

**BULL TROUT PROPOSED CRITICAL HABITAT
JUSTIFICATION:
RATIONALE FOR WHY HABITAT IS ESSENTIAL, AND
DOCUMENTATION OF OCCUPANCY**

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INTRODUCTION

The U.S. Fish & Wildlife Service (Service) has prepared this document to support the rationale for why bull trout habitats are essential for the conservation of the species and therefore should be proposed as critical habitat and to document the basis for identifying habitat occupancy by bull trout.

We have organized the document by six draft Recovery Units (RUs), 32 Critical Habitat Units (CHUs), and 99 Critical Habitat Subunits (CHSUs) (see text below for more detail).

Rationale for why habitat is essential may be applied across an entire watershed, a portion of a watershed, or an individual stream reach or water body segment, depending on the refinement and quality of available data. Similarly, scientific observations of bull trout occupancy may be documented only broadly within a watershed or specifically within a stream reach, depending on available data.

The text portion of this document captures a broader rationale for why habitat is essential at the level of the 32 CHUs and 99 CHSUs. Appendix 1 captures rationale for why each of the 118 core areas is or is not essential. Appendix 2 documents occupancy as specifically as possible for each of more than 3,500 water body segments and, if available, any specific rationale for why that segment is essential. However, in the majority of cases, there is no stream-specific rationale and the reader is referred back to the text for the entire CHSU. Also, the same citation of occupancy may be frequently repeated for individual stream reaches if that is the only citation that provides documentation across a broad area.

METHOD FOR DETERMINING CRITICAL HABITAT

The Service met internally on July 6–7, 2009 to develop specific guidance for identifying bull trout critical habitat consistent with Service policies. We evaluated six possible approaches and determined to *propose to designate all habitat important to the conservation (i.e., recovery) of the species*. This approach would provide broad added protection for occupied habitats necessary for recovery and a significant regulatory tool for protecting important unoccupied habitats and help focus recovery actions on those habitats of greatest importance for recovery.

In addition, the Service broadly considered status and threats of bull trout across six draft recovery units (see below) consistent with seven guiding principles for bull trout conservation (also see below). We determined that in some portions of the bull trout range, status was sufficiently weak and threats sufficiently high (e.g., low numbers of individuals or populations and poor habitat quality, such as in the Klamath River Basin) that protecting all occupied habitat and some unoccupied habitat may be necessary to achieve recovery. In other areas, status was sufficiently strong and threats low (e.g., portions of the Clark Fork and Kootenai CHUs) that protecting most occupied and relatively less unoccupied habitat may be necessary to achieve recovery. Two key habitat use types for bull trout are spawning and rearing habitat and foraging, migration, and overwintering (FMO) habitat. Much unoccupied habitat proposed for protection is in FMO habitat and is intended to ensure connectivity among existing, currently isolated bull trout populations. Our proposal for designating critical habitat and our geographic-specific rationales below, reflect this broad evaluation.

SIX RECOVERY UNITS ARE ESSENTIAL

Bull trout are listed under the Endangered Species Act (ESA) as “Threatened” throughout the coterminous United States, primarily due to habitat threats. In 2008, the Service completed a 5-year review¹ of bull trout status and concluded in part that the Service should reevaluate the number of bull trout Distinct Population Segments (DPSs) and consider reclassifying bull trout into separate DPSs. The Service subsequently recommended not immediately pursuing reclassification due to time and cost constraints. Instead, the Service used four relevant factors under two of the three criteria in its 1996 DPS policy to identify the following six draft RUs:

- A. Coastal Recovery Unit
- B. Klamath Recovery Unit
- C. Mid-Columbia Recovery Unit
- D. Upper Snake Recovery Unit
- E. Columbia Headwaters Recovery Unit
- F. Saint Mary Recovery Unit

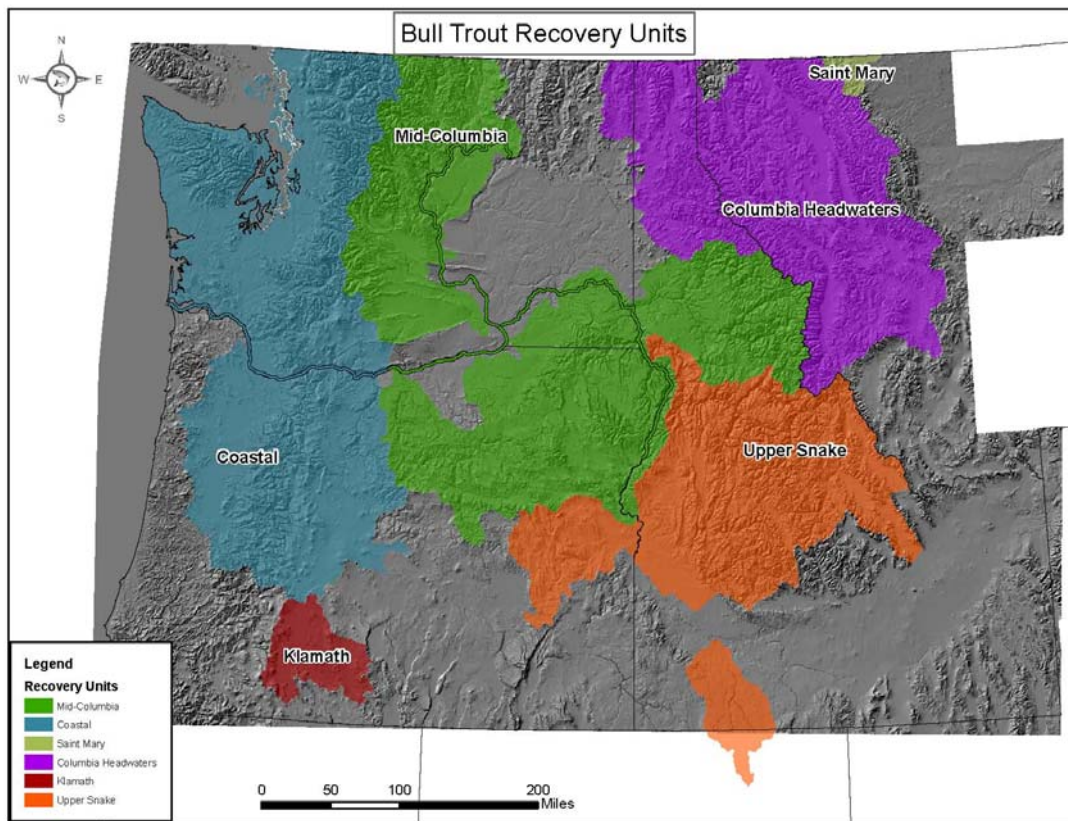


Figure 1. Six draft bull trout recovery units in the Pacific Northwest of the United States

¹ U.S. Fish and Wildlife Service (Service). 2008. Bull trout (*Salvelinus confluentus*) 5-year review: Summary and evaluation. U.S. Fish and Wildlife Service, Portland, OR. 55 p.

Based on meeting these four relevant factors from two of the criteria in the DPS policy, the Service concluded that conserving each RU was essential for the conservation of the listed entity as a whole because of their individual value as defined by the policy criteria. The two criteria and four factors that were relevant to evaluating bull trout recovery units were:

Discreteness: A population segment of a vertebrate species may be considered discrete if:

1. It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

Significance: If a population segment is considered discrete under the above condition, its biological and ecological significance will then be considered in light of Congressional guidance that the authority to list DPSs be used "sparingly" while encouraging the conservation of genetic diversity. In carrying out this examination, the Services considered available scientific evidence of the DPS's importance to the taxon to which it belonged. This consideration included, but was not limited to, the following:

1. Persistence of the DPS in an ecological setting unusual or unique for the taxon,
2. Evidence that loss of the DPS would result in a significant gap in the range of a taxon,
3. Evidence that the DPS differed markedly from other populations of the species in its genetic characteristics.

The Service then developed a rule set for each of the four factors for evaluating each potential RU against these four factors. This rule set included

1. Markedly Separate
 - a. Divergence measured by mitochondrial or microsatellite deoxyribonucleic acid (DNA)—*Low, Medium, High*
 - b. Isolation from nearest population—*Low, Medium, High*
 - c. Life-history difference
2. Ecological Setting
 - a. Life-history strategy
 - b. Species assemblage
 - c. Ecological zone
3. Significant Gap
 - a. Loss of population throughout any major drainage basins (Puget Sound, Klamath, Saint Mary) or major portion of the Columbia Basin (lower Columbia, Snake, middle Columbia, Kootenai/Clark Fork)
4. Differs Markedly
 - a. Divergence measured by mitochondrial or microsatellite DNA—*Low, Medium, High*
 - b. Shared evolutionary future

Subsequent to identifying these six RUs using the approach outlined above, we evaluated each RU and determined that they fulfilled the need to ensure a resilient (protect large areas of high-quality habitat), redundant (protect multiple populations), and representative (protect diverse genetic and life-history aspects) distribution of bull trout populations throughout the range of the listed entity. We also found them to be consistent with the seven guiding principles

(below). For each RU, we determined why it should be considered a separate RU and justified why it was essential based on the following rationale:

A. Coastal Recovery Unit

The Coastal RU is essential to the conservation of bull trout because populations are significantly different at the mitochondrial DNA level from the four RUs east of the Cascade Range and at the microsatellite DNA level from the Klamath RU; in the Olympic Peninsula and Puget Sound areas, they are almost completely isolated from other RUs and are partially isolated from other RUs in the lower Columbia River; some populations within this RU exhibit amphidromous (move to and from salt water from fresh water) life history form; they co-occur with Dolly varden (*Salvelinus malma*) in the northern portion of the RU and coastal populations of anadromous salmonids elsewhere; they occur in a coastal climate and vegetative condition west of the Cascade Range, different from the four RUs to the east; loss of this RU would result in a significant gap in the range of bull trout; and the entire RU has or could have a shared evolutionary future by migrating among populations over long periods of time.

B. Klamath Recovery Unit

The Klamath RU is essential to the conservation of bull trout because populations are significantly different at the mitochondrial DNA level from the four RUs east of the Cascade Range and at the microsatellite DNA level from the Coastal RU; they are highly isolated from all other RUs; populations currently persist almost solely in a resident life history form (though migratory forms would likely reoccur given suitable habitat conditions); they co-occur with species not found in other RUs, such as indigenous suckers (*Catostomus* spp.); they occur in a relatively warmer and drier inland climate that is different from the Coastal RU and farther south than most other inland populations; loss of this RU would result in a significant gap in the range of bull trout; and the entire RU has or could have a shared evolutionary future by migrating among populations over long periods of time.

