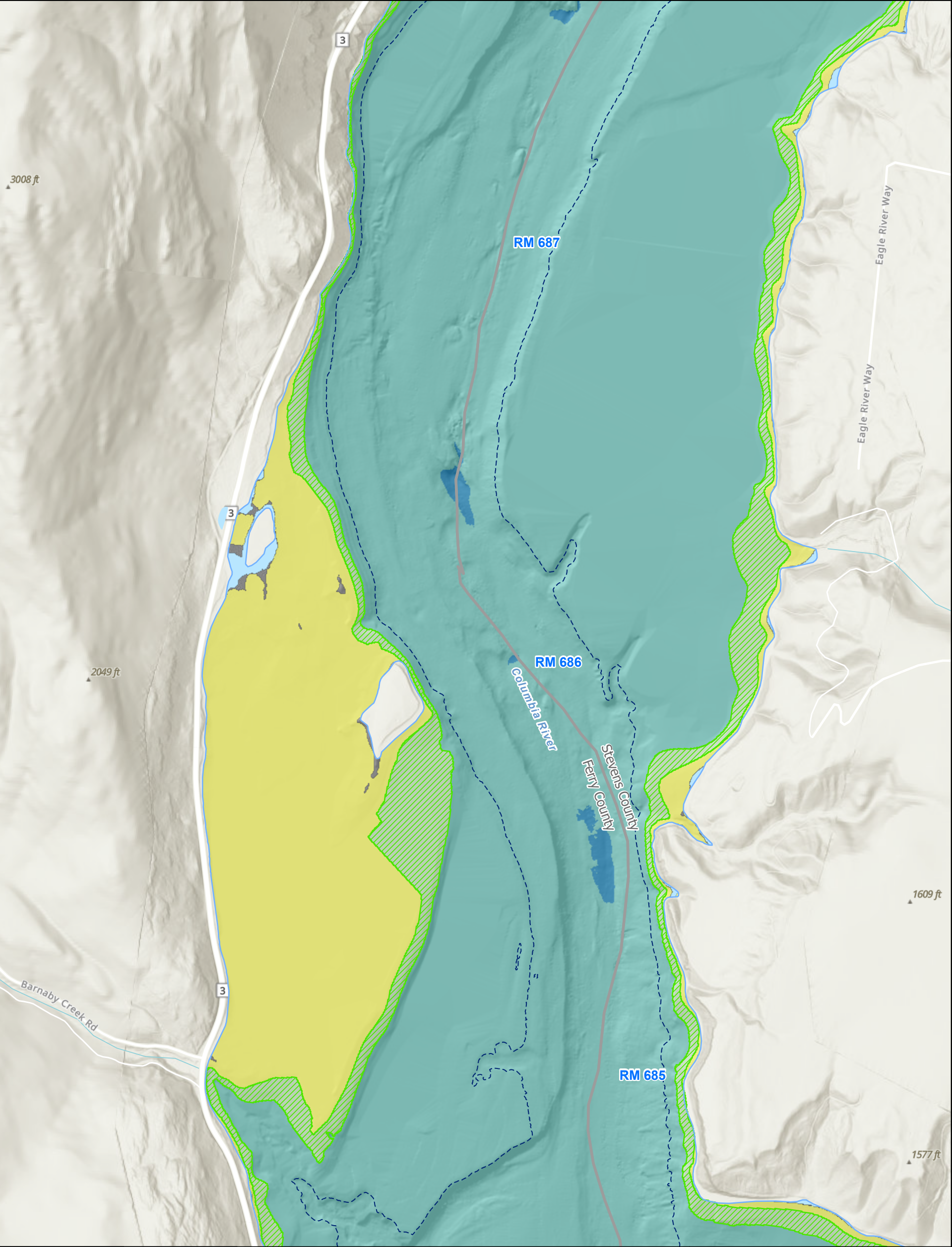


0 1,400 2,800 Feet

Map D-1 Tile 21.
Identification of AVZ
Final Aquatic BERA
Upper Columbia River, Washington



ERM

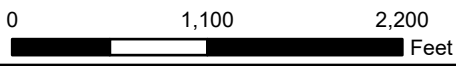


Main Tile Extent



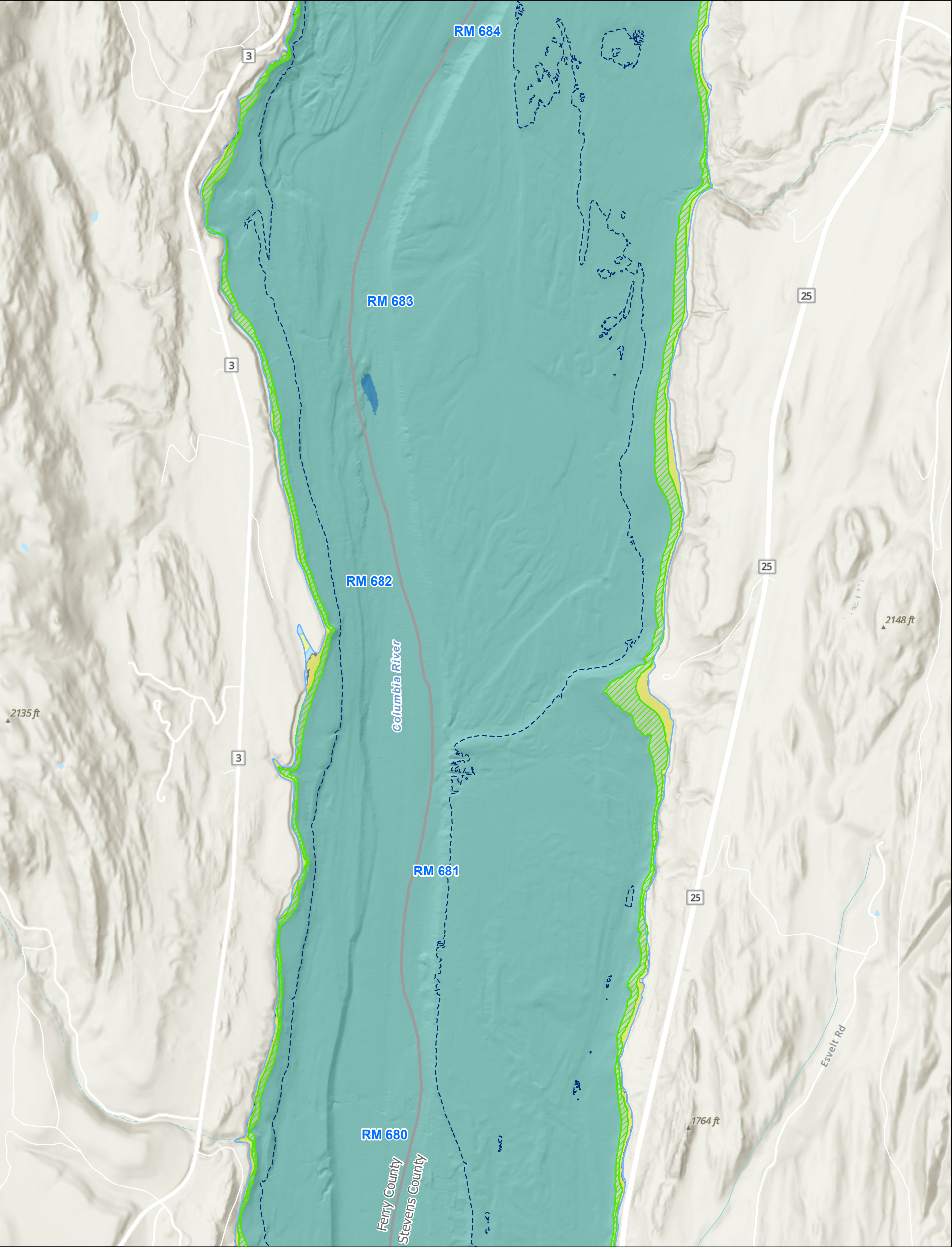
Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- ▨ AVGZ
- ▭ County Boundary
- Elevation (ft amsl)**
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74

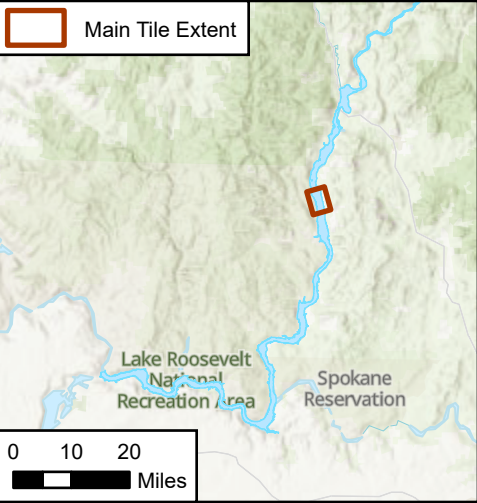


Map D-1 Tile 22.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



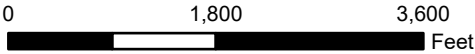


 Main Tile Extent



Legend

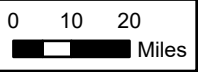
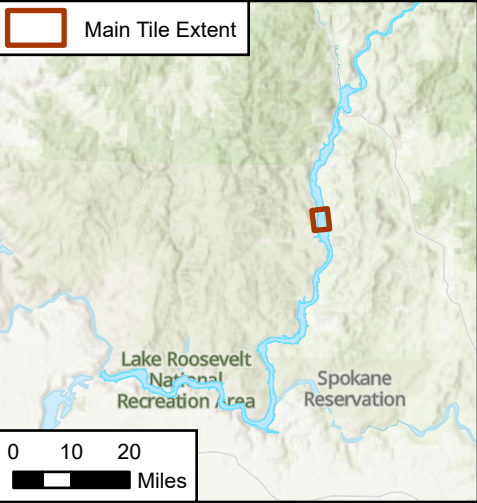
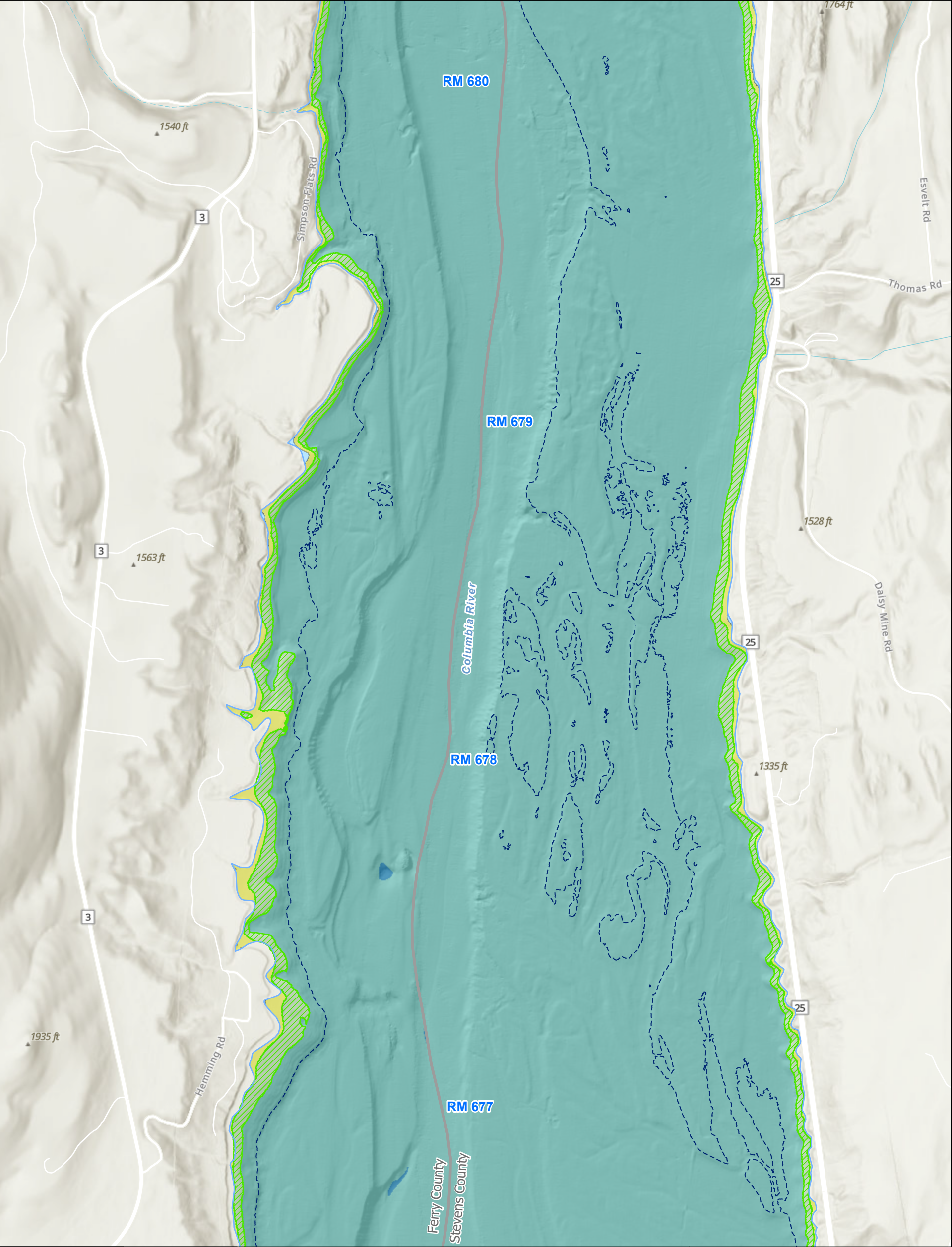
-  UCR Shallow/Deep Partition (1,210 ft amsl)
-  Columbia River Shoreline
-  AVGZ
-  County Boundary
- Elevation (ft amsl)**
 -  868.72–1,000
 -  1,000–1,100
 -  1,100–1,260
 -  1,260–1,280
 -  1,280–1,696.74