C. Mid-Columbia Recovery Unit

The Mid-Columbia RU is essential to the conservation of bull trout because populations are significantly different at the mitochondrial DNA level from the two recovery units west of the Cascade Range and at the microsatellite DNA level from the three other RUs east of the Cascade Range; they are mostly isolated from other RUs due to distance and partial dispersal barriers, including the Columbia Gorge downstream and Hells Canyon and ancient waterfalls in the upper Columbia River basin upstream; they co-occur with anadromous Columbia River basin salmonids similar to the Upper Snake RU but different from the other RUs; they occur inland, in a lower elevation climate and different vegetative conditions than the two RUs west of the Cascade Range and three RUs upstream closer to the Continental Divide; loss of this RU would result in a significant gap in the range of bull trout; and the entire RU has or could have a shared evolutionary future by migrating among populations over long periods of time.

D. Upper Snake Recovery Unit

The Upper Snake RU is essential to the conservation of bull trout because populations are significantly different at the mitochondrial DNA level from the two RUs west of the Cascade Range and at the microsatellite DNA level from the three RUs east of the Cascade Range; they are mostly isolated from other RUs in the headwaters of the Snake River basin due to distance in the lower Salmon River and a partial dispersal barrier in Hells Canyon; they co-occur with anadromous Columbia River basin salmonids similar to the Mid-Columbia RU but different from the other RUs; they occur inland in a lower elevation climate and different vegetative condition than the two RUs west of the Cascade Range and three RUs upstream closer to the Continental Divide; loss of this RU would result in a significant gap in the range of bull trout; and the entire RU has or could have a shared evolutionary future by migrating among populations over long periods of time.

E. Columbia Headwaters Recovery Unit

The Columbia Headwaters RU is essential to the conservation of bull trout because populations are significantly different at the mitochondrial DNA level from the two RUs west of the Cascade Range and at the microsatellite DNA level from the three other RUs east of the Cascade Range; they are mostly isolated from other RUs in the headwaters of the Columbia River basin by ancient waterfalls downstream; most populations occur in the adfluvial migratory form; they evolved in the absence of anadromous salmonids; they occur inland in a cooler and drier climate and different vegetative conditions than the two RUs west of the Cascade Range and the Mid-Columbia RU; loss of this RU would result in a significant gap in the range of bull trout; and populations within each of three different, isolated watersheds have or could have a shared evolutionary future by migrating among populations over long periods of time.

F. Saint Mary Recovery Unit

The Saint Mary RU is essential to the conservation of bull trout because populations are significantly different at the mitochondrial DNA level from the two RUs west of the Cascade Range and at the microsatellite DNA level from the three other RUs east of the Cascade Range; they are highly isolated east of the Continental Divide from all other RUs to the west; they evolved in the presence of lake trout (*Salvelinus namaycush*) and other species found only east of the Continental Divide; they occur inland in a cooler and drier climate and different vegetative conditions than the two RUs west of the Cascade Range and the Mid-Columbia RU; loss of this RU would result in a significant gap in the range of bull trout; and the entire RU has or could have a shared evolutionary future by migrating among populations over long periods of time.

SEVEN GUIDING PRINCIPLES FOR BULL TROUT CONSERVATION

To identify those habitats within each RU essential to the conservation of bull trout, the Service used the Four Biological Indicators derived from the 2002 and 2004 bull trout draft

recovery plans²³⁴ and seven newly developed “Guiding Principles” to help ensure conservation of bull trout and their habitat identified below. The Service developed Appendix 1 evaluating bull trout core areas and FMO habitat in each of six recovery units using the seven guiding principles for bull trout conservation. Using the four criteria below, the Service then identified occupied habitat with primary constituent elements (PCEs) and unoccupied habitat that are essential for bull trout conservation within each RU. These habitat are proposed to be designated as critical habitat.

Four Biological Indicators

1. Distribution
2. Abundance
3. Trend
4. Connectivity

Seven Guiding Principles:

1. Conserve opportunity for diverse life-history expression
2. Conserve opportunity for genetic diversity
3. Ensure bull trout are distributed across representative habitats
4. Ensure sufficient connectivity among populations
5. Ensure sufficient habitat to support population viability (e.g., abundance, trend indices)
6. Consider threats (e.g., climate change)
7. Ensure sufficient redundancy in conserving population units

² U.S. Fish and Wildlife Service (Service). 2002. Draft recovery plan for bull trout (*Salvelinus confluentus*) in the coterminous United States: Klamath River, Columbia River, and St. Mary-Belly River Distinct Population Segments. Service, Portland, OR.

³ U.S. Fish and Wildlife Service (Service). 2004a. Draft recovery plan for the Coastal-Puget Sound distinct population segment of bull trout (*Salvelinus confluentus*). Service, Puget Sound Management Unit, Portland, OR. 389 + xvii p.

⁴ U.S. Fish and Wildlife Service (Service). 2004b. Draft recovery plan for the Jarbidge River distinct population segment of bull trout (*Salvelinus confluentus*). Service, Portland, OR. 132 + xiii p.

Four criteria for focusing habitat protection were developed and applied by the Service to identify those habitats essential to the conservation of bull trout:

1. Map bull trout habitat occupancy for each RU; evaluate all habitats to determine how they may be essential to the conservation of the species.
2. Where there may be more occupied habitat than necessary to achieve recovery, prioritize critical habitat designations on the following:
 - i. **Emphasize** areas as essential to those local populations and/or spawning and rearing streams of **highest conservation value** such as:
 1. Largest areas or populations
 2. Most highly connected populations
 3. Areas that are that can contribute to bull trout conservation
 4. Areas with highest conservation potential (e.g., quantity or quality of PCEs)
 - ii. **Emphasize** as essential those core areas of **highest conservation value** such as:
 1. Largest areas or populations
 2. Most highly connected populations
 3. Areas that are that can contribute to bull trout conservation
 4. Areas with highest conservation potential (e.g., quantity or quality of PCEs)
 - iii. **Emphasize** essential FMO habitats of **highest conservation value**, such as:
 1. Habitats that connect populations and core areas
 2. Habitat that enhances the conservation of a core area or local population
3. Identify any unoccupied habitat essential for bull trout conservation using the guidance above.
4. Evaluate each RU to ensure that the seven guiding principles are met and sufficient critical habitat has been identified to ensure the conservation of bull trout at that scale.

THIRTY-TWO CRITICAL HABITAT UNITS AND NINETY-NINE SUBUNITS CONTRIBUTE TO CONSERVATION

We identified 32 CHUs and 99 CHSUs within each of the 6 draft RUs throughout the range of bull trout based on distribution, connectivity, and proximity among populations.

- A. Coastal Recovery Unit
 1. Olympic Peninsula
 2. Puget Sound

3. Lower Columbia River Basins
 4. Upper Willamette River
 5. Hood River
 6. Lower Deschutes River
 7. Odell Lake
 8. Mainstem Lower Columbia River
- B. Klamath Recovery Unit
9. Klamath River Basin
- C. Mid-Columbia Recovery Unit
10. Upper Columbia River Basins
 11. Yakima River
 12. John Day River
 13. Umatilla River
 14. Walla Walla River Basin
 15. Lower Snake River Basins
 16. Grande Ronde River
 17. Imnaha River
 18. Sheep and Granite Creeks
 19. Hells Canyon Complex
 20. Powder River Basin
 21. Clearwater River
 22. Mainstem Upper Columbia River
 23. Mainstem Snake River
- D. Upper Snake Recovery Unit
24. Malheur River Basin
 25. Jarbidge River Basin
 26. Southwest Idaho River Basins
 27. Salmon River Basin
 28. Little Lost River
- E. Columbia Headwaters Recovery Unit
29. Coeur d'Alene River Basin
 30. Kootenai River Basin
 31. Clark Fork River Basin
- F. Saint Mary Recovery Unit
32. Saint Mary River Basin

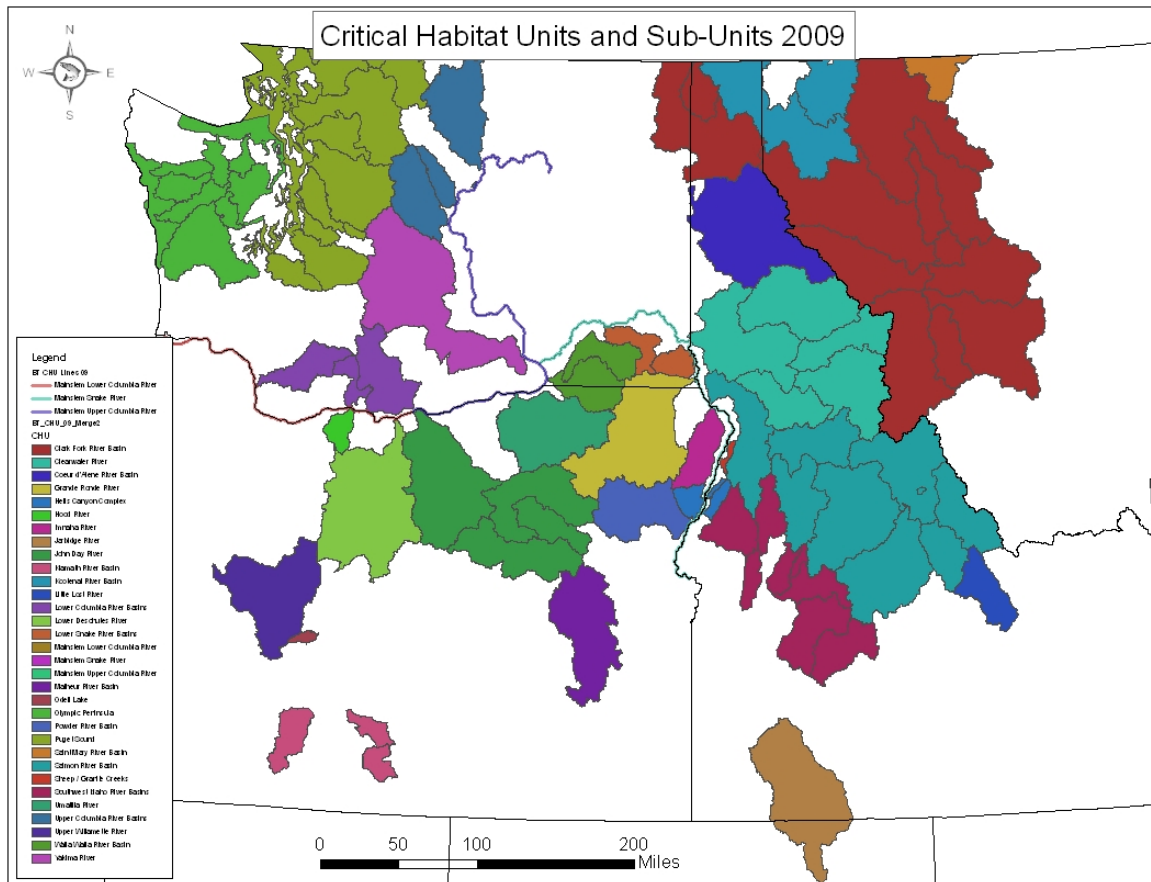


Figure 2. Thirty-two bull trout Critical Habitat Units with subunits delineated

We determined individually that each of the 32 CHUs and 99 CHSUs are essential for the conservation of the species based on the rationales outlined below that are consistent with the seven guiding principles. For all units we used the best data available to inform our rationale for why it is essential; for some units fewer data were available than for others. Please see Appendix 2 for more detailed information on occupancy for each of over 3,500 water body segments and in some cases, segment-specific rationale for why those habitats are proposed for designation as critical habitat.

A. Coastal Recovery Unit

1. Olympic Peninsula Critical Habitat Unit

The Olympic Peninsula CHU is essential for maintaining bull trout distribution within this unique geographic region of the RU. Watersheds on the Olympic Peninsula drain to marine waters in the Hood Canal, Strait of Juan de Fuca, and Pacific Ocean. Sixty major glaciers still cover the Olympic Mountains, providing sources of cold water to the glacially fed rivers on the Olympic Peninsula. The Olympic Peninsula supports one of the few temperate rain forests in the world, much of which is contained within the Olympic National Park, which is also designated as a World Biosphere Reserve and World Heritage Site.

This CHU is essential for maintaining distribution of the amphidromous life history form within the Coastal RU, which is rare across the geographic range of this species. It is not only essential for maintaining this life history form within this RU, but within its coterminous range. It is one of only two CHUs that contain the amphidromous life history form. See Appendices 1 and 2 for more information.

a. Dungeness River Critical Habitat Subunit

The Dungeness River CHSU is essential to bull trout conservation because it represents the core amphidromous population of bull trout within the Strait of Juan de Fuca. Its sympatric distribution with Dolly varden suggests this CHSU may represent a key climate change refugium for the species due to Dolly varden's presumed colder water requirements. Extensive portions of the headwater habitat are within protected areas (Olympic National Park and Buckhorn Wilderness) (see Appendices 1 and 2 for more detailed information).

b. Elwha River Critical Habitat Subunit

The Elwha River CHSU is essential to bull trout conservation because it represents one of only two populations of bull trout within the Strait of Juan de Fuca. It is essential for population redundancy in this region and expansion of the amphidromous life history form once the Elwha Dams are removed. This CHSU may represent a key climate change refugium for the species due to the extensive glacially influenced habitat and protected nature of the upper watershed (Olympic National Park) (see Appendices 1 and 2 for more detailed information).

c. Hoh River Critical Habitat Subunit

The Hoh River CHSU is essential to bull trout conservation because it maintains the northernmost population of amphidromous bull trout along the Pacific Coast of the Olympic Peninsula and may represent the stronghold for the three Washington coast populations of bull trout. This CHSU may represent a key climate change refugium for the species due to the extensive glacially influenced habitat. Extensive portions of the headwater habitat are within a protected area (Olympic National Park) (see Appendices 1 and 2 for more detailed information).

d. Queets River Critical Habitat Subunit

The Queets River CHSU is essential to bull trout conservation because it represents part of the core distribution of amphidromous bull trout along the Washington coast and is vital for population redundancy. Extensive portions of the habitat are within protected areas (Olympic National Park) (see Appendices 1 and 2 for more detailed information).

e. Quinault River Critical Habitat Subunit

The Quinault River CHSU is essential to bull trout conservation because it maintains the southernmost population of amphidromous bull trout along the Pacific Coast. Its sympatric distribution with Dolly varden suggests this CHSU may represent a key climate change refugium for the species due to Dolly varden's presumed colder water requirements. Extensive portions of the headwater habitat are within protected areas (Olympic National Park and Colonel Bob Wilderness) (see Appendices 1 and 2 for more detailed information).

f. Skokomish River Critical Habitat Subunit

The Skokomish River CHSU is essential to bull trout conservation because it represents the only natal distribution of bull trout within the Hood Canal region of the Olympic Peninsula.

Portions of the headwater habitat are within a protected area (Olympic National Park) (see Appendices 1 and 2 for more detailed information).

g. Hood Canal Critical Habitat Subunit

Hood Canal Marine CHSU is essential to bull trout conservation and for recovering the amphidromous life history form in the Hood Canal region of the Olympic Peninsula. It contains essential FMO habitat for the expression of the amphidromous life history form (see Appendices 1 and 2 for more detailed information).

h. Strait of Juan de Fuca Critical Habitat Subunit

The Strait of Juan de Fuca CHSU is essential to bull trout conservation and for supporting the expression of the amphidromous life history form along the northern extent of the Olympic Peninsula. This CHSU encompasses both marine (Strait of Juan de Fuca) and freshwater (Siebert Creek, Morse Creek, Ennis Creek, and Valley Creek) FMO habitats required for the expression of the amphidromous life history form within the Olympic Peninsula CHU (see Appendices 1 and 2 for more detailed information).

i. Pacific Coast Critical Habitat Subunit

The Pacific Coast CHSU is essential to bull trout conservation and for supporting the expression of the amphidromous life history form along the coastal region of the Olympic Peninsula. This CHSU encompasses both marine (Pacific Ocean) and freshwater (Goodman Creek, Mosquito Creek, Cedar Creek, Steamboat Creek, Kalaloch Creek, Raft River, Moclips River, Joe Creek, and Copalis River) FMO habitats required for the expression of the amphidromous life history form within the Olympic Peninsula CHU (see Appendices 1 and 2 for more detailed information).

j. Chehalis River/Grays Harbor Critical Habitat Subunit

The Chehalis River/Grays Harbor CHSU is essential to bull trout conservation and for supporting the expression of the amphidromous life history form along the Pacific Coast. This CHSU includes Grays Harbor, Humptulips River, and the Chehalis River and several of its major tributaries (Wishkah River, Wynoochee River, Satsop River) The Chehalis River system is the second largest river basin in Washington, providing the primary freshwater FMO habitat (outside of core areas) for the amphidromous life history form from Washington coast core areas. Grays Harbor is the key connection between the Pacific Ocean and freshwater FMO habitats within the Chehalis River basin and Humptulips River drainage for Washington coast core areas (see Appendices 1 and 2 for more detailed information).

2. Puget Sound Critical Habitat Unit

The Puget Sound CHU is essential for maintaining bull trout distribution within this unique geographic region of the RU. Puget Sound is a fjord-like estuary that covers an area of approximately 2,330 square kilometers (km²) (900 square miles (mi²)), including 3,700 kilometers (km) (2,300 miles(mi)) of nearshore marine coastline. It was designated as an “Estuary of National Significance” by the U.S. Environmental Protection Agency in 1988.

This CHU is essential for maintaining distribution of the amphidromous life history form within the Coastal RU, which is rare across this species geographic range. It is not only essential for maintaining this life history form within this RU but within its coterminous range. It is one

of only two CHUs that contain the amphidromous life history form. See Appendices 1 and 2 for more detailed information.

a. Chilliwack River Critical Habitat Subunit

The Chilliwack River CHSU is essential to bull trout conservation because it represents unique geographic distribution within the RU, and supports multiple migratory life history forms. Chilliwack Lake and significant portions of its headwaters are in protected areas (North Cascades National Park, Chilliwack Ecological Reserve, and Chilliwack Lake Provincial Park) (see Appendices 1 and 2 for more detailed information).

b. Nooksack River Critical Habitat Subunit

The Nooksack River CHSU is essential to bull trout conservation because it represents the northern most distribution of amphidromous bull trout in Puget Sound. Bull trout's sympatric distribution with Dolly varden suggests this CHSU may represent a key climate change refugium for the species due to Dolly varden's presumed colder water requirements. Portions of the headwaters are within protected areas (Mount Baker Wilderness) (see Appendices 1 and 2 for more detailed information).

c. Lower Skagit River Critical Habitat Subunit

The Lower Skagit River CHSU is essential to bull trout conservation because it represents the stronghold for the amphidromous life history form and the species, within the Coastal RU. This CHSU contains diverse life history forms and represents a significant distribution of the species within the Puget Sound region and the RU. Extensive portions of the habitat are within protected areas (North Cascades National Park, Glacier Peak Wilderness, and Henry Jackson Wilderness) (see Appendices 1 and 2 for more detailed information).

d. Upper Skagit River Critical Habitat Subunit

The Upper Skagit River CHSU is essential to bull trout conservation because it represents a significant portion of the distribution of bull trout in Puget Sound. Bull trout's sympatric distribution with Dolly varden suggests this CHSU may represent a key climate change refugium for the species due to Dolly varden's presumed colder water requirements. Core area habitats are largely within protected areas (North Cascades National Park and Pasayten Wilderness) (see Appendices 1 and 2 for more detailed information).

e. Stillaguamish River Critical Habitat Subunit

The Stillaguamish River CHSU is essential to bull trout conservation because it represents part of the core distribution of amphidromous bull trout in Puget Sound. Bull trout's sympatric distribution with Dolly varden suggests this CHSU may represent a key climate change refugium for the species due to Dolly varden's presumed colder water requirements. A small section of the river's headwaters is within a protected area (Boulder River Wilderness) (see Appendices 1 and 2 for more detailed information).

f. Samish River Critical Habitat Subunit

The Samish River CHSU is of secondary importance relative to CHSUs containing natal populations but it provides important FMO habitat (outside of core areas) essential to the amphidromous life history form (see Appendices 1 and 2 for more detailed information).

g. Snohomish–Skykomish River Critical Habitat Subunit

The Snohomish–Skykomish River CHSU is essential to bull trout conservation because it represents the second stronghold for the amphidromous life history form within the Coastal RU. It also represents part of the core distribution of amphidromous bull trout in Puget Sound. Extensive portions of the habitat are within protected areas (Henry Jackson Wilderness, Wild Sky Wilderness, and Alpine Lakes Wilderness) (see Appendices 1 and 2 for more detailed information).

h. Lake Washington Critical Habitat Subunit

The Lake Washington CHSU is of secondary importance relative to CHSUs containing natal populations but it provides important FMO habitat (outside of core areas) essential to the amphidromous life history form (see Appendices 1 and 2 for more detailed information).

i. Lower Green River Critical Habitat Subunit

The Lower Green River CHSU is of secondary importance relative to CHSUs containing natal populations but it provides important FMO habitat (outside of core areas) essential to the amphidromous life history form (see Appendices 1 and 2 for more detailed information).

j. Lower Nisqually River Critical Habitat Subunit

The Lower Nisqually River CHSU is of secondary importance relative to CHSUs containing natal populations but provides important FMO habitat for the amphidromous life history form, especially in southern Puget Sound. It is important for future recovery efforts (i.e., recolonization or reintroduction) as amphidromous populations increase in abundance (see Appendices 1 and 2 for more detailed information).

k. Chester Morse Lake Critical Habitat Subunit

Chester Morse Lake CHSU is essential to bull trout conservation because it represents the natural expression of a rare life history form within the RU. Its isolated status provides potential refuge for the species from any threat that would largely affect amphidromous populations in the RU. The core area is encompassed by a municipal watershed managed under the Cedar River Watershed Habitat Conservation Plan so habitat is largely protected (see Appendices 1 and 2 for more detailed information).

l. Puyallup River Critical Habitat Subunit

The Puyallup River CHSU is essential to bull trout conservation because it represents the southernmost distribution of amphidromous bull trout in Puget Sound, supports multiple life history expressions, and may represent a key climate change refugium for the species due to the extensive glacially influenced habitat. Extensive portions of the habitat are within a protected area (Mount Rainier National Park) (see Appendices 1 and 2 for more detailed information).

m. Puget Sound Marine Critical Habitat Subunit

The Puget Sound Marine CHSU is essential to bull trout conservation and for supporting the expression of the amphidromous life history form in the Puget Sound region. It contains essential FMO habitat required for the expression of the amphidromous life history form within the Puget Sound CHU (see Appendices 1 and 2 for more detailed information).