Map D-1 Tile 23.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington

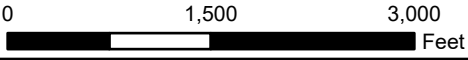


ERM



Legend

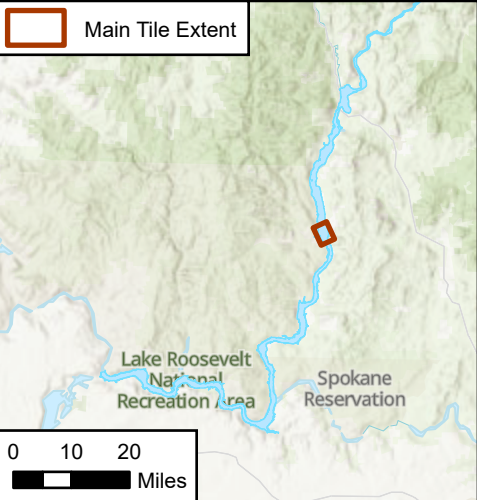
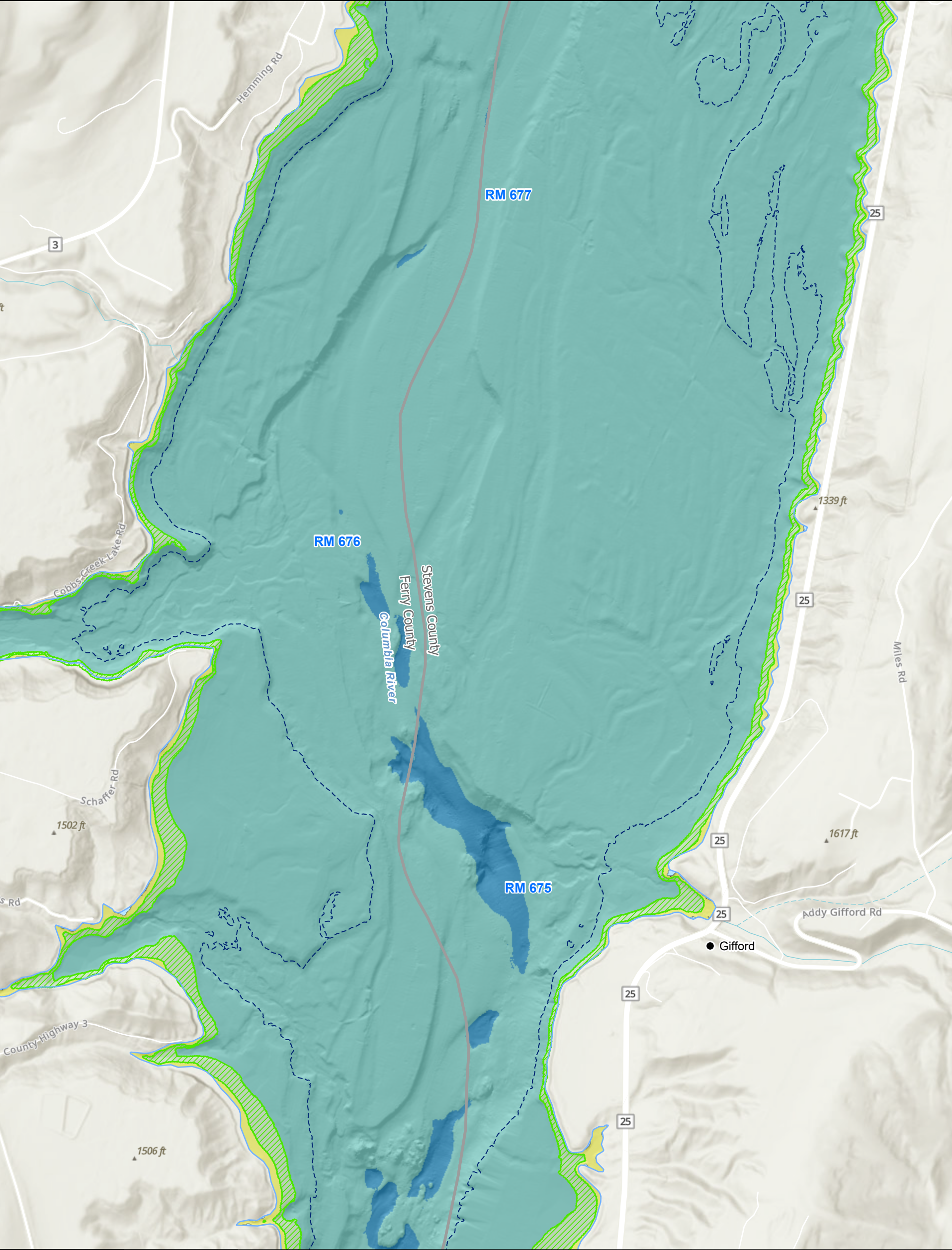
- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ
- County Boundary
- Elevation (ft amsl)**
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74



Map D-1 Tile 24.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



ERM



Legend

- City/Town
- - - UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- ▨ AVZ
- ▭ County Boundary

Elevation (ft amsl)

- 868.72–1,000
- 1,000–1,100
- 1,100–1,260
- 1,260–1,280
- 1,280–1,696.74

0 10 20 Miles

0 1,400 2,800 Feet

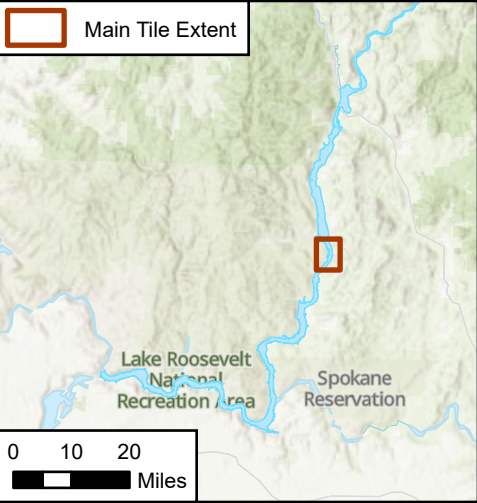
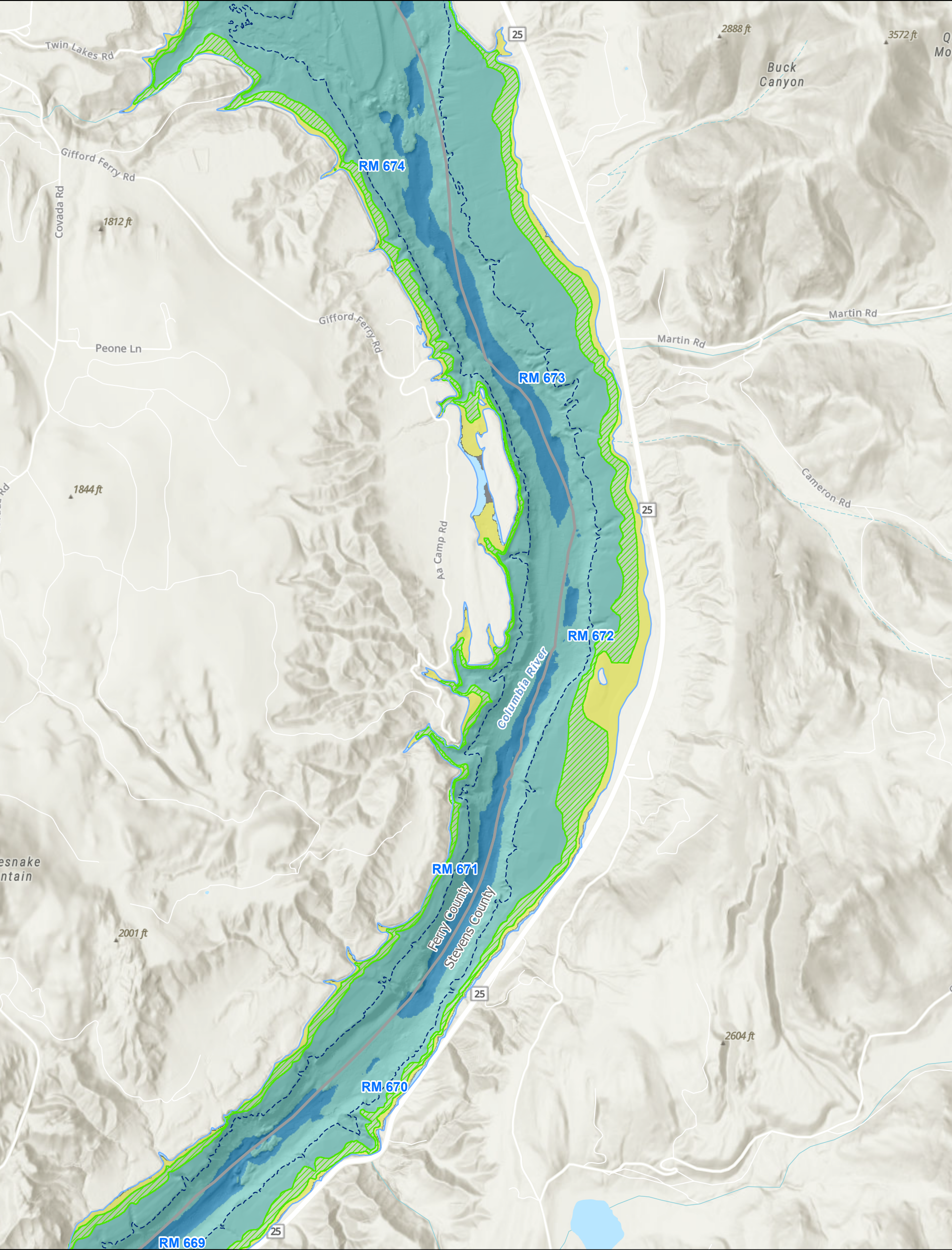
N

Map D-1 Tile 25.
Identification of AVZ
Final Aquatic BERA
Upper Columbia River, Washington

 **ERM**

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Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- ▨ AVGZ
- ▭ County Boundary

Elevation (ft amsl)

- 868.72–1,000
- 1,000–1,100
- 1,100–1,260
- 1,260–1,280
- 1,280–1,696.74

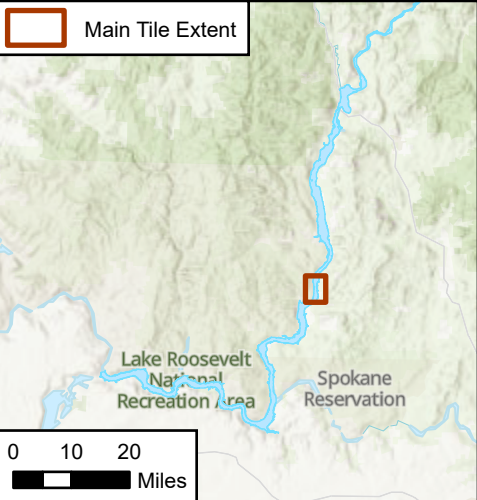
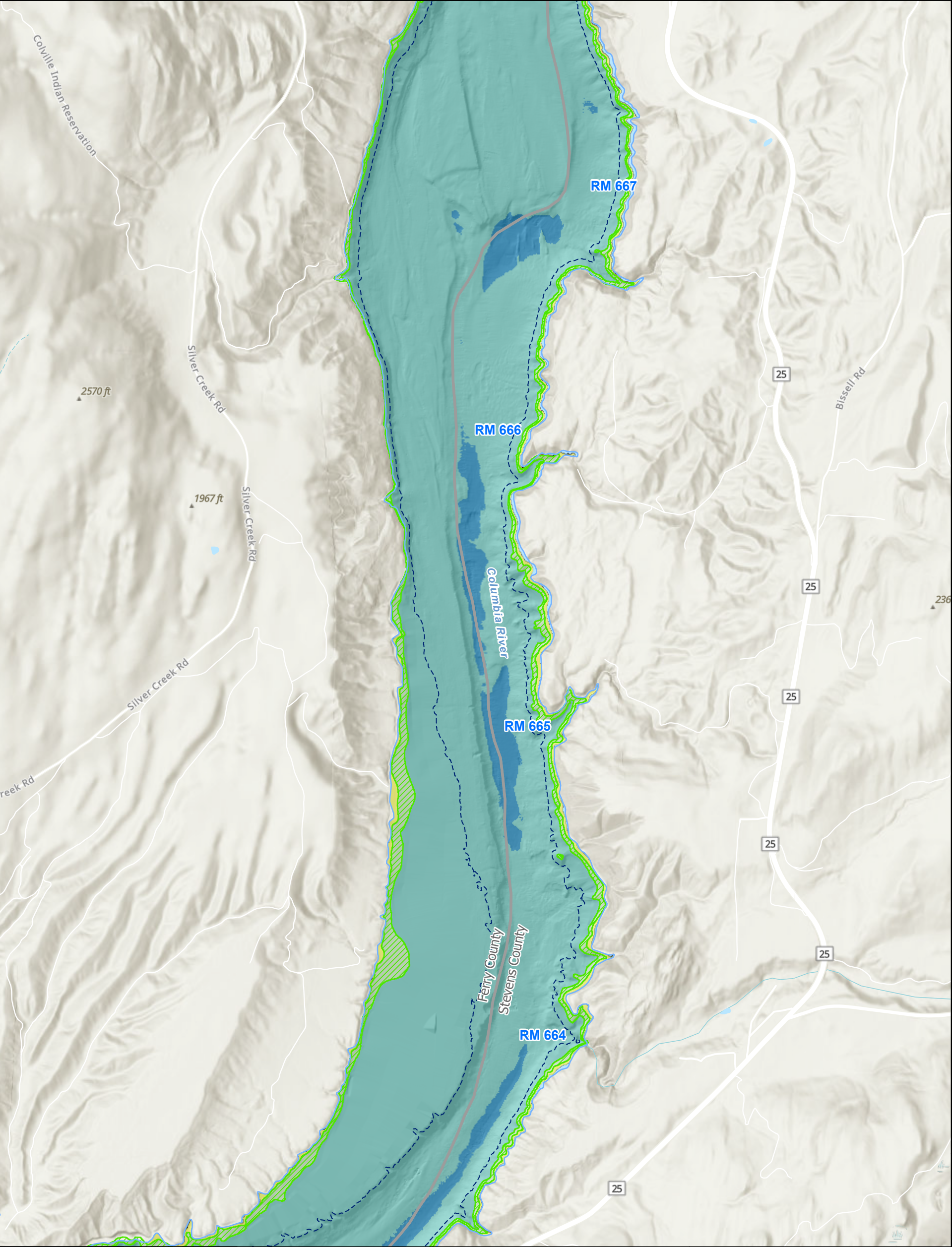
0 10 20 Miles