3. Lower Columbia River Basins Critical Habitat Unit

The Lower Columbia River Basins CHU is essential for maintaining bull trout distribution within this unique geographic region of the Coastal RU. It is also essential for maintaining broad distribution of the migratory life history form within the lower Columbia River basin that may still have the potential to re-express amphidromy. See Appendices 1 and 2 for more detailed information.

a. Lewis River Critical Habitat Subunit

The Lewis River CHSU is essential to bull trout conservation because it has one of the most abundant populations in the lower Columbia region of the RU. A recent Federal Energy Regulatory Commission (FERC) settlement agreement will provide future connectivity to the mainstem Columbia River (see Appendices 1 and 2 for more detailed information).

b. Klickitat River Critical Habitat Subunit

The Klickitat River CHSU is essential to bull trout conservation because the headwater resident population represents a possible refugium for the species in the lower Columbia region. Of the three CHSUs in the Lower Columbia River Basins CHU, The Klickitat River CHSU is the only undammed system with access for fluvial bull trout (see Appendices 1 and 2 for more detailed information).

c. White Salmon River Critical Habitat Subunit

The White Salmon River CHSU is of secondary importance relative to existing core areas but provides essential habitat necessary for future recovery efforts (i.e., reintroduction or natural recolonization of the fluvial life history form) once Condit Dam is removed. Existing conditions appear to provide only limited FMO habitat (see Appendices 1 and 2 for more detailed information).

4. Upper Willamette River Critical Habitat Unit

The Upper Willamette CHU is essential to bull trout conservation because it is the only CHU west of the Cascade Range in western Oregon, is among the farthest south and west populations in the range of the species, is a long distance via waterways to the next nearest populations, probably has been functionally isolated for a long time, and is genetically distinguishable. Bull trout were likely fluvial historically but now include several local populations that have adopted an adfluvial life history strategy due to the presence of impassable dams and large reservoirs. The one remaining fluvial local population is the mainstem McKenzie local population. Local populations in the McKenzie River are not robust and thus, the maintenance and recovery of this along with other local populations in the core area, and the reestablishment of bull trout in historical habitat elsewhere in and outside the core area, are likely required for long-term persistence.

The four local populations in the McKenzie and Middle Fork Willamette rivers have been isolated from each other due to the construction and operation of impassable dams. Connecting each of these local populations is important for future connectivity and long-term persistence. Connectivity between local populations in the McKenzie River Subbasin is expected over the next decade due to fish passage modifications planned for Trail Bridge Dam (mainstem McKenzie River) and Cougar Dam (South Fork McKenzie River). The majority of the

McKenzie and Middle Fork Willamette rivers provide suitable bull trout spawning and rearing, foraging, migrating and overwintering habitats. Provided connectivity is restored in the near future, the habitat contained in the proposed rule is likely sufficient to support population viability in the Upper Willamette Core Area. See Appendices 1 and 2 for more detailed information.

5. Hood River Critical Habitat Unit

The Hood River CHU is essential to the conservation of bull trout because of the population's unique genetic diversity suggesting that colonizers from both the Snake and Upper Columbia have contributed to the Hood River population; this fact provides a unique opportunity for conserving genetic diversity. It is likely that before passage barriers were present, the population had a unique fluvial life history strategy connecting widely divergent habitats across a broad geographic range. The Hood River habitat may have served as an important connectivity area for highly fluvial fish from both the coastal and Snake River/Upper Columbia River groupings of bull trout. The glaciers that form some of the rivers fluctuate dramatically in diurnal cycles in flow, turbidity, and temperature. The unique ability of Hood River bull trout to adapt to this unpredictable environment separates and differentiates them from other bull trout in the coastal lineage and represents a unique habitat type. The Hood River bull trout population may be one of the most recoverable bull trout populations in Oregon. See Appendices 1 and 2 for more detailed information.

6. Lower Deschutes River Critical Habitat Unit

The Lower Deschutes River CHU is essential to the conservation of bull trout because populations here are genetically diverse; have diverse life history expressions including fluvial, adfluvial, and resident populations with extensive connectivity within and outside the CHU; and are the most robust in this part of the Mid-Columbia RU. The Deschutes River basin contains a variety of representative habitats, including high Cascade headwater streams, glacially fed streams, spring systems, lake habitat, and mainstem river habitat. Maintaining and recovering these populations will ensure conservation of adaptations to these unique habitats, and adequate redundancy within this basin and relative to adjacent core areas (e.g., Hood River, John Day River, etc.). Protecting and maintaining all five of the Deschutes River basin's bull trout populations will help ensure the long-term viability of these bull trout by protecting a geographically widespread distribution of unique but related bull trout. See Appendices 1 and 2 for more detailed information.

7. Odell Lake Critical Habitat Unit

The Odell Lake CHU is essential to the conservation of bull trout because it includes the only remaining natural adfluvial population of bull trout in Oregon, and fish here are genetically and ecologically unique. Odell Lake bull trout have been isolated from the Deschutes River population by a lava flow that impounded Odell Creek and formed Davis Lake approximately 5,500 years ago. Adfluvial bull trout populations are less common than fluvial bull trout range wide, especially in this portion of the Mid-Columbia RU, and therefore Odell Lake supports an important and limited life history expression. Bull trout here may express an even rarer allacustrine life history strategy, outmigrating from the lake, downstream into Odell Creek to spawn; they may spawn in lentic waters near the outlet of the lake. See Appendices 1 and 2 for more detailed information.

8. Mainstem Lower Columbia River Critical Habitat Unit

The Columbia River, from the Pacific Ocean upstream to John Day Dam, is essential for maintaining bull trout distribution and provides essential FMO habitat for extant tributary populations of bull trout in the Lewis, Hood, Klickitat, and Deschutes Rivers and connectivity between these core areas, as well as facilitates the potential reestablishment of a population within the White Salmon River. Connectivity from the Pacific Ocean and upriver allows for the opportunity for amphidromous and fluvial life history expressions and genetic exchange and diversity, which are essential to the recovery unit.

The entire reach, from the Columbia River mouth to John Day Dam, is considered essential and included in designated critical habitat because (1) it is or could potentially be used as FMO habitat by bull trout from tributaries; (2) quality habitat containing several primary constituent elements exists during the FMO period for bull trout; and (3) inclusion of this area in critical habitat reflects two Recovery Objectives, maintaining stable or increasing trends in abundance (indirectly by providing for the needs of migratory forms) and restoring and maintaining suitable habitat conditions for bull trout life history stages. See Appendices 1 and 2 for more detailed information.

B. Klamath Recovery Unit

9. Klamath River Basin Critical Habitat Unit

Please refer to the RU section above that describes why the Klamath River Basin CHU is essential and see Appendices 1 and 2 for more detailed information.

a. Upper Klamath Lake Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it is needed to maintain redundancy in local population numbers. Only two populations (Sun Creek and Threemile Creek) remain in this CHSU out of seven local populations in all three CHSUs combined, placing the Upper Klamath Lake CHSU populations at an increased risk of extirpation. These local populations likely face greater risk because they are not interconnected. Extirpation of local populations in the Upper Klamath Lake CHSU has occurred in recent times. Populations in this CHSU are genetically differentiated from those in the other two CHSUs in the Klamath River Basin CHU. Among all three CHSUs in the Klamath RU, genetic variation is

lowest in this CHSU. The two local populations have been isolated from habitat fragmentation and have experienced population bottlenecks. As such, currently unoccupied habitat is needed to restore connectivity among local populations and is proposed as critical habitat. This unoccupied critical habitat includes canals, which now provide the only means of connectivity as migratory corridors.

The Service has proposed West and Sevenmile Canals as critical habitat because they will provide connectivity between recovered local populations. West Canal intercepts the flows from Cherry, Threemile, Crane, and Fourmile Creeks and provides a corridor of connectivity between these streams. Before the creation of West Canal, these streams likely connected directly with FMO habitat in the Upper Klamath and Agency Lakes. Sevenmile Canal is the redirected, channelized lower reaches of Sevenmile Creek and also provides a connectivity corridor between streams supporting isolated local populations of bull trout. Therefore, these canals, although artificial, now represent aquatic habitat important to bull trout recovery.