0 2,300 4,600 Feet

N

Map D-1 Tile 26.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington

 **ERM**



Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- ▨ AVGZ
- ▭ County Boundary

Elevation (ft amsl)

- 868.72–1,000
- 1,000–1,100
- 1,100–1,260
- 1,260–1,280
- 1,280–1,696.74

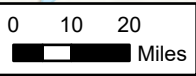
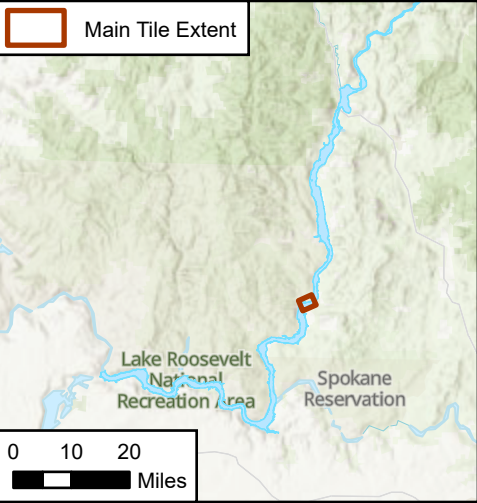
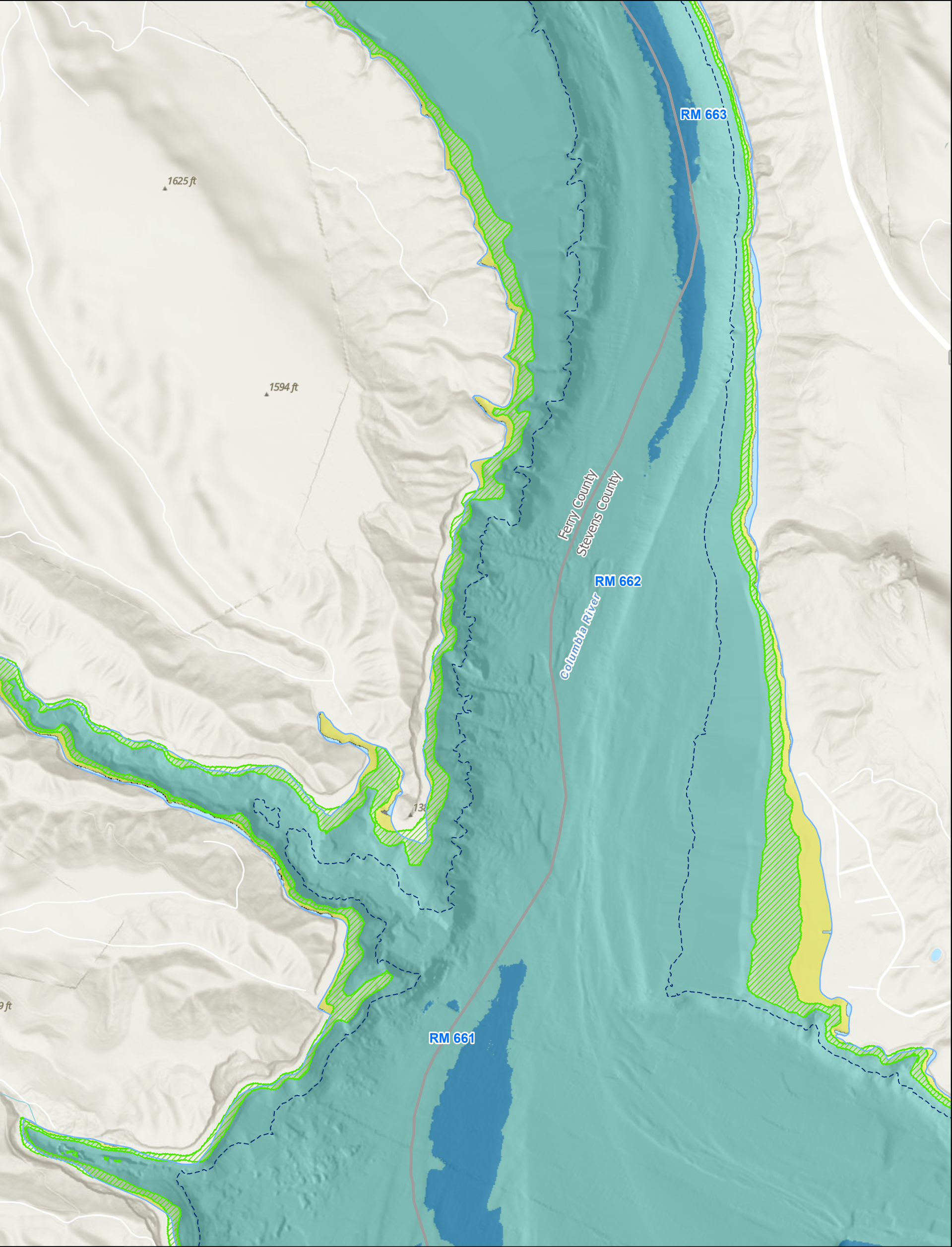
Scale: 0 10 20 Miles

Scale: 0 1,900 3,800 Feet

North Arrow: N

Map D-1 Tile 27.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington

 **ERM**



Legend

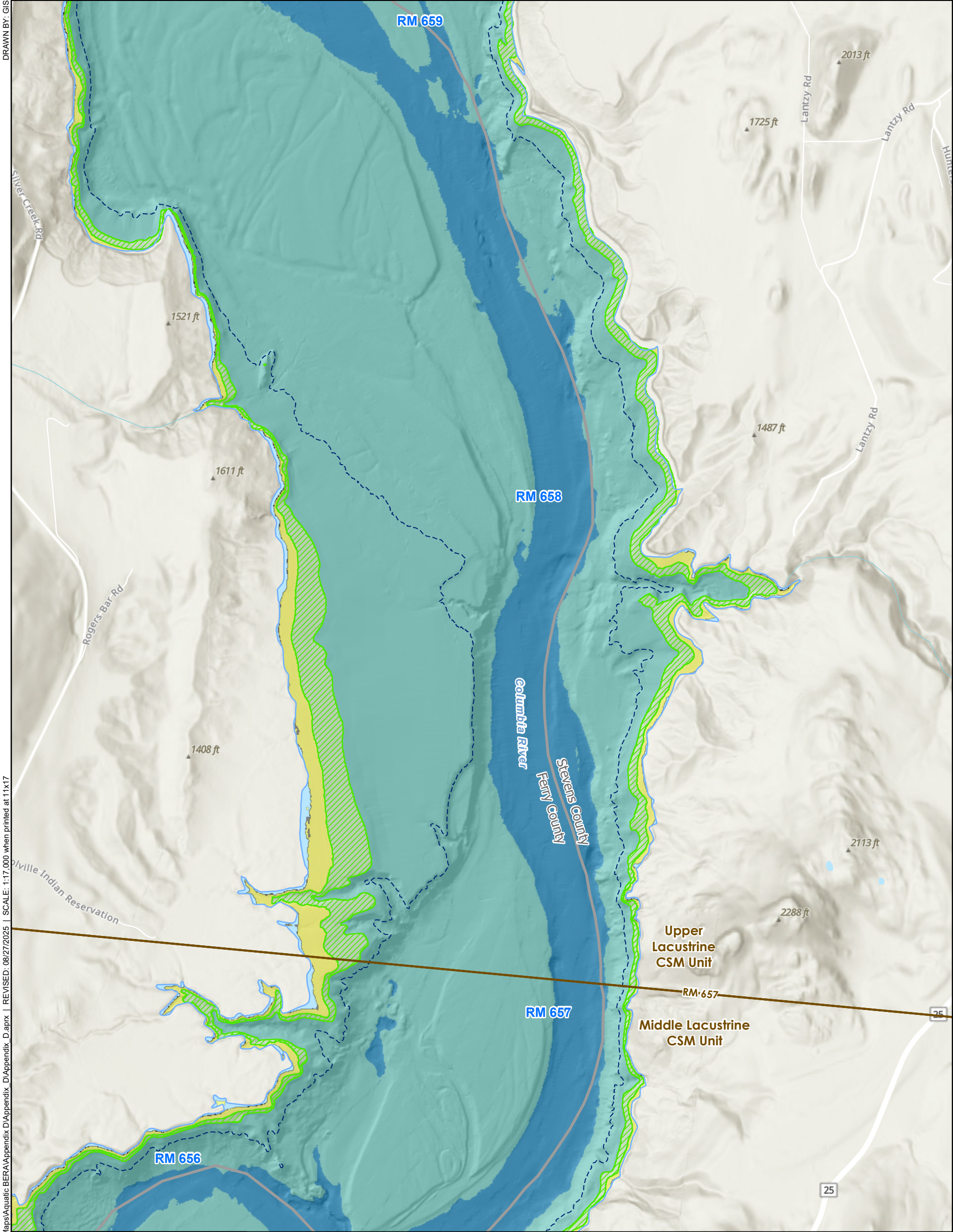
- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- ▨ AVZ
- ▭ County Boundary

Elevation (ft amsl)

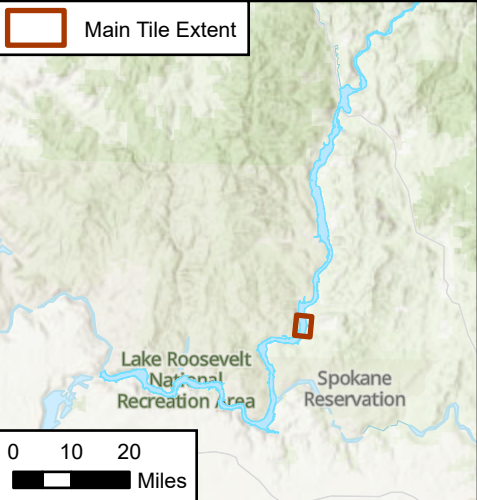
- 868.72–1,000
- 1,000–1,100
- 1,100–1,260
- 1,260–1,280
- 1,280–1,696.74

Map D-1 Tile 28.
Identification of AVZ
Final Aquatic BERA
Upper Columbia River, Washington

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Main Tile Extent



Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ
- County Boundary
- Elevation (ft amsl)
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74