Because isolation and habitat fragmentation resulting from migratory barriers have negatively affected bull trout by (1) reducing geographical distribution; (2) increasing the probability of losing individual local populations; (3) increasing the probability of hybridization with introduced brook trout; (4) reducing the potential for movements in response to developmental, foraging, and seasonal habitat requirements; and (5) reducing reproductive capability by eliminating the larger, more fecund migratory form from many subpopulations, restoring connectivity and the frequency of occurrence of the migratory form will be an important factor in providing for bull trout recovery (see Appendices 1 and 2 for more detailed information).

b. Sycan River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it is needed to maintain redundancy in local population numbers. Only one local population (Long Creek) remains in this CHSU out of seven local populations in all three CHSUs combined, placing the Sycan River CHSU population at an increased risk of extirpation. The local population in this CHSU likely faces greater risk because it is the only remaining local population. Other local populations in the Sycan River CHSU have been extirpated. This CHSU's local population is genetically differentiated from those in the other two CHSUs. This CHSU also is essential in that bull trout in this CHSU exhibit resident and fluvial life histories, which are important for representing diverse life history expression in the Klamath RU. Migratory bull trout are able to grow larger than their resident counterparts, resulting in greater fecundity and higher reproduction potential. Migratory life history forms also have been shown to be important for population persistence and resilience (see Appendices 1 and 2 for more detailed information).

c. Upper Sprague River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it is needed to maintain redundancy in local population numbers. Five local populations (Boulder Creek, Dixon Creek, Deming Creek, Leonard Creek, and Brownsworth Creek) remain in this CHSU out of seven local populations in all three CHSUs combined, placing the Upper Sprague River CHSU at an intermediate risk of extinction. These local populations likely face a higher risk because not all are interconnected. Populations in this CHSU are genetically differentiated from those in the other two CHSUs. This CHSU also is essential in that bull trout in this CHSU exhibit resident and fluvial life histories, which are important for representing diverse life history expression in

the Klamath RU. Migratory bull trout are able to grow larger than their resident counterparts, resulting in greater fecundity and higher reproduction potential. Migratory life history forms also have been shown to be important for population persistence and resilience (see Appendices 1 and 2 for more detailed information).

C. Mid-Columbia Recovery Unit

10. Upper Columbia River Basins Critical Habitat Unit

The Upper Columbia River Basins CHU is essential for maintaining bull trout distribution within this unique geographic region of the Mid-Columbia RU and conserving multiple life history types. It is located in the most northern geographical area for the Mid-Columbia River RU and has been impacted by glacial movements from Canada and floods from Glacial Lake Missoula. It is essential for maintaining broad distribution within the Columbia River basin. This CHU supports populations in core areas that exhibit unique adfluvial, fluvial, and alluustrine life history movements between lakes, rivers, and the mainstem Columbia River and includes several unique resident populations that are unique in genetic diversity and distribution. Modeling efforts for climate change identify several important areas in this CHU associated with glacially fed systems that will be essential for recovery during warming periods. This CHU contributes substantially to bull trout population numbers likely because this is a high-producing amphidromous portion of the Columbia River and habitat remains physically connected to natural lakes and large rivers. FMO habitat between core areas and habitat within the mainstem Columbia River is essential for conservation by providing year-round connectivity and the expression of migratory life history forms. See Appendices 1 and 2 for more detailed information.

a. Methow River Critical Habitat Subunit

The Methow River CHSU is essential for bull trout conservation in the Methow core area. It represents the northernmost distribution of bull trout in the Mid-Columbia RU. The Methow River drains an area of approximately 4,895 km² (1,890 mi²). Spawning areas are mostly within Okanogan-Wenatchee National Forest Wilderness and are managed by standards and guidelines in the U.S. Forest Service's forest plan. Modeling efforts indicate the unique association of bull trout with glacially fed streams persisting through climate change as long as the glaciers themselves persist. The Methow River supports two alluustrine populations: one in Black Lake within the Chewuch River drainage and one in the Lost River, a tributary to the upper Methow River. Populations of bull trout in this CHSU rely heavily on mainstem rivers, including the Columbia River mainstem, for connectivity, forage, and overwintering, which are essential for conservation. This CHSU supports a group of long-range moving bull trout where one adult was found moving between the Okanogan River and below the Priest Rapids Dam in the mainstem Columbia River (see Appendices 1 and 2 for more detailed information).

b. Chelan River Critical Habitat Subunit

The Chelan River CHSU is essential for bull trout conservation and recovery of all migratory local populations in the Upper Columbia River Basins CHU using the Columbia River mainstem, which includes most populations. It includes the area below the dam on Lake Chelan, downstream to the Columbia River. It lies mostly adjacent to private or State lands and includes a management plan operated by the Chelan County Public Utilities District as part of the

Lake Chelan Dam relicensing project. This CHSU is unique in that it provides the closest and largest source of cold water directly to the mainstem Columbia River in the Upper Columbia CHU and possibly the entire Mid-Columbia RU. As such, it could prove to be important for reducing climate change effects. This CHSU is essential for conservation because migratory life history forms of bull trout using the Columbia River mainstem rely heavily on this area for forage and overwintering habitat (see Appendices 1 and 2 for more detailed information).

c. Entiat River Critical Habitat Subunit

The Entiat River CHSU is essential for bull trout conservation and recovery of local populations in the Entiat core area. It represents populations in the northernmost distribution of bull trout in the Mid-Columbia RU. The Entiat River drains an area of approximately 1,085 km² (419 mi²). Spawning areas are mostly within the Okanogan-Wenatchee National Forest Wilderness and are managed by standards and guidelines in the U.S. Forest Service's forest plan. This CHSU is unique in that it supports the only core area in the Upper Columbia CHU that relies mostly on the Columbia River mainstem for connectivity, forage, and overwintering, which are essential for conservation. It provides key habitat for conservation in the smallest core area within the Upper Columbia CHU and supports a portion of the population that includes long-range migratory bull trout (see the Appendices 1 and 2 for more detailed information).

d. Wenatchee River Critical Habitat Subunit

The Wenatchee River CHSU is essential for bull trout conservation and recovery of local populations in the Wenatchee core area. It represents populations in the northernmost distribution of bull trout in the Mid-Columbia RU. The Wenatchee River drains an area of approximately 3,551 km² (1,371 mi²). Spawning areas are mostly within the Okanogan-Wenatchee National Forest Wilderness and are managed by standards and guidelines in the U.S. Forest Service's forest plan. Modeling efforts indicate the unique association with glacially fed streams persisting through climate change. The Wenatchee River supports one of the largest local populations in the Mid-Columbia RU and includes an allucustrine population in the Chiwawa River that uses Lake Wenatchee. Several unique resident populations exist in this CHSU. Populations of bull trout in this CHSU rely heavily on Lake Wenatchee and mainstem rivers, including the Columbia River mainstem, for connectivity, forage, and overwintering, which are essential for conservation. This CHSU provides valuable foraging habitat due to the presence of one of two strong runs of spawning sockeye salmon (*Oncorhynchus nerka*) in the Columbia River basin. This CHSU also supports a group of long-range moving bull trout, including multiple life history types exhibiting movement patterns between spawning tributaries and Lake Wenatchee; the middle Wenatchee River mainstem; the lower Wenatchee River mainstem; and the Columbia, the Entiat, and Methow Rivers (see Appendices 1 and 2 for more detailed information).

11. Yakima River Basin Critical Habitat Unit

The Yakima River Basin CHU is essential for bull trout conservation because it helps maintain bull trout distribution within this unique upper-middle geographic region of the Mid-Columbia RU. It is located between the Lower Snake River and the Upper Columbia CHUs and drains an area of approximately 15,900 km² (6,155 mi²). It supports the largest core area in the state of Washington. Spawning areas are mostly within the Okanogan-Wenatchee National Forest Wilderness or State and tribal lands and are managed by standards and guidelines in the

U.S. Forest Service's forest plan or Washington State's Forest Practice Rules. This CHU is essential for maintaining broad distribution within the Columbia River basin and supports populations with unique genetics when compared to populations in CHUs located both north and south. It supports fluvial, adfluvial, and several resident populations unique in distribution. Modeling efforts for climate change indicate this CHU is at high risk and connectivity to reservoirs and glacial areas will be essential for recovery during warming periods. This CHU was historically a high-producing amphidromous watershed and contributes habitat that supports one of the largest local populations in the RU. FMO habitat in this CHU is essential for maintaining the historic migratory life history forms and conserving the species by providing year-round connectivity between lakes and reservoirs and mainstem rivers, including the Columbia River (see Appendices 1 and 2 for more detailed information).

12. John Day River Critical Habitat Unit

The John Day River CHU is essential for bull trout conservation because it is a large CHU, centrally located in the southern portion of the Mid-Columbia RU; has no major dams to prevent connectivity through existing FMO habitats within and among this and other CHUs via the Columbia River; and appears to contain both resident and fluvial life history strategies (see Appendices 1 and 2 for more detailed information).

a. Lower Mainstem John Day River Critical Habitat Subunit

The Lower Mainstem John Day River CHSU is essential for bull trout conservation because it serves as FMO habitat and provides a vital connection between the headwaters of the John Day River basin to FMO habitat in the Columbia River. The lower mainstem John Day, from the mouth upstream to its confluence with the North Fork John Day River, is presumed occupied FMO habitat (see Appendices 1 and 2 for more detailed information).

b. North Fork John Day River Critical Habitat Subunit

The North Fork John Day River CHSU is essential for bull trout conservation because it provides critical spawning and rearing habitat, is connected to the mainstem John Day River FMO habitat, and has no major physical barriers (see Appendices 1 and 2 for more detailed information).

c. Middle Fork John Day River Critical Habitat Subunit

The Middle Fork John Day River CHSU is essential for bull trout conservation because it provides critical spawning and rearing habitat, is connected to the mainstem John Day River FMO habitat, and has no major physical barriers (see Appendices 1 and 2 for more detailed information).

d. Upper Mainstem John Day River Critical Habitat Subunit

The Upper Mainstem John Day River CHSU is essential for bull trout conservation because it provides critical spawning and rearing habitat, is connected to the mainstem John Day River FMO habitat, and has no major physical barriers (see Appendices 1 and 2 for more detailed information).

13. Umatilla River Critical Habitat Unit

The Umatilla River CHU is essential to the conservation of bull trout because it contains a discrete population of bull trout in the southeastern part of the Mid-Columbia RU with connectivity to FMO habitat in the Columbia River and the potential to interact with bull trout from other CHSUs. The Umatilla River contains stream habitats representative of the Blue Mountains, and without the Umatilla River population there would be almost 161 km (100 mi) of river between occupied river basins. Losing this population would greatly reduce the potential for connectivity between core areas in the middle Columbia River. See Appendices 1 and 2 for more detailed information.

14. Walla Walla River Critical Habitat Unit

The Walla Walla River CHU is essential to the conservation of bull trout because it contains a discrete population of bull trout in the southeastern part of the Mid-Columbia RU with connectivity to FMO habitat in the Columbia River and the potential to interact with bull trout from other CHSUs. The fluvial population in the Walla Walla River is particularly significant because of its size and documented movement of bull trout into the Columbia River. See Appendices 1 and 2 for more detailed information.

a. Walla Walla River Critical Habitat Subunit

The Walla Walla River CHSU is essential to the conservation of bull trout because it contains stream habitats representative of the Blue Mountains and, because of its large size and varied terrain, the basin encompasses a wide variety of habitat conditions. Losing this population would greatly reduce the potential for connectivity between populations in the Snake and Columbia Rivers. Conditions in this basin, particularly in the upper Walla Walla River, are good for population recovery. The large size and diversity of Walla Walla River Basin should increase its resiliency to the affects of climate change. The almost complete absence of brook trout in the Walla Walla River increases the recovery potential of bull trout in this basin. The Walla Walla River Basin is a major stronghold for bull trout in the Mid-Columbia River region. Its relatively large population is essential to the recovery of bull trout in this region (see Appendices 1 and 2 for more detailed information).

b. Touchet River Critical Habitat Subunit

The Touchet River CHSU is essential to the conservation of bull trout because it contains stream habitats representative of the Blue Mountains and, because of its large size and varied terrain, the basin encompasses a wide variety of habitat conditions. Losing this population would greatly reduce the potential for connectivity between populations in the Snake and Columbia Rivers (see Appendices 1 and 2 for more detailed information).

15. Lower Snake River Critical Habitat Unit

The Lower Snake River CHU is essential to the conservation of bull trout because both fluvial and resident bull trout life history forms occur in the Asotin and Tucannon Rivers, and these basins are the only suitable bull trout refugia with adequate spawning and rearing and FMO habitat in the lower Snake River basin. The Tucannon and Asotin Basins are fairly isolated from other bull trout populations. Bull trout persistence in these basins is important for maintaining connectivity between populations in the upper Snake River basin and the Columbia River.

While some habitat within the core area is highly suitable for bull trout, other habitat is less suitable and may prove marginal given habitat degradation and impending climate change. The Tucannon River and Asotin Creek are separated from one another by 132 km (82 mi) of the Snake River and two dams, so connectivity between the populations in these basins is somewhat limited. However, habitat connectivity is better between Asotin Creek and the Grande Ronde River, and there is only one Snake River dam between the Tucannon and Columbia Rivers. Losing either of these populations would greatly reduce the potential for connectivity between populations in the middle/upper Snake River and the Columbia River. Also, there are no major dams on either of these streams, increasing the potential to recover fluvial populations that connect to the Snake River. Bull trout have been extirpated from a large portion of their previous habitat in the lower Snake River basin. The Tucannon and Asotin populations are important to maintaining bull trout in the lower Snake River and bolstering population connectivity between the Snake and Columbia Rivers. Within these basins, all suitable habitat is essential to population persistence given the limited amount of habitat, particularly in the Asotin Creek Basin. See Appendices 1 and 2 for more detailed information.

a. Tucannon River Critical Habitat Subunit

The Tucannon River CHSU is essential to the conservation of bull trout because both fluvial and resident bull trout life-history forms occur in the CHSU, and along with Asotin Creek, this CHSU is the only suitable bull trout refugium with adequate spawning and rearing and FMO habitat in the lower Snake River basin. The Tucannon Basin is fairly isolated from other bull trout populations. Bull trout persistence in this CHSU is important for maintaining connectivity between populations in the upper Snake River basin and the Columbia River (see Appendices 1 and 2 for more detailed information).

b. Asotin Creek Critical Habitat Subunit

The Asotin Creek CHSU is essential to the conservation of bull trout because both fluvial and resident bull trout life history forms occur in the CHSU, and along with Tucannon River, this CHSU is the only suitable bull trout refugium with adequate spawning and rearing and FMO habitat in the lower Snake River basin. Asotin Creek is fairly isolated from other bull trout populations. Bull trout persistence in this CHSU is important for maintaining connectivity between populations in the upper Snake River basin and the Columbia River (see Appendices 1 and 2 for more detailed information).

16. Grande Ronde River Critical Habitat Unit

The Grande Ronde River CHU is essential to the conservation of bull trout because it supports strong bull trout populations and provides high-quality habitat to potentially expand bull trout distribution and is considered to be essential for bull trout recovery in the Mid-Columbia RU. The eleven populations in this CHU are spread over a large geographical area with multiple age classes, containing both resident and fluvial fish. This bull trout stronghold also has a prey base; connectivity with the Snake River; general distribution of bull trout throughout the habitat; and varying habitat conditions. But in several of the populations, including the Wenaha River, Lostine River, Lookingglass Creek, and Little Minam River populations, excellent habitat conditions exist; many streams and rivers are designated as Wild and Scenic Rivers and/or located within or near Wilderness areas.

Two wilderness areas are designated within the Grande Ronde River basin. The Eagle Cap Wilderness is located in the Wallowa-Whitman National Forest, encompasses 146,272 hectares (ha) (361,446 acres (ac)), and includes most of the Minam, upper Wallowa and Lostine river drainages as well as Bear Creek and Hurricane Creek and a small portion of Catherine Creek. Federal Wild and Scenic River status is designated for the Lostine and Minam Rivers and Oregon State Scenic Waterway status is designated to the Minam and Wallowa Rivers. The Grande Ronde River with its headwaters in the Wallowa-Whitman National Forest is designated as a Federal Wild and Scenic River and a State Scenic Waterway, from the confluence with the Wallowa River to the Washington border. The Wenaha-Tucannon Wilderness is located in the Umatilla National Forest, encompasses 71,817 ha (177,465 ac), and includes most of the Wenaha River drainage. The Wenaha River is designated as a Federal Wild and Scenic River. The Little Minam core area is located entirely within the Eagle Cap Wilderness. See Appendices 1 and 2 for more detailed information.

17. Imnaha River Critical Habitat Unit

The Imnaha River CHU is essential to the conservation of bull trout because it supports strong bull trout populations that are considered to be essential for bull trout recovery in the Mid-Columbia RU. It contains four generally healthy populations spread over a large geographical area with multiple age classes, containing both resident and fluvial fish. This bull trout stronghold also has a prey base; connectivity with the Snake River; wide distribution throughout the habitat; and overall, excellent habitat conditions. Primary spawning activity on the Imnaha River have been documented to occur in the headwaters, which lie within wilderness, and contain higher elevation, coldwater habitat that should help ameliorate future climate change effects on bull trout in the Columbia River basin. See Appendices 1 and 2 for more detailed information.

18. Sheep and Granite Creeks Critical Habitat Unit

The Sheep and Granite Creeks CHU is essential for maintaining bull trout distribution within this unique geographic region of the Mid-Columbia RU. This CHU occurs immediately below Hells Canyon Dam. Two drainages occur within this CHU: Sheep and Granite Creeks, both within Idaho. This CHU is essential due to its location in the southeastern extent of the Middle Columbia RU and the presence of both fluvial and resident life history forms. Migratory life history expression is needed for the long-term conservation of the species, but some resident populations may also contain unique genes that promote resistance to specific threats. See Appendices 1 and 2 for more detailed information.

19. Hells Canyon Complex Critical Habitat Unit

The Hells Canyon Complex CHU is essential for maintaining bull trout distribution within this unique geographic region of the Mid-Columbia RU. This CHU occurs above Hells Canyon Dam and below Brownlee Reservoir. There are three drainages that occur within this CHU: Pine Creek in Oregon and Indian Creek and Wildhorse River in Idaho. This CHU contains both fluvial and resident populations of bull trout that have access to the Snake River, which assists in promoting the migratory life history expression within the Upper Snake RU. Migratory life history expression is needed for the long-term conservation of the species. This

CHU also represents the southeasternmost extent of the Middle Columbia RU. See Appendices 1 and 2 for more detailed information.

a. Indian Creek Critical Habitat Subunit

The Indian Creek CHSU is essential to the conservation of bull trout because it represents one of the most southwestern areas of the Mid-Columbia RU and has fluvial life history forms that are important for the long-term recovery of the species (see Appendices 1 and 2 for more detailed information).

b. Pine Creek Critical Habitat Subunit

The Pine Creek CHSU is essential to the conservation of bull trout because it has many individuals and a large amount of habitat. This CHSU also occurs in the easternmost extent of the RU. This CHSU has fluvial life history forms that are important for the long-term recovery of the species (see Appendices 1 and 2 for more detailed information).

c. Wildhorse River Critical Habitat Subunit

The Wildhorse River CHSU is essential to the conservation of bull trout because it represents one of the most southwestern areas of the Mid-Columbia RU and has fluvial life history forms that are important for the long-term recovery of the species (see Appendices 1 and 2 for more detailed information).

20. Powder River Critical Habitat Unit

The Powder River CHU is essential to the conservation of bull trout because isolated populations represent a genetically distinct population in this part of the Hells Canyon reach of the Snake River. All remaining populations are located in headwater streams that drain the Elkhorn Mountain Range and persist in areas where the habitat is still suitable. Additional, currently unoccupied FMO habitat may be necessary to achieve recovery here. The entire CHU is essential because it provides redundancy across the Powder River basin and to the CHU. The presence of multiple local populations distributed throughout a watershed provides a mechanism for spreading risk. See Appendices 1 and 2 for more detailed information.

21. Clearwater River Critical Habitat Unit

The Clearwater River CHU is essential for maintaining bull trout distribution within this unique geographic region of the Mid-Columbia RU. This CHU extends from the Snake River confluence at Lewiston, Idaho, on the west to headwaters in the Bitterroot Mountains along the Idaho and Montana border. The Clearwater River CHU represents the easternmost extent of the Mid Columbia RU. This CHU is among the largest CHU in the Mid Columbia RU and contains several large and stable core area populations of bull trout. Fluvial and resident bull trout are the predominant life history forms known to occur within this CHU with several adfluvial populations occurring in headwater lakes. This CHU includes five critical habitat subunits: Middle–Lower Fork Clearwater River; South Fork Clearwater River; Selway River; Lochsa River (and Fish Lake); and the North Fork Clearwater River (and Fish Lake). See Appendices 1 and 2 for more detailed information.

a. Middle–Lower Fork Clearwater River Critical Habitat Subunit

The Middle–Lower Fork Clearwater River CHSU is essential to bull trout conservation because the Clearwater River and Middle Fork Clearwater River primarily serve as migratory corridors, connecting bull trout local populations within the Clearwater River CHU as well as maintaining connectivity to other Mid-Columbia River bull trout populations. These mainstem river reaches also provide important foraging and overwintering areas for subadult and adult bull trout that originate in upstream CHSUs (see Appendices 1 and 2 for more detailed information).

b. South Fork Clearwater River Critical Habitat Subunit

The South Fork Clearwater River CHSU is essential to bull trout conservation because both migratory and resident life histories are known to occur within the CHSU. Although the overall core area population level is considered to be moderate, bull trout are distributed among most of the major watersheds within the CHSU. Located downstream of the Lochsa River CHSU and Selway River CHSU and upstream of the North Fork Clearwater CHSU, the South Fork Clearwater River CHSU provides additional habitat for foraging and thermal refuge for bull trout that disperse from these other CHSUs. Furthermore, for bull trout originating in the North Fork Clearwater CHSU that are entrained past Dworshak Dam, the South Fork Clearwater River CHSU is the first major drainage below the dam supporting known local populations and suitable habitat that the entrained fish can utilize to fulfill their life cycle as they are unable to return to their natal streams (see Appendices 1 and 2 for more detailed information).