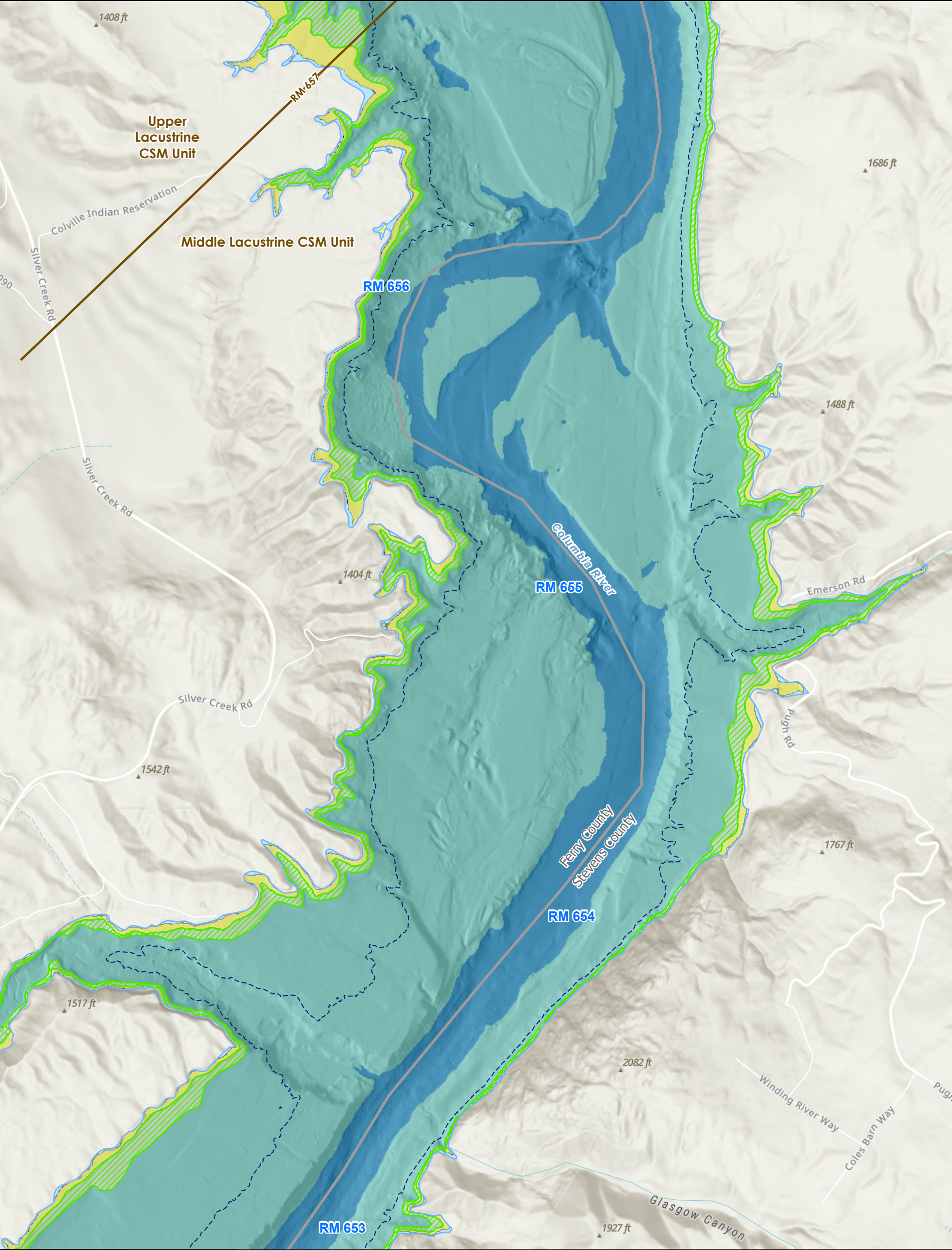


0 1,500 3,000 Feet

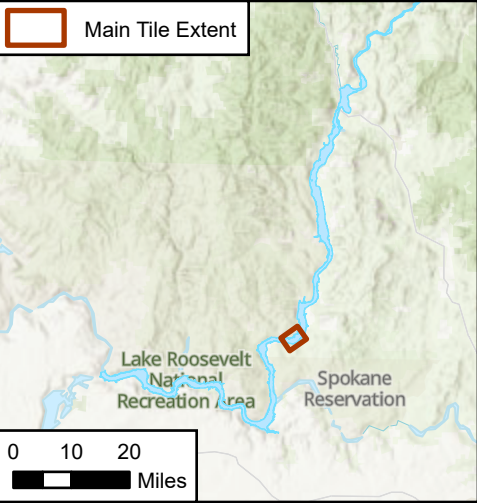
Map D-1 Tile 29.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



ERM

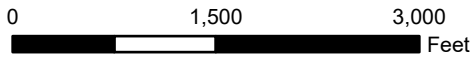
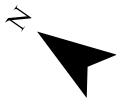


Main Tile Extent



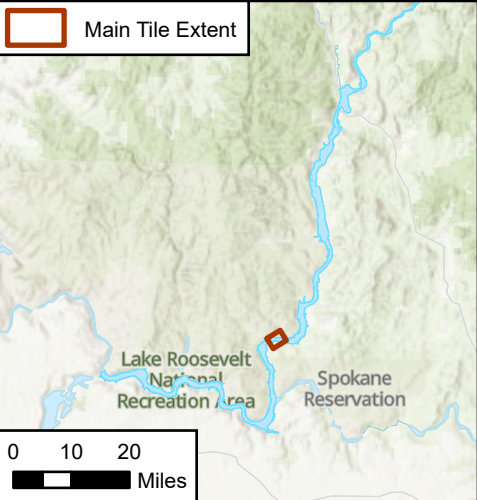
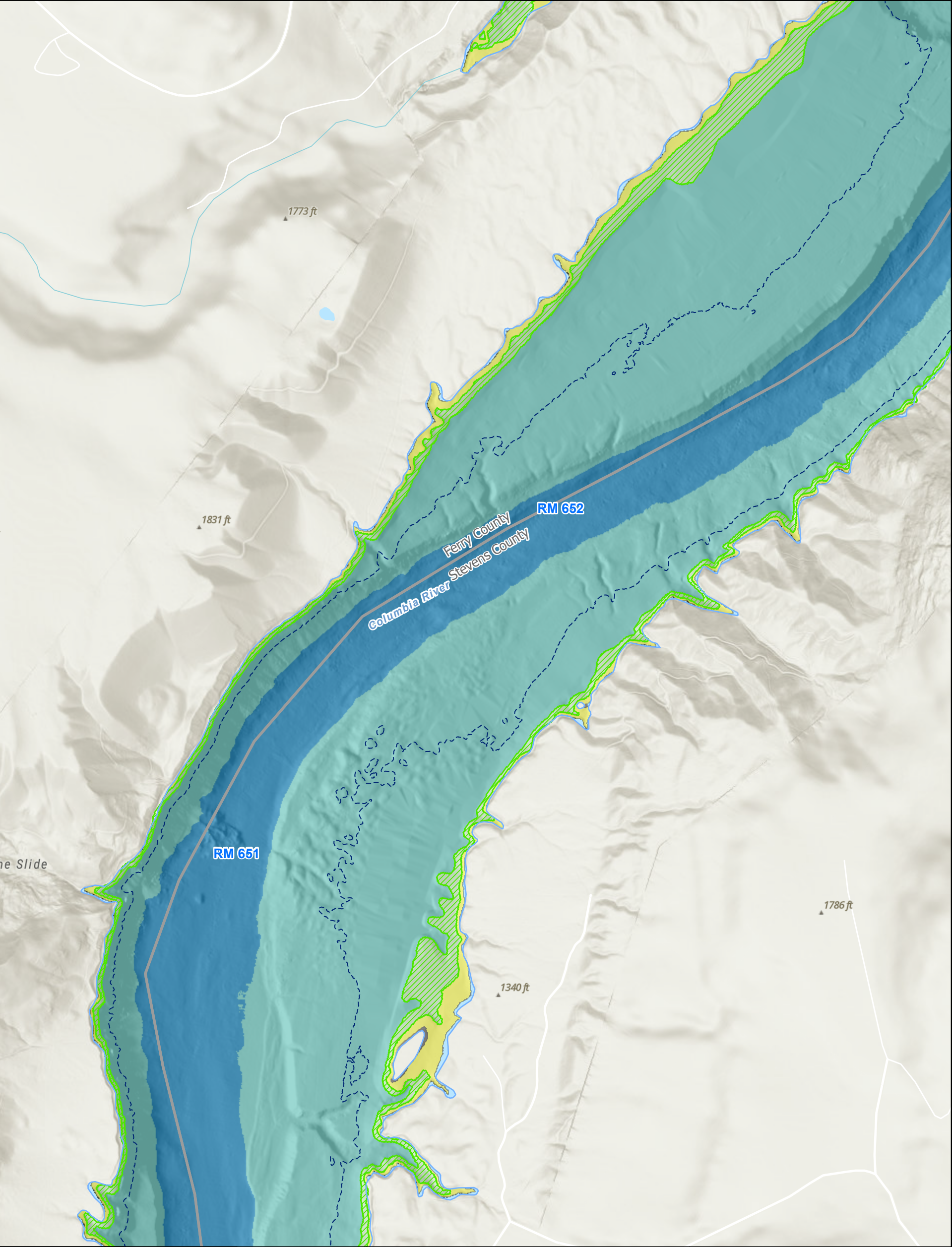
Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- ▨ AVGZ
- ▭ County Boundary
- Elevation (ft amsl)**
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74



Map D-1 Tile 30.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington





Main Tile Extent

Legend

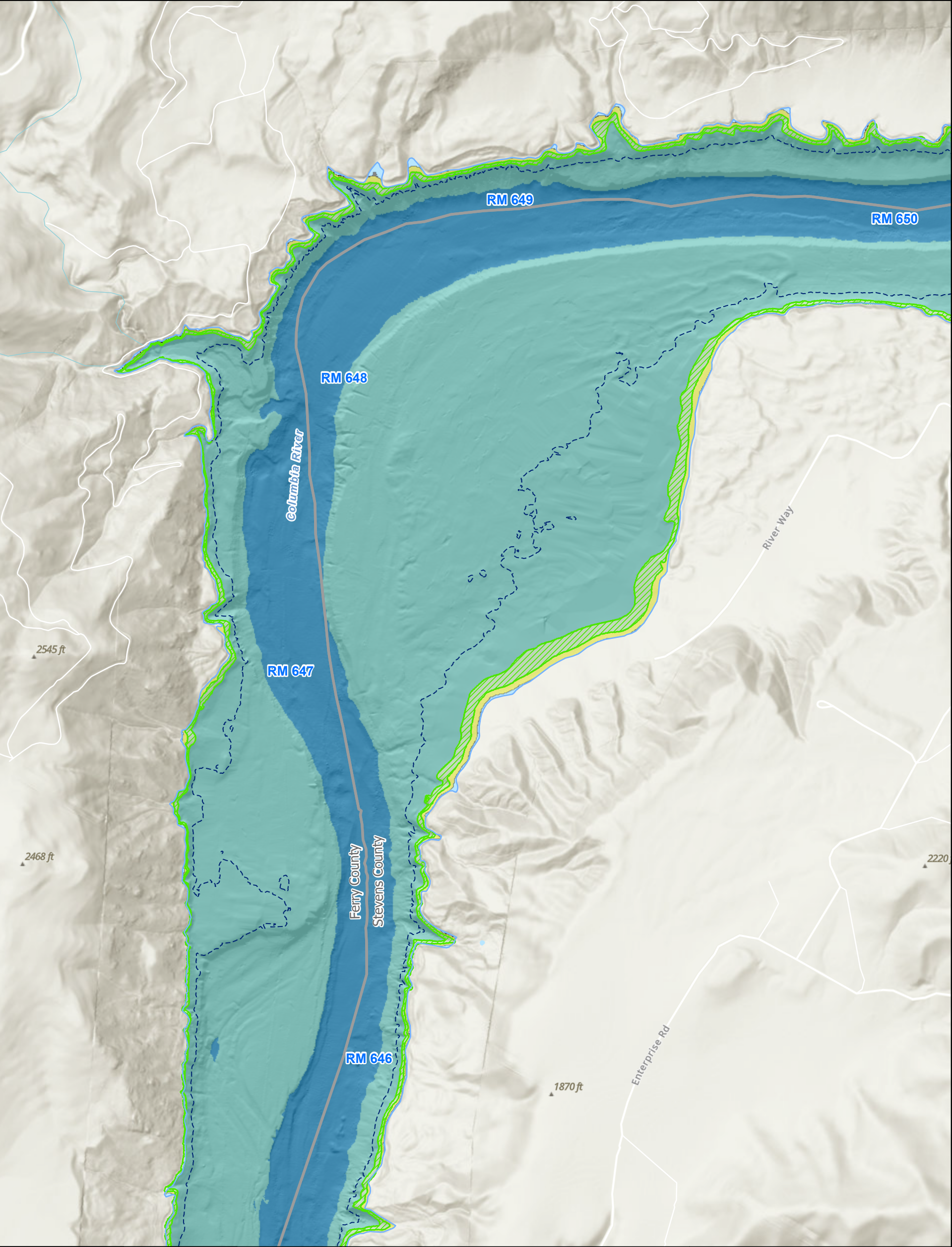
- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVZG
- County Boundary
- Elevation (ft amsl)**
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74

0 10 20 Miles

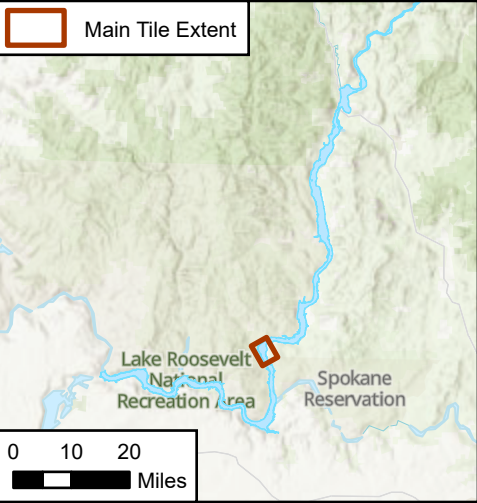
0 1,100 2,200 Feet

N

Map D-1 Tile 31.
Identification of AVZG
Final Aquatic BERA
Upper Columbia River, Washington