c. Selway River Critical Habitat Subunit

The Selway River CHSU is essential to bull trout conservation because the Selway River core area has many individuals and local populations that are distributed throughout much of the CHSU. The Selway River CHSU is almost entirely within Wilderness areas and has much habitat with few threats. Bull trout within the Selway River CHSU are one of the more secure and stable bull trout core area populations within the Clearwater River CHU and provide a very important stronghold against potential extinction (see Appendices 1 and 2 for more detailed information).

d. Lochsa River Critical Habitat Subunit (and Fish Lake)

The Lochsa River CHSU is essential to bull trout conservation because it has moderately few individuals and relatively many local populations or population complexes distributed throughout much of the upper portion of the CHSU. In addition to fluvial life history forms, which are important in the long-term recovery of the species, the Lochsa River CHSU also contains one of only two headwater lake adfluvial bull trout populations (Fish Lake) in the entire Clearwater River CHU. The relatively large amount of occupied habitat and few threats are considered important factors in preventing potential extinction (see Appendices 1 and 2 for more detailed information).

e. North Fork Clearwater River (and Fish Lake) Critical Habitat Subunit

The North Fork Clearwater River CHSU is essential to bull trout conservation because the North Fork Clearwater River core area has a relatively large number of local populations that support large numbers of bull trout. The CHSU is also relatively secure with few threats. This CHSU also includes the Fish Lake core area, which contains one of only two headwater lake adfluvial bull trout populations in the entire Clearwater River CHU. Bull trout within the North

Fork Clearwater River CHSU are one of the more secure and stable bull trout core area populations within the Clearwater CHU, which provides a very important stronghold against potential extinction (see Appendices 1 and 2 for more detailed information).

22. Mainstem Upper Columbia River Critical Habitat Unit

The Mainstem Upper Columbia River CHU is essential for maintaining bull trout distribution within this unique geographic region of the Mid-Columbia RU and conserving the fluvial migratory life history types exhibited by many of the populations from adjacent core areas. It is essential for conservation by maintaining broad distribution within the Mid-Columbia RU across Washington, Idaho, and Oregon. Its location between Chief Joseph Dam in the most northern geographical area and John Day Dam in the most southern area provides key connectivity for the Mid-Columbia River RU. It is essential for maintaining distribution and genetic contributions to the Lower Columbia and Snake River Mainstems and 13 CHUs. Bull trout are known to reside year-round as sub-adults and adults, but spawning adults may utilize the mainstem Columbia River for up to at least 9 months as well. Several studies in the upper Columbia and lower Snake Rivers indicate migration between the Mainstem Upper Columbia River CHU and core areas, generally during periods of cooler water temperatures. FMO habitat provided by the mainstem Columbia River is essential for conservation because it supports the expression of the fluvial migratory life history forms for multiple core areas. In addition, there are several accounts of amphidromous life history forms present between Yakima and John Day Rivers that may still have the potential to express anadromy. See Appendices 1 and 2 for more detailed information.

23. Mainstem Snake River Critical Habitat Unit

The Mainstem Snake River CHU is maintaining bull trout distribution within this unique geographic region of the Mid-Columbia RU. The Snake River, from the mouth at the Columbia River to the upper end of Brownlee Reservoir, is occupied in several reaches and is essential to the long-term conservation of the species because it helps conserve the opportunity for migratory life history expression, facilitates genetic exchange, and ensures connectivity between populations and core areas. The mainstem Snake River plays an important role in the recovery of bull trout populations by providing essential FMO habitat necessary for populations found in the Tucannon River, Asotin Creek, Grande Ronde River, Imnaha River, Clearwater River, Salmon River, Sheep Creek, Granite Creek, Powder River, Pine Creek, Indian Creek, and Wildhorse Creek core areas. Brownlee Reservoir contains potential FMO habitat for fluvial bull trout in the Powder River and Eagle Creek.

The entire reach, from the mouth to the upper end of Brownlee Reservoir, is considered essential and included in designated critical habitat because: (1) it is presently or could potentially be used as FMO habitat by bull trout from tributaries; (2) quality habitat containing several primary constituent elements exists during the FMO period for bull trout; and (3) including this area in critical habitat reflects two recovery objectives: maintaining stable or increasing trends in abundance (indirectly by providing for the needs of migratory forms) and restoring and maintaining suitable habitat conditions for all bull trout life history stages. See Appendices 1 and 2 for more detailed information.

D. Upper Snake Recovery Unit

24. Malheur River Basin Critical Habitat Unit

The Malheur River Basin CHU is essential to the conservation of bull trout because the two local bull trout populations are genetically distinct, exhibit important resident and fluvial life histories, and represents the westernmost occurrence of bull trout in the Upper Snake River RU. This CHU does or can contain multiple populations, providing a mechanism for spreading risk from stochastic events and ensuring population redundancy. The Malheur River core area is disconnected from other core areas in the Upper Snake River RU. See Appendices 1 and 2 for more detailed information.

25. Jarbidge River Critical Habitat Unit

The Jarbidge River CHU is essential to bull trout conservation. Jarbidge River bull trout are a high conservation priority for maintaining the maximum genetic diversity and evolutionary potential of the species across its range. The ecological setting of this CHU is unique. It is the southernmost extent of the species' range. The loss of bull trout in this CHU would result in a substantial modification of the species' range. Bull trout in the Jarbidge area are isolated from the rest of the species' range due to a combination of physical barriers that have been in place for over a century and habitat that has been unsuitable for much of this same period of isolation. Although recognized as being within the Snake River complex, recent genetic analyses conducted by the Service's Abernathy Fish Technology Center indicate that genetic characteristics of bull trout in the Jarbidge area do differ from other populations. Local genetic adaptations of this southernmost bull trout population may be a very desirable trait in the face of global climate change. See Appendices 1 and 2 for more detailed information.

26. Southwest Idaho River Basins Critical Habitat Unit

The Southwest Idaho River Basins CHU is essential maintaining bull trout distribution within this unique geographic region of the Upper Snake RU. This CHU occurs in southwestern Idaho and consists of three River Basins: the Boise River, Payette River, and Weiser River. This CHU contains adfluvial, fluvial, and resident populations of bull trout. Large adfluvial and fluvial populations of bull trout occur within the Boise and Payette River systems, but small isolated populations may contain genes that protect the species from specific threats. Migratory life history expression is needed for the long-term conservation of the species, but some resident populations may also contain unique genes that protect the populations from specific threats. The populations that exhibit adfluvial life history expressions may be the largest in the Upper Snake River RU. The migratory life history expression is needed for the long-term conservation of the species. See Appendices 1 and 2 for more detailed information.

a. Weiser River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because of the potential possibility that the resident populations have unique genetic diversity and distribution and may contribute to the long-term persistence of the species (see Appendices 1 and 2 for more detailed information).

b. Squaw Creek Critical Habitat Subunit

This CHSU is essential to bull trout conservation because of the potential possibility that the resident populations have unique genetic diversity and distribution and may contribute to the long-term persistence of the species (see Appendices 1 and 2 for more detailed information).

c. North Fork Payette River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because of the potential possibility that the resident populations have unique genetic diversity and distribution and may contribute to the long-term persistence of the species (see Appendices 1 and 2 for more detailed information).

d. Middle Fork Payette River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because of the potential possibility that the resident populations have unique genetic diversity and distribution and may contribute to the long-term persistence of the species. This CHSU contains populations that exhibit fluvial life history expressions that are important to the long-term recovery of the species (see Appendices 1 and 2 for more detailed information).

e. Upper South Fork Payette River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because of populations exhibiting fluvial life history expression and the high number of individuals. This CHSU is essential due to the potential possibility that the resident populations have unique genetic diversity and distribution and may contribute to the long-term persistence of the species (see Appendices 1 and 2 for more detailed information).

f. Deadwood River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it provides a rare adfluvial life history expression in the Upper Snake RU. It contains a moderate number of adults. Migratory life history expression is important to the long-term recovery of the species (see Appendices 1 and 2 for more detailed information).

g. Arrowrock Critical Habitat Subunit

This CHSU is essential to bull trout conservation because of the populations exhibiting rare adfluvial life history expressions, moderate number of local populations, large numbers of individuals, moderate amount of habitat, and few threats. Migratory life history expression is important to the long-term recovery of the species (see Appendices 1 and 2 for more detailed information).

h. Anderson Ranch Critical Habitat Subunit

This CHSU is essential to bull trout conservation because of the presence of populations exhibiting rare adfluvial life history expressions, moderate number of local populations, moderate number of individuals, moderate amount of habitat, and few threats. Migratory life history expression is important to the long-term recovery of the species (see Appendices 1 and 2 for more detailed information).

27. Salmon River Basin Critical Habitat Unit

The Salmon River Basin CHU is essential for maintaining bull trout distribution within this unique geographic region of the Upper Snake RU. This CHU extends from the Idaho–Montana border to the Oregon–Idaho border before entering the Snake River and represents the most northern and eastern extents of the Upper Snake RU. This CHU is the largest CHU of the Upper Snake RU and contains the largest populations of bull trout in this RU. It supports populations that express adfluvial, fluvial, and resident life history expression. Migratory life history expression is needed for the long-term conservation of the species; while some resident populations may also contain unique genes that promote persistence from specific threats. Large portions of this CHU occur within the Frank Church—River of No Return Wilderness, which implies that many CHSUs in the Salmon River basin have few threats compared to other areas in the Upper Snake RU. This CHU contains 10 critical habitat subunits: Lake Creek, Lemhi River, Little-Lower Salmon River, Middle Fork Salmon River, Middle Salmon River–Chamberlain River, Middle Salmon River–Panther River, Opal Lake, Pahsimeroi River, South Fork Salmon River, and Upper Salmon River. See Appendices 1 and 2 for more detailed information.

a. Little-Lower Salmon Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it is in the northwesternmost extent of the CHU and contains many individuals, a large amount of habitat, and few threats. This CHSU has fluvial life history forms that are important to the long-term recovery of the species. This CHSU provides access to the Snake River, which promotes the migratory life history form that is needed for the conservation of the species (see Appendices 1 and 2 for more detailed information).

b. South Fork Salmon River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it contains many individuals, a moderate amount of habitat, and few threats. This CHSU contains populations that contain fluvial life history expressions which are important to the long-term recovery of the species (see Appendices 1 and 2 for more detailed information).