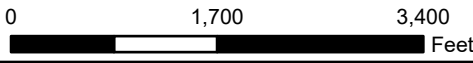


 Main Tile Extent



Legend

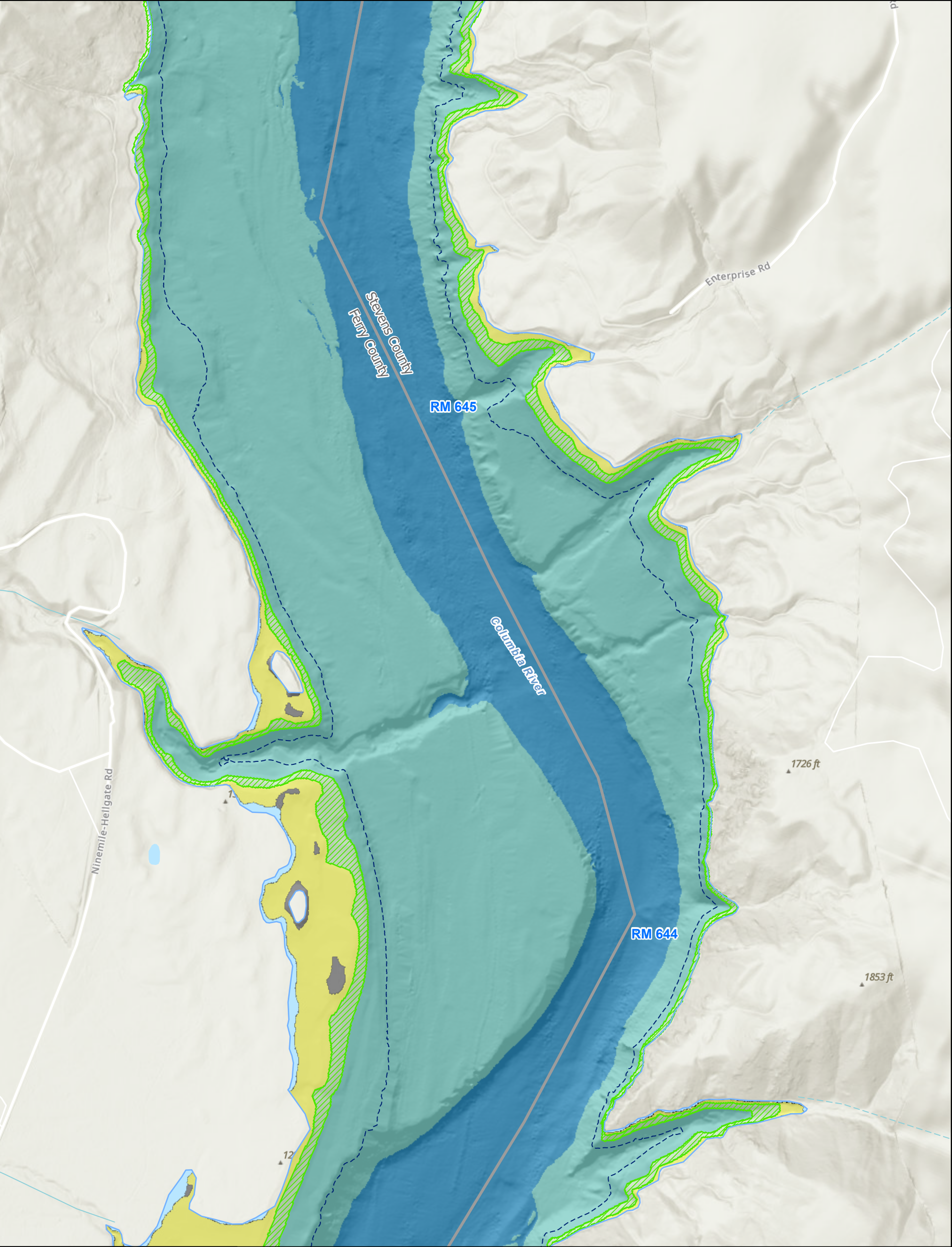
-  UCR Shallow/Deep Partition (1,210 ft amsl)
-  Columbia River Shoreline
-  AVGZ
-  County Boundary
- Elevation (ft amsl)**
 -  868.72–1,000
 -  1,000–1,100
 -  1,100–1,260
 -  1,260–1,280
 -  1,280–1,696.74



Map D-1 Tile 32.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



ERM

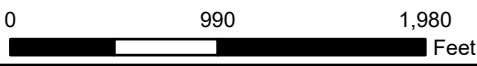


Main Tile Extent



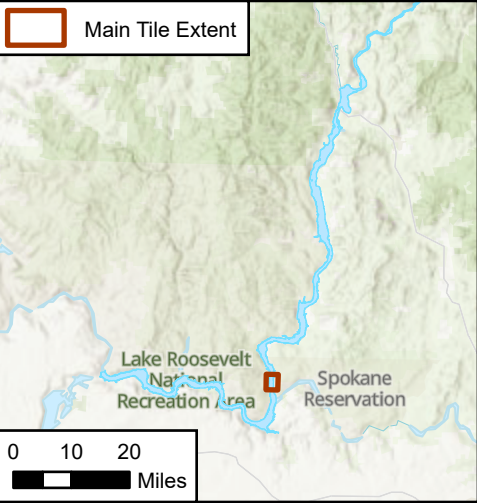
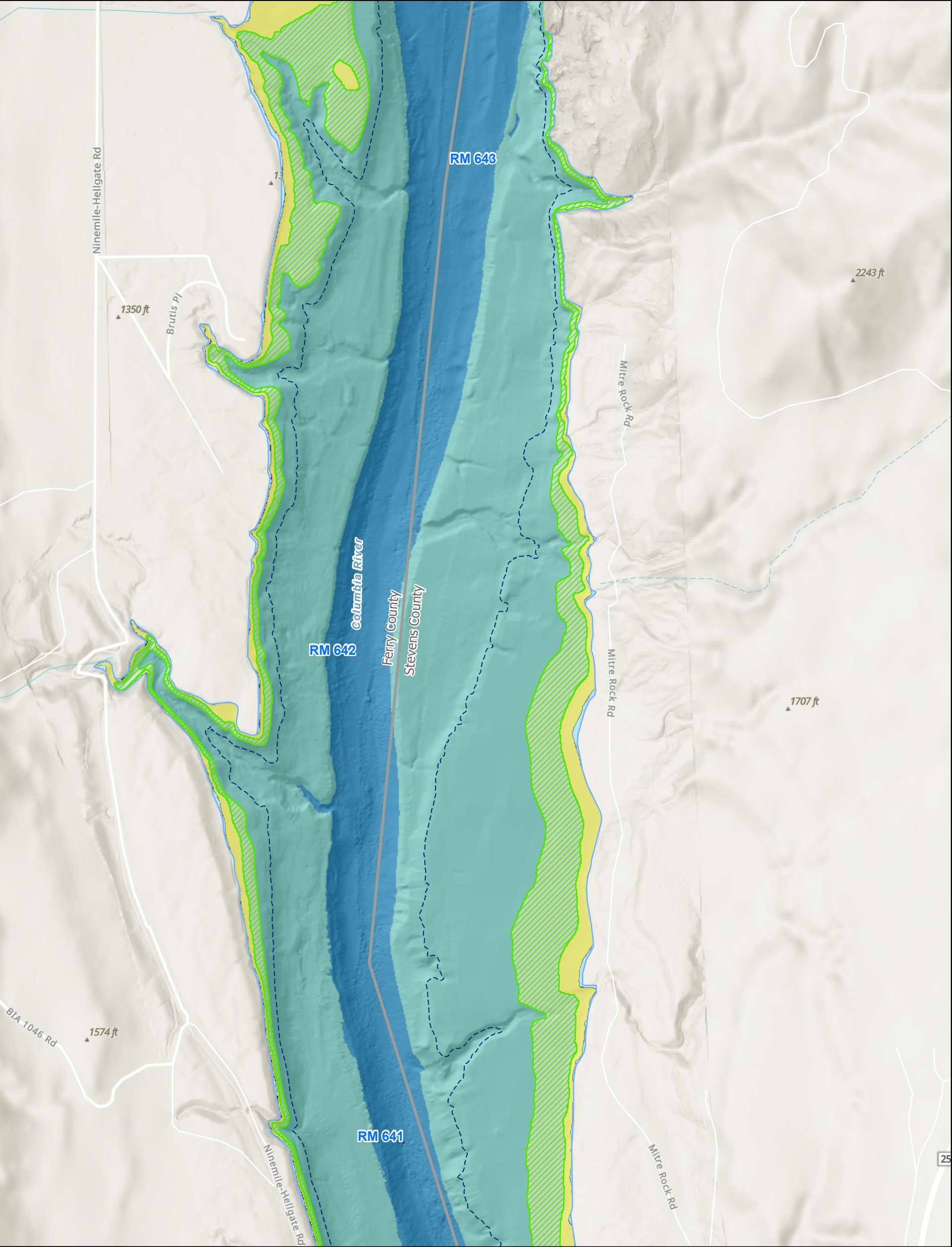
Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ
- County Boundary
- Elevation (ft amsl)
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74



Map D-1 Tile 33.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington





Main Tile Extent

UCR Shallow/Deep Partition (1,210 ft amsl)

Columbia River Shoreline

AVGZ

County Boundary

Elevation (ft amsl)

868.72–1,000

1,000–1,100

1,100–1,260

1,260–1,280

1,280–1,696.74

N

0

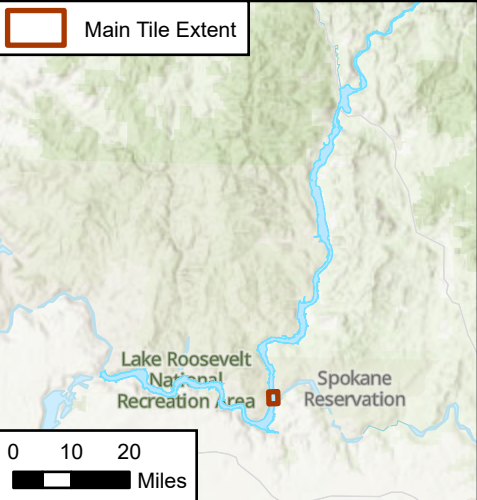
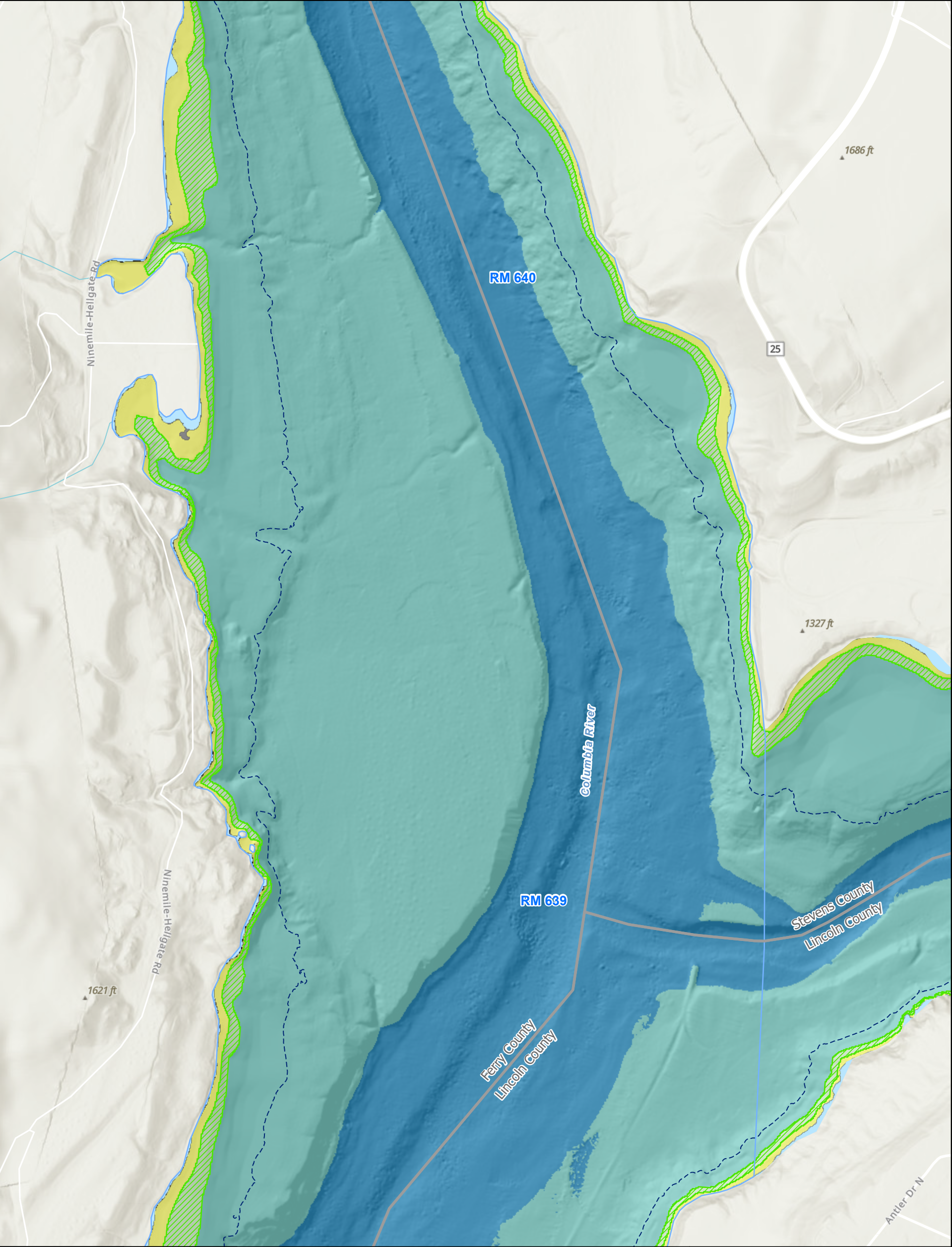
1,100

2,200

Feet

Map D-1 Tile 34.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington

 **ERM**



Main Tile Extent

UCR Shallow/Deep Partition (1,210 ft amsl)

Columbia River Shoreline

AVZ

County Boundary

Elevation (ft amsl)

868.72–1,000

1,000–1,100

1,100–1,260

1,260–1,280

1,280–1,696.74

N

0

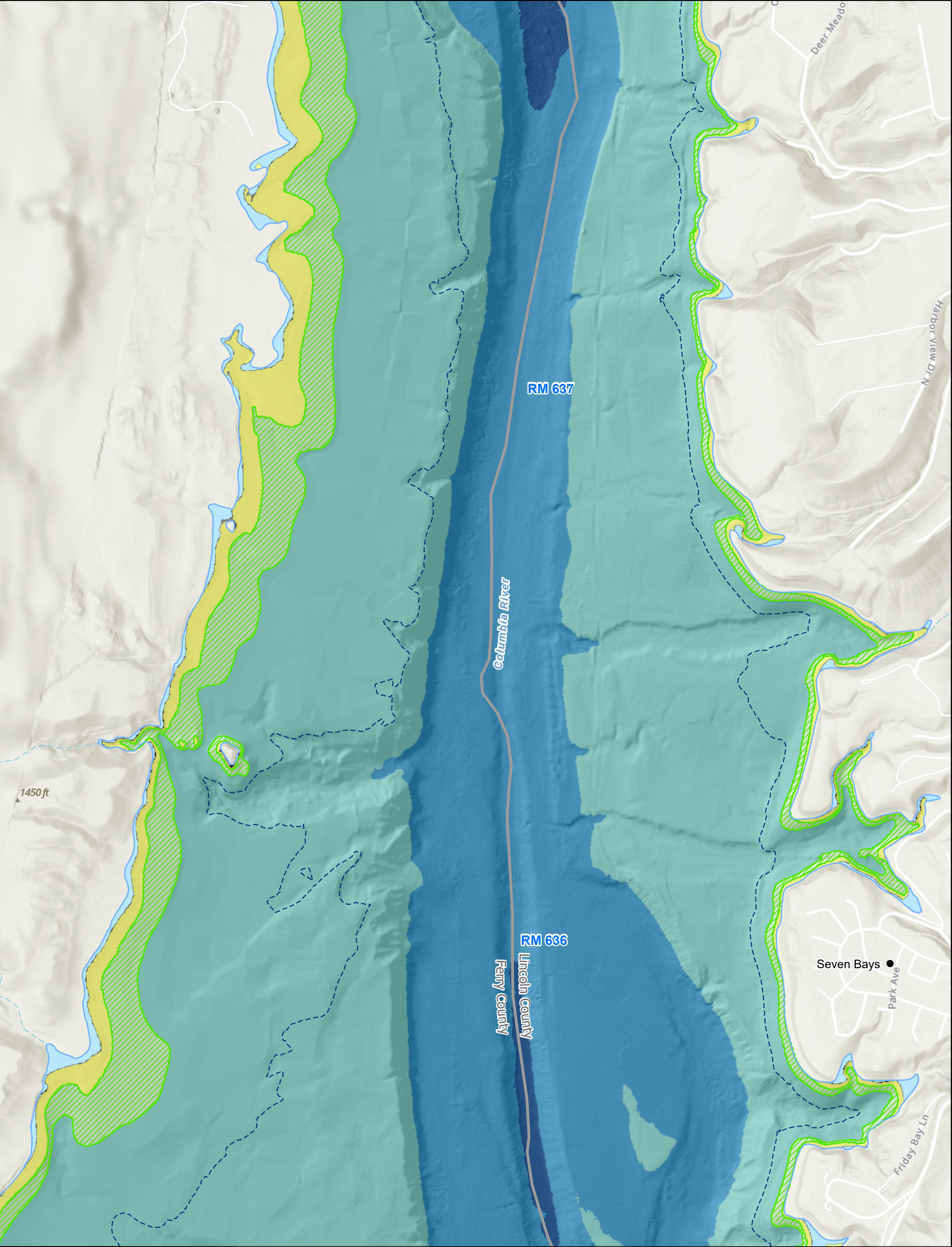
900

1,800

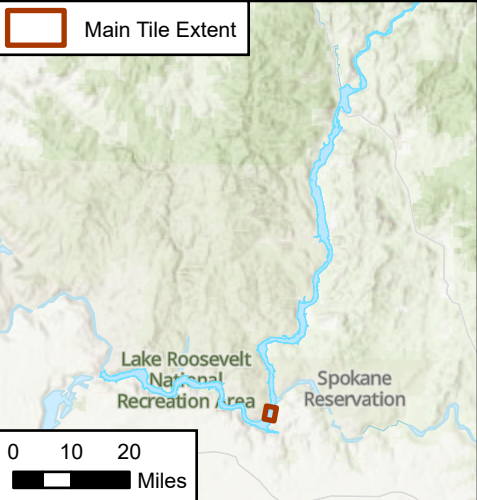
Feet

Map D-1 Tile 35.
Identification of AVZ
Final Aquatic BERA
Upper Columbia River, Washington

ERM

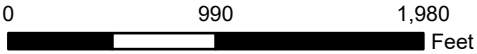


 Main Tile Extent



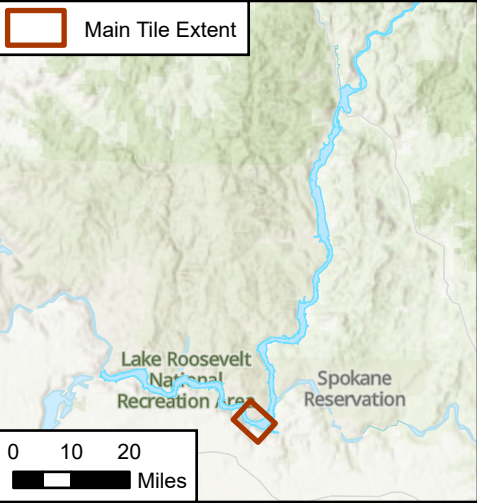
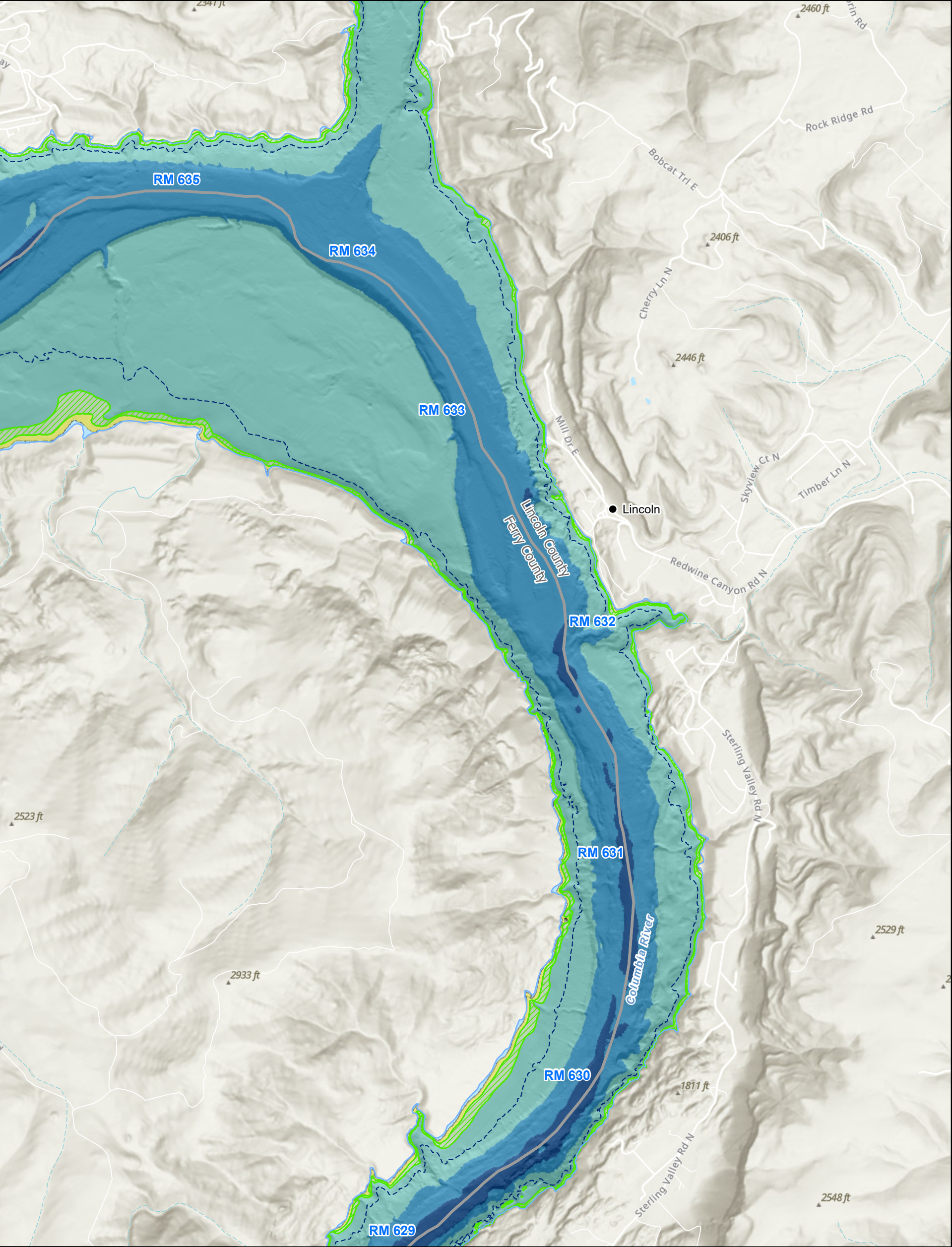
Legend

- City/Town
- - - UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
-  AVGZ
-  County Boundary
- Elevation (ft amsl)**
 -  868.72–1,000
 -  1,000–1,100
 -  1,100–1,260
 -  1,260–1,280
 -  1,280–1,696.74



Map D-1 Tile 36.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington

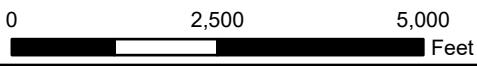




Main Tile Extent

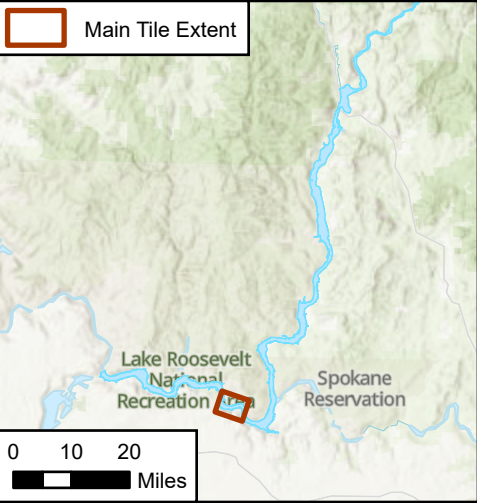
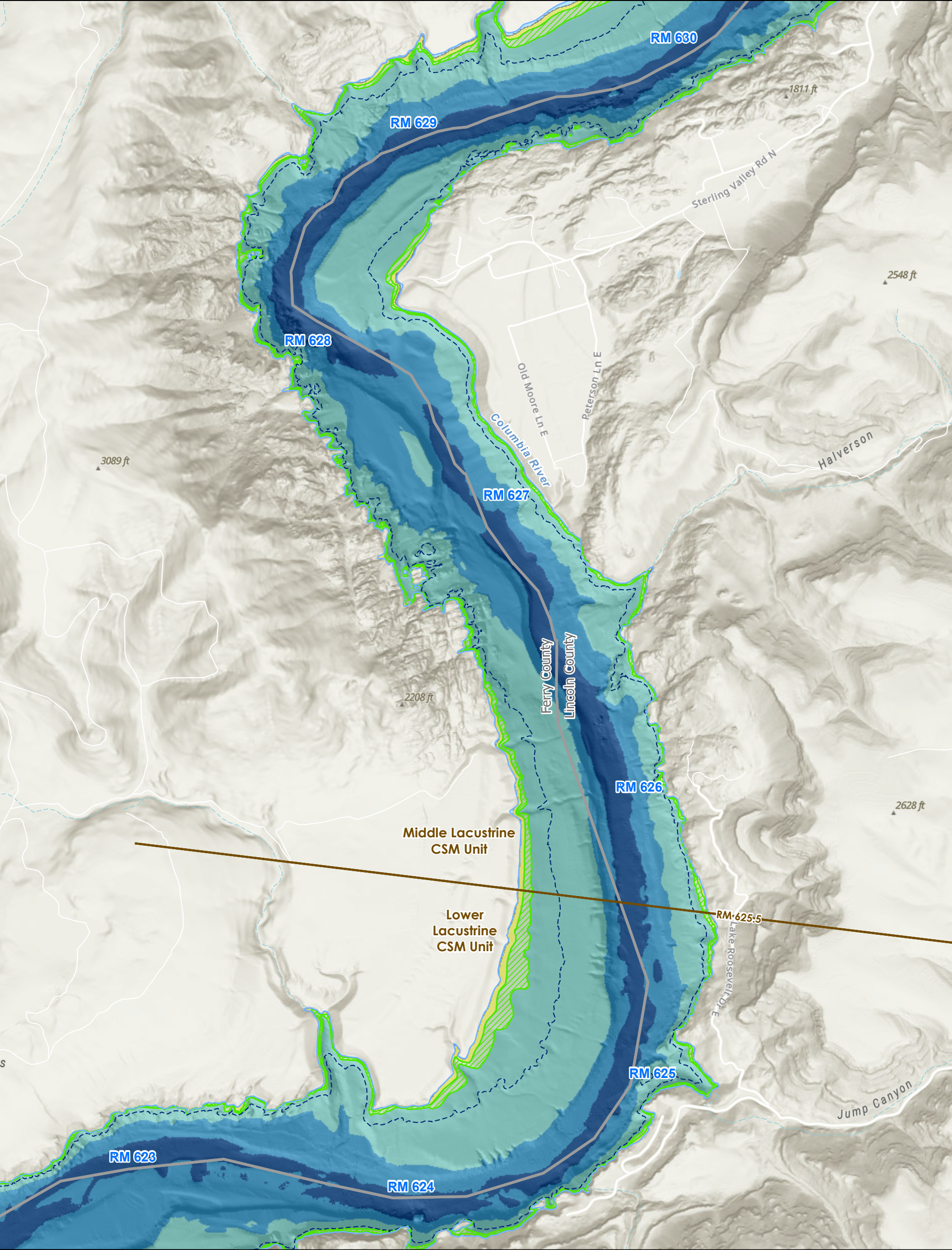
Legend

- City/Town
 - - - UCR Shallow/Deep Partition (1,210 ft amsl)
 - Columbia River Shoreline
 - ▨ AVGZ
 - ▭ County Boundary
- Elevation (ft amsl)**
- 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74



Map D-1 Tile 37.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington





Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVZ
- County Boundary

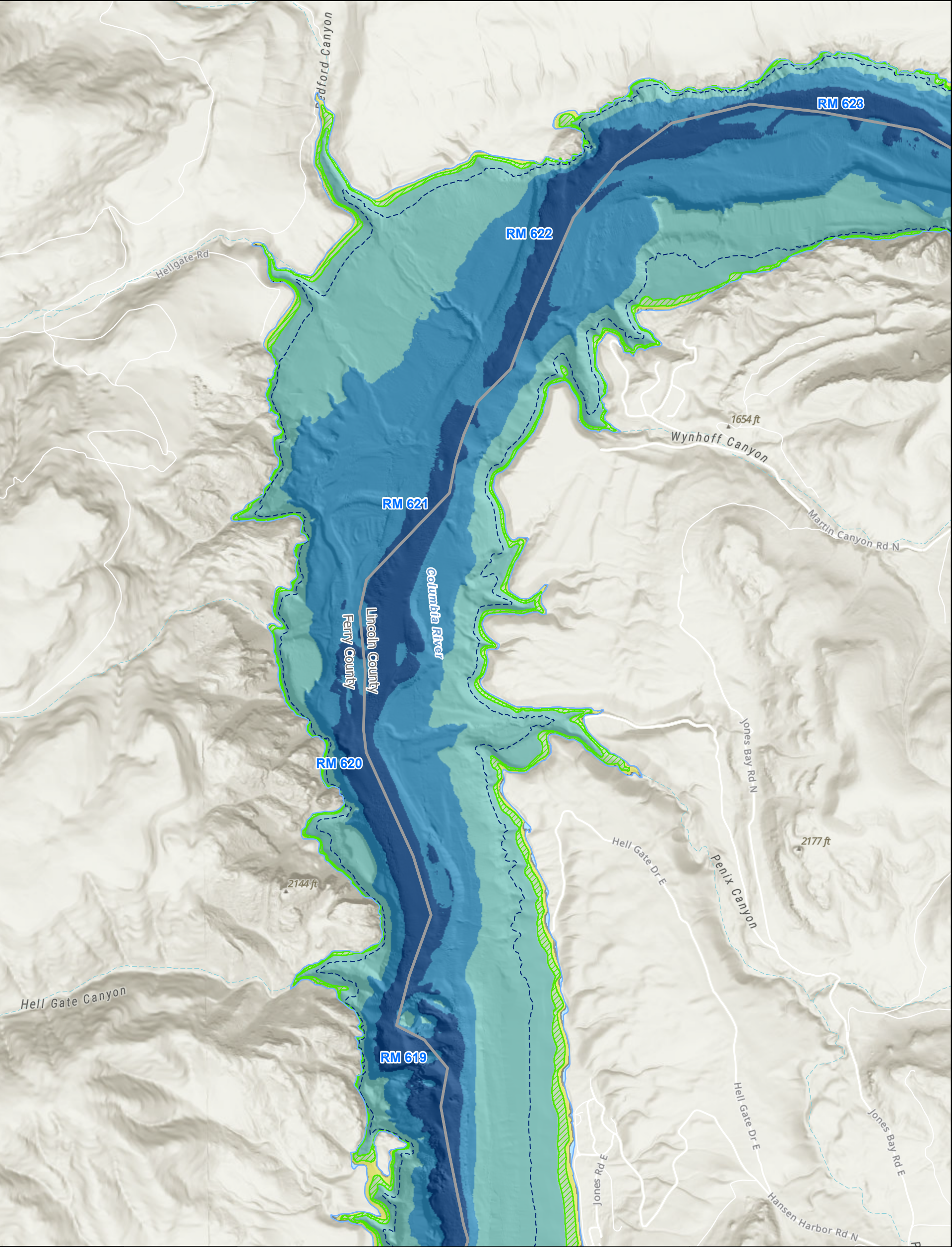
Elevation (ft amsl)

- 868.72–1,000
- 1,000–1,100
- 1,100–1,260
- 1,260–1,280
- 1,280–1,696.74

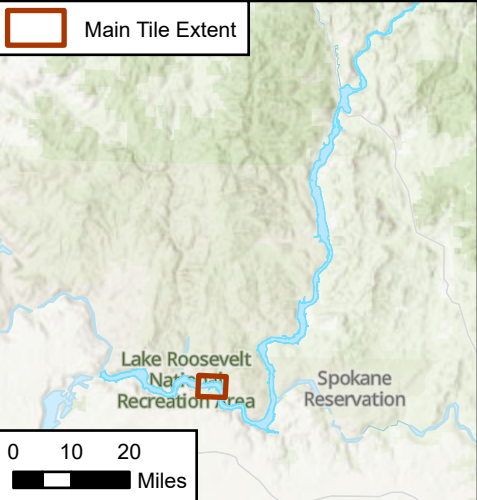
0 10 20 Miles

0 2,100 4,200 Feet

Map D-1 Tile 38.
Identification of AVZ
Final Aquatic BERA
Upper Columbia River, Washington

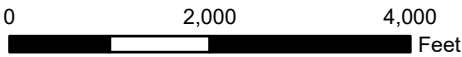


 Main Tile Extent



Legend

-  UCR Shallow/Deep Partition (1,210 ft amsl)
-  Columbia River Shoreline
-  AVGZ
-  County Boundary
- Elevation (ft amsl)**
 -  868.72–1,000
 -  1,000–1,100
 -  1,100–1,260
 -  1,260–1,280
 -  1,280–1,696.74

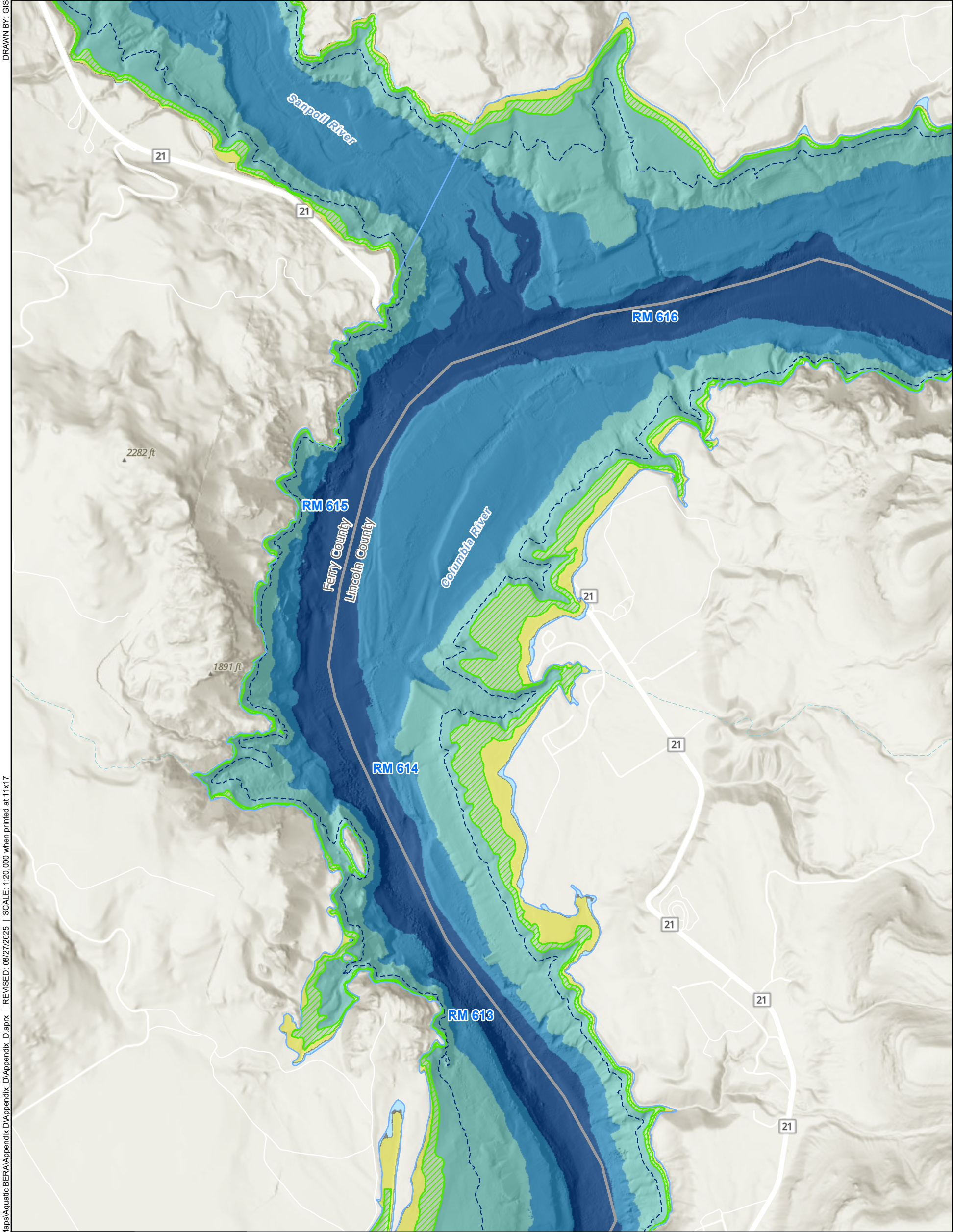


Map D-1 Tile 39.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington

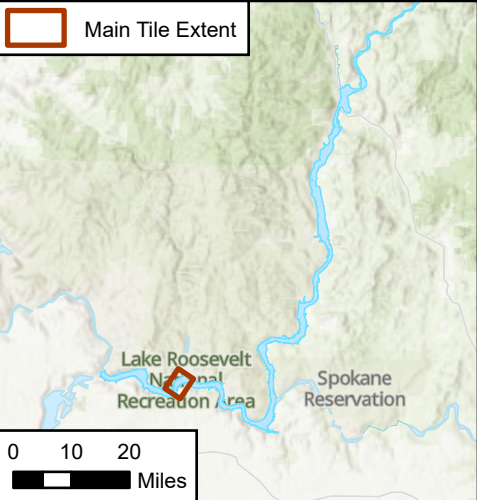


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FILE: M:\US\Projects\S-UT\Tech\0499466_Teck_Upper Columbia River\Maps\Aquatic BERA\Appendix D\Appendix D.aprx | REVISED: 08/27/2025 | SCALE: 1:20,000 when printed at 11x17

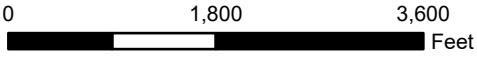


Main Tile Extent



Legend

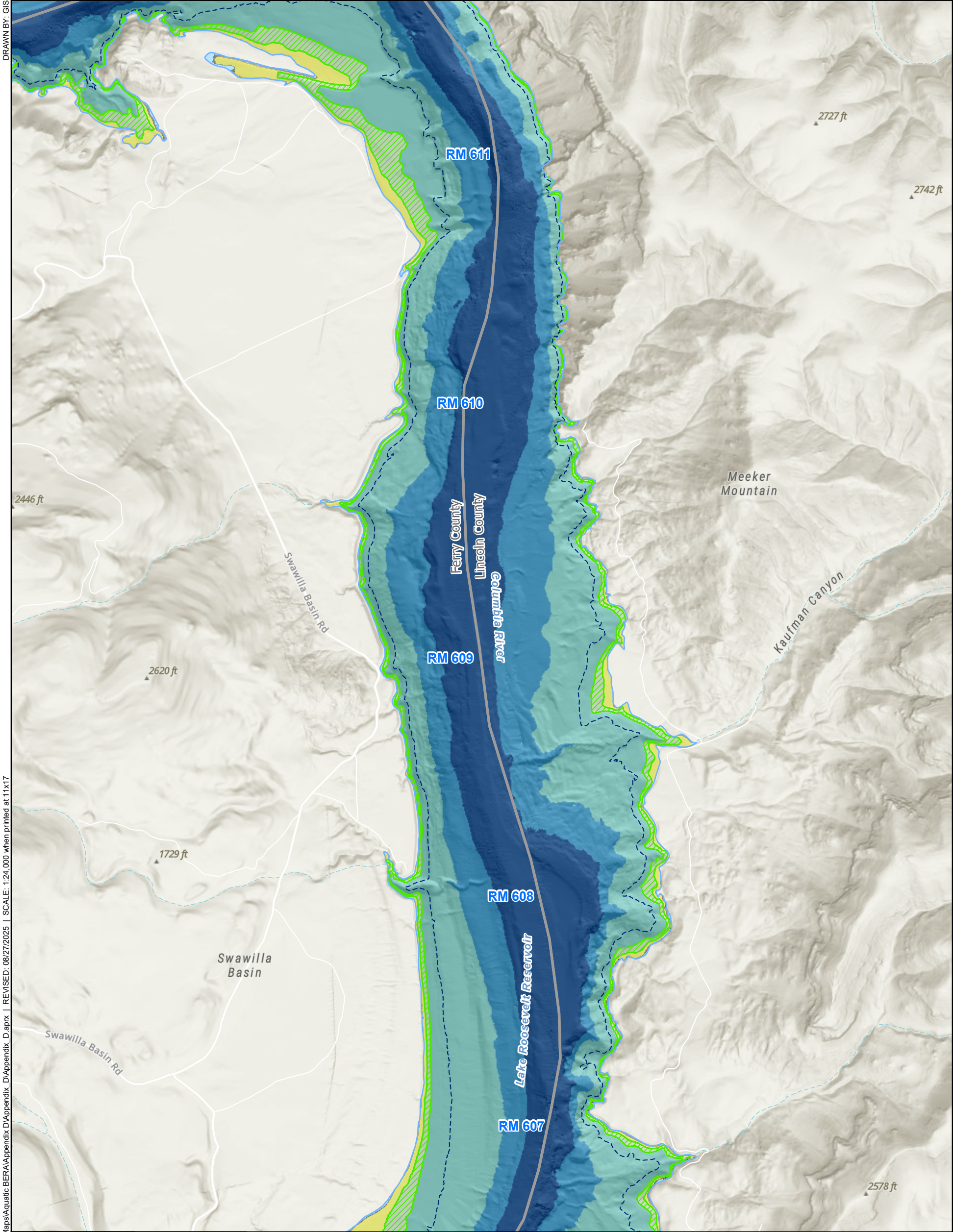
- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- ▨ AVGZ
- ▭ County Boundary
- Elevation (ft amsl)**
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74



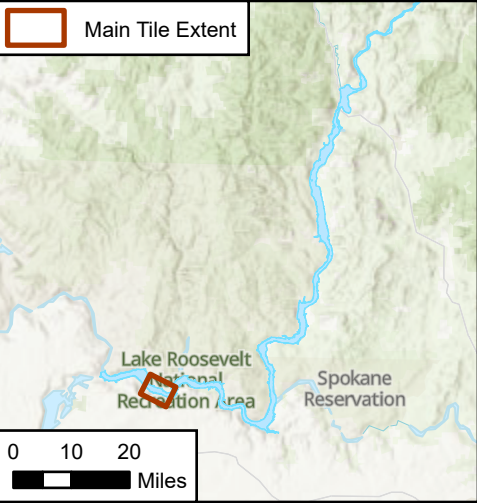
Map D-1 Tile 40.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



FILE: M:\US\Projects\S-UI\Task\0499466 Teck Upper Columbia River\Maps\Aquatic BERA\Appendix D\Appendix D.aprx | REVISED: 08/27/2025 | SCALE: 1:24,000 when printed at 11x17

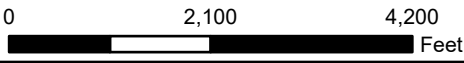


Main Tile Extent



Legend

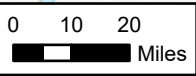
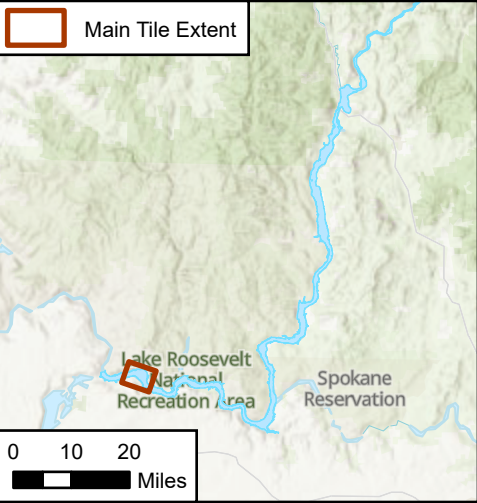
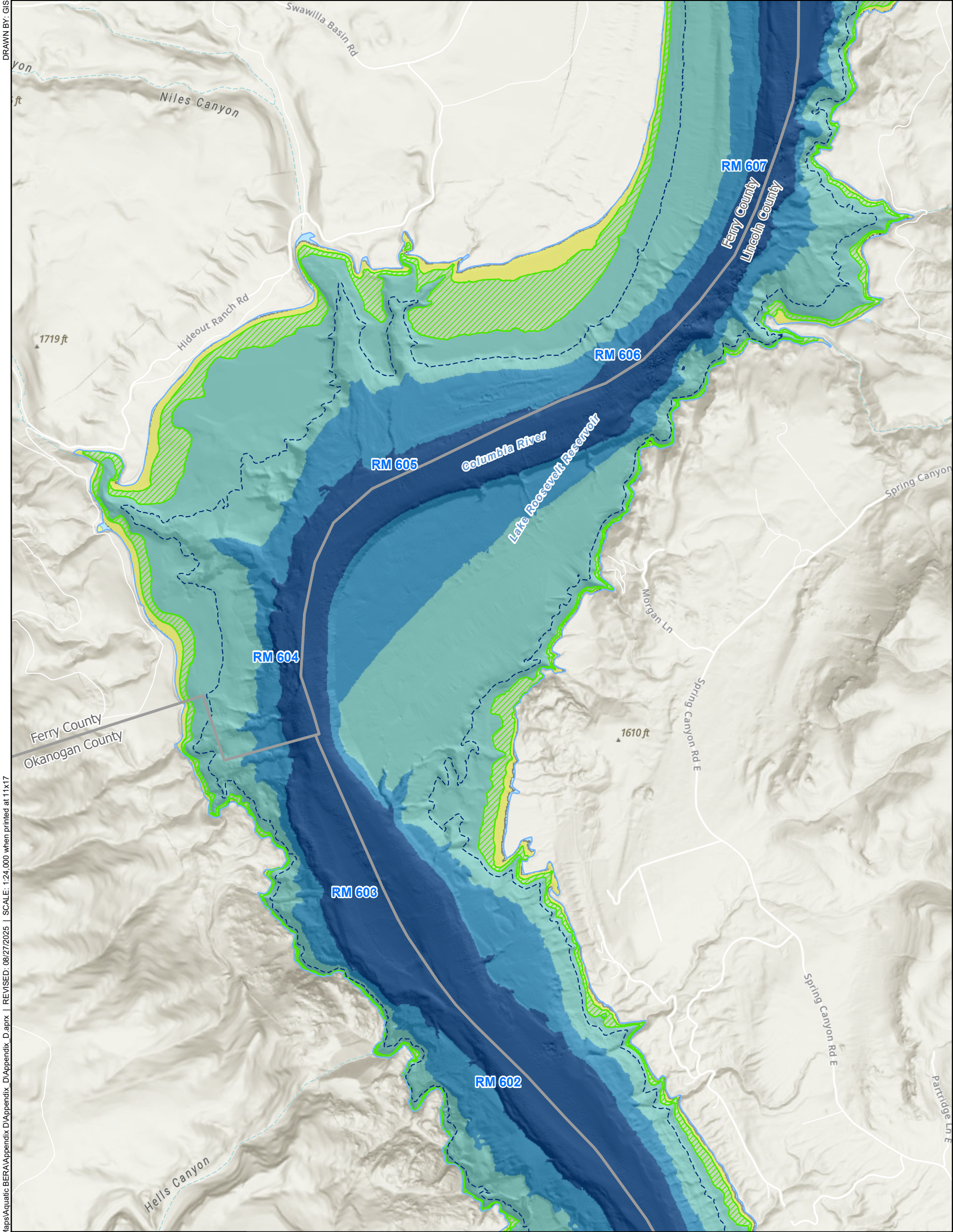
- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ
- County Boundary
- Elevation (ft amsl)
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74



Map D-1 Tile 41.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington

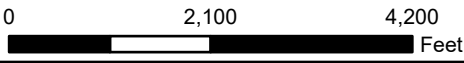


FILE: M:\US\Projects\S-UI\Task\0499466 Teck Upper Columbia River\Maps\Aquatic BERA\Appendix D\Appendix D.aprx | REVISED: 08/27/2025 | SCALE: 1:24,000 when printed at 11x17



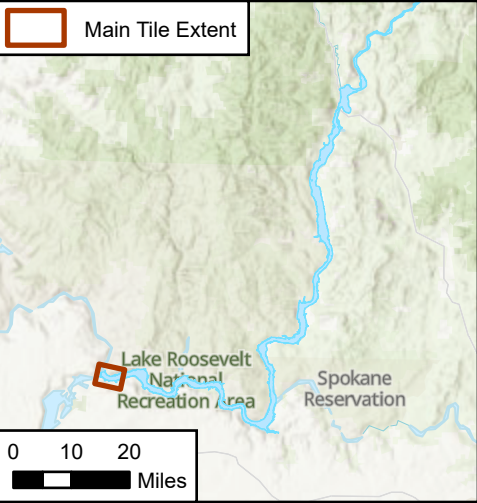
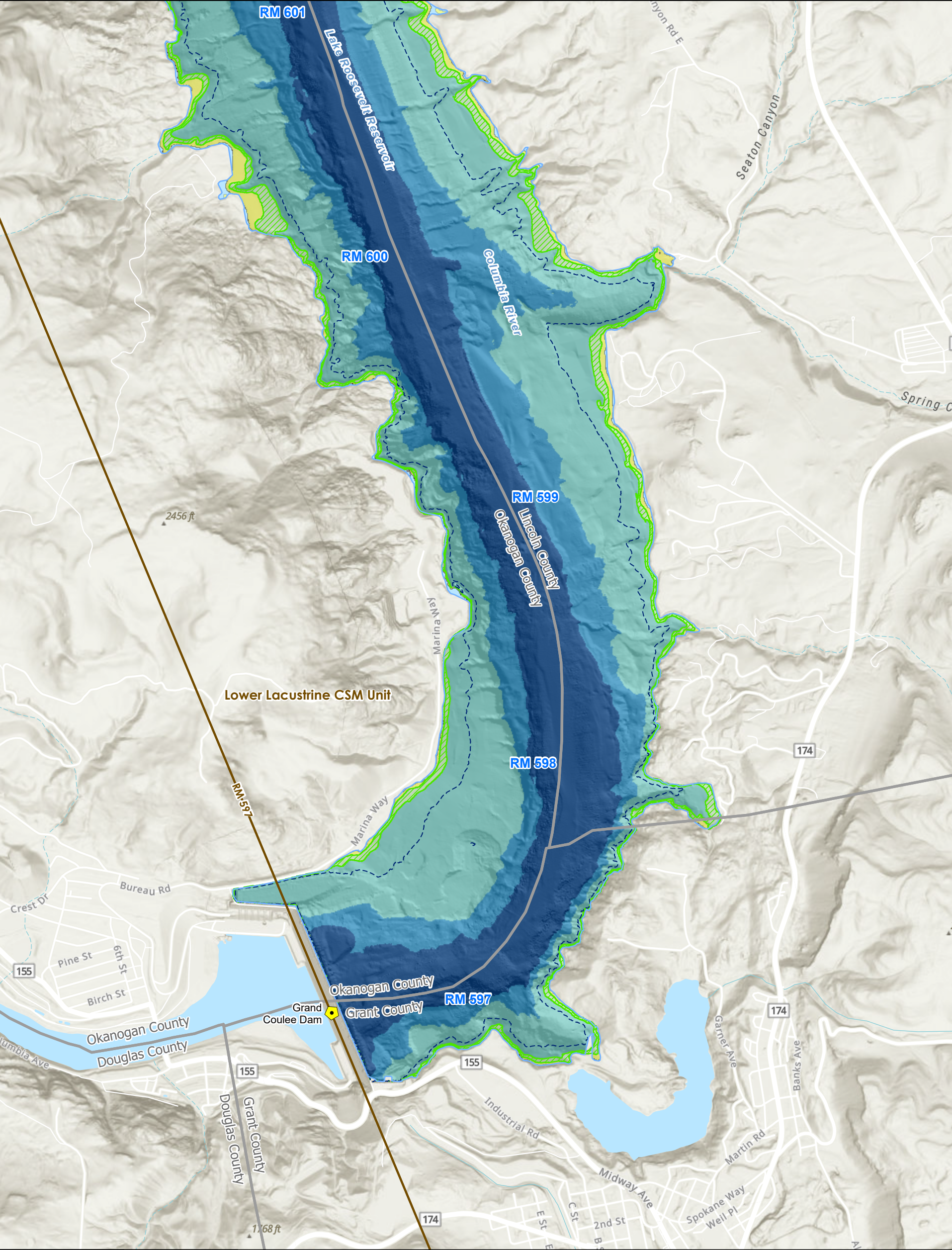
Legend

- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- ▨ AVZ
- ▭ County Boundary
- Elevation (ft amsl)**
 - 868.72–1,000
 - 1,000–1,100
 - 1,100–1,260
 - 1,260–1,280
 - 1,280–1,696.74



Map D-1 Tile 42.
Identification of AVZ
Final Aquatic BERA
Upper Columbia River, Washington





Legend

- Major Dam
- UCR Shallow/Deep Partition (1,210 ft amsl)
- Columbia River Shoreline
- AVGZ
- County Boundary

Elevation (ft amsl)

- 868.72–1,000
- 1,000–1,100
- 1,100–1,260
- 1,260–1,280
- 1,280–1,696.74

0 10 20 Miles

0 1,900 3,800 Feet

N

Map D-1 Tile 43.
Identification of AVGZ
Final Aquatic BERA
Upper Columbia River, Washington



ERM HAS OVER 140 OFFICES ACROSS THE FOLLOWING
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China	Romania
Colombia	Singapore
France	South Africa
Germany	South Korea
Guyana	Spain
Hong Kong	Switzerland
India	Taiwan
Indonesia	Thailand
Ireland	United Arab Emirates
Italy	United Kingdom
Japan	United States
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