c. Middle Salmon River–Chamberlain River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it contains many individuals, a large amount of habitat, and few threats. This CHSU has fluvial life history forms that are important in the long-term recovery of the species. This CHSU provides a migratory corridor between multiple CHSUs, which assists in the promotion of the migratory life history expression within the Salmon River basin (see Appendices 1 and 2 for more detailed information).

d. Middle Fork Salmon River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it contains the largest number of local populations, a high number of individuals, a large amount of habitat, and few threats. This CHSU also has fluvial life history forms that are important to the long-term recovery of the species (see Appendices 1 and 2 for more detailed information).

e. Middle Salmon–Panther River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it contains many individuals, a large amount of habitat, and moderate threat level. This CHSU has fluvial life history forms that are important in the long-term recovery of the species. This CHSU provides a migratory corridor

between multiple CHSUs, which promotes the expression of the migratory life history expression within the Salmon River basin (see Appendices 1 and 2 for more detailed information).

f. Lake Creek Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it provides a rare adfluvial life history form in the Upper Snake RU. This CHSU occurs within Lake Creek, which is isolated from other CHSUs and CHUs. This CHSU contains a moderate number of individuals that are exposed to a moderate threat level (see Appendices 1 and 2 for more detailed information).

g. Opal Lake Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it provides a rare adfluvial life history expression in the Upper Snake RU. This CHSU occurs within Opal Lake, which is isolated from other bull trout populations, and contains a moderate number of individuals that are exposed to a moderate threat level (see Appendices 1 and 2 for more detailed information).

h. Lemhi River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it has many individuals, a large amount of habitat, and few threats. This CHSU also occurs in the easternmost extent of the RU. This CHSU has fluvial life history forms that are important to the long-term recovery of the species (see Appendices 1 and 2 for more detailed information).

i. Pahsimeroi River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it has many individuals, a moderate amount of habitat, and a moderate threat level. This CHSU occurs in the easternmost extent of the CHU that is still hydrologically connected to other CHSUs. The resident populations in this CHSU may also contain unique genes that promote persistence from specific threats (see Appendices 1 and 2 for more detailed information).

j. Upper Salmon River Critical Habitat Subunit

This CHSU is essential to bull trout conservation because it provides a rare adfluvial life history expression in the Upper Snake RU. It contains many individuals, a large amount of habitat, and few threats. This CHSU contains populations that contain fluvial life history expressions that are important in the long-term recovery of the species (see Appendices 1 and 2 for more detailed information).

28. Little Lost River Critical Habitat Unit

The Little Lost River CHU is essential for maintaining bull trout distribution within this unique geographic region of the Upper Snake River RU. This CHU occurs in southeastern Idaho within a hydrologically closed system, resulting in isolated populations. This CHU occurs in a unique ecological setting and contains many individuals that are subjected to few threats. Due to the unique geologic history of this area, resident populations may also contain unique genes that further promote persistence. This CHU is in the southeasternmost portion of the Upper Snake RU. See Appendices 1 and 2 for more detailed information.

E. Columbia Headwaters Recovery Unit

29. Coeur d'Alene River Basin Critical Habitat Unit

The Coeur d'Alene River Basin CHU is essential maintaining bull trout distribution within this unique geographic region of the Columbia Headwaters RU because it represents the most downstream extent of bull trout in the Columbia Headwaters RU. Bull trout local populations that were known to be historically present have not been recently documented in large portions of the Coeur d'Alene Lake basin. Reestablishing local populations that are broadly distributed throughout the CHU has been identified as necessary for bull trout recovery. The bull trout population that occurs in this CHU (currently primarily located in the headwaters of the upper Saint Joe River system, which is a major tributary to Coeur d'Alene Lake) has been isolated from other bull trout populations for at least 10,000 years by natural falls on the Spokane River (the outflow of Coeur d'Alene Lake). Losing this population would represent a loss of unique genetic and adaptive characteristics and result in a significant gap in range of bull trout with no opportunity for natural recolonization. See Appendices 1 and 2 for more detailed information.

30. Kootenai River Basin Critical Habitat Unit

The Kootenai River Basin CHU is essential for maintaining bull trout distribution within this unique geographic region of the Columbia Headwaters RU. This CHU is a uniquely configured transboundary watershed, flowing in a horseshoe pattern that both originates (eastern or upstream arm) and ends (at Kootenay Lake) in British Columbia. This CHU is essential to bull trout recovery because it contains the strongest adfluvial core area population across the range of the species (10,000+ adults in Lake Koocanusa) and also supports the single largest spawning run of adult bull trout (3,000–5,000 adults annually) in the Wigwam River, British Columbia. These high population levels produce a harvestable surplus, allowing closely regulated angler utilization in Lake Koocanusa and provide numerous opportunities for research and evaluation of a high-density (i.e., recovered) bull trout population. The core area populations (Lake Koocanusa, Kootenai River, Bull Lake) represent working models for creating and sustaining bull trout recovery opportunities in other heavily managed watersheds. See Appendices 1 and 2 for more detailed information.

a. Kootenai River Critical Habitat Subunit

The Kootenai River CHSU, including the Kootenai River core area, is essential to bull trout conservation because it conserves a relatively rare “big river fluvial” life history form in the Columbia Headwaters RU, portions of which extend into British Columbia, Canada. The Bull Lake core area, also an important element of this CHSU, hosts an adfluvial population that exhibits downstream spawning migration, also relatively unique. Bull trout in the Kootenai River core area have exhibited adaptive traits in surviving major changes to the river ecosystem caused by Libby Dam, and the CHSU produces some of the largest fluvial specimens (to 20+ pounds) seen anywhere in the range of the species. Nonnative species, especially hybridization and competition with brook trout, represent an ongoing threat that is still being evaluated and may become increasingly problematic in this CHSU (see Appendices 1 and 2 for more detailed information).

b. Lake Koocanusa Critical Habitat Subunit

The Lake Koocanusa CHSU is essential to bull trout conservation because it is amongst the most secure and stable bull trout refugium across the range of the species and may provide a very important stronghold against potential extinction. The adfluvial population that is the sole life history form present in the CHSU originated from fluvial stocks in the Kootenai River trapped upstream of Libby Dam, which successfully adapted to the newly expanded habitat and have provided a strong and resilient core area population. There are low numbers of nonnative fish in this CHSU and most of the spawning and rearing habitat is in British Columbia. The most important spawning stream, the Wigwam River, supports 1,500–2,500 bull trout redds annually. The strong bull trout population has provided an opportunity to allow anglers to utilize the bull trout resource, harvesting a closely regulated number of fish despite ESA listing. Conservation of this bull trout CHSU in the United States provides our Canadian counterparts with strong incentive for continued cooperation in broader bull trout recovery efforts (see Appendices 1 and 2 for more detailed information).

31. Clark Fork River Basin Critical Habitat Unit

The Clark Fork River Basin CHU is essential maintaining bull trout distribution within this unique geographic region of the Columbia Headwaters RU in large part because it represents the evolutionary heart of the migratory adfluvial bull trout life history form. Flathead Lake and Lake Pend Oreille are the two largest lakes in the range of the species, and bull trout from those core areas historically grew to be large and migrated upstream up to 322 km (200 mi) to spawning and rearing habitats. These habitats were partially fragmented by hydroelectric dams and other manmade barriers but are increasingly being reconnected with dam removal (Milltown Dam) and improved fish passage (Cabinet Gorge, Noxon Rapids, Thompson Falls). The resident life history form of bull trout is minimally present in this CHU and fluvial bull trout play a reduced role relative to adfluvials. The two major lakes (Flathead and Pend Oreille), as well as over 20 additional core areas established in smaller headwater lakes that are isolated from Flathead and Pend Oreille to varying degrees, are the primary refugia for the naturally occurring adfluvial form of bull trout across their range. Groundwater-fed coldwater spawning and rearing habitat is critical to supporting bull trout in this CHU. Extensive portions of the headwater habitat are within protected areas (Glacier National Park and Bob Marshall and Great Bear Wilderness) and portions of the spawning and rearing habitat extend northward into British Columbia. Bull trout remain relatively abundant in portions of this CHU but are depressed in other areas. See Appendices 1 and 2 for more detailed information.

a. Priest Lakes Critical Habitat Subunit

The Priest Lakes CHSU is essential to bull trout conservation because it is the only major watershed occupied by bull trout in the most downstream portion (Pend Oreille River) of the Clark Fork River Basin CHU. Its high elevation with relatively secure and un-entered spawning and rearing habitat in headwater reaches of the Upper Priest River may prove resilient during ongoing climate change. While artificially isolated from other bull trout populations, losing this CHSU would create a gap in the range of the species with no opportunity for natural recolonization at this time (see Appendices 1 and 2 for more detailed information).

b. Lake Pend Orielle Critical Habitat Subunit

The Lake Pend Orielle CHSU is essential to bull trout conservation because it is among the more secure and stable bull trout refugia across the range of the species and may provide a very important stronghold against potential extinction. Adfluvial bull trout comprise the predominant life history form present in the CHSU, and the CHSU has averaged over 800 bull trout redds annually over the last 10 years with a high of greater than 1,250 redds in recent years. Lake Pend Oreille not only provides important FMMO habitat to bull trout local populations in Lake Pend Oreille tributaries and Pend Oreille River tributaries but to bull trout populations in the Lower Clark Fork River CHSU. Bull trout local populations have not been recently documented in Pend Oreille River tributaries that were known to be historically present. Reestablishing local populations that are broadly distributed throughout the CHSU has been identified as necessary for bull trout recovery (see Appendices 1 and 2 for more detailed information).

c. Lower Clark Fork River Critical Habitat Subunit

The Lower Clark Fork River CHSU is essential to bull trout conservation because it provides an important portion of the spawning and rearing habitat for Lake Pend Oreille, as well as an essential migratory corridor for bull trout from Lake Pend Oreille to be able to access productive watersheds upstream of this CHSU. Historic fragmentation of the CHSU due to three privately owned mainstem hydroelectric dams (Cabinet Gorge, Noxon Rapids, and Thompson Falls) seriously compromised access and productivity of this habitat for bull trout for nearly a century. However, ongoing and planned near-term fish passage efforts (both fishways and trap and transport programs) have improved the longer-term prognosis for bull trout connectivity, and this CHSU is expected to provide a critical linkage to recovering bull trout in the entire Clark Fork River CHU in the future. Continuing efforts to suppress nonnative fish will remain an important component of the recovery efforts, which are largely well funded by a long term FERC license agreement with Avista Corp (see Appendices 1 and 2 for more detailed information).

d. Middle Clark Fork River Critical Habitat Subunit

The Middle Clark Fork River CHSU is essential to bull trout conservation, primarily as a migratory linkage between the Lower Clark Fork River CHSU and Upper Clark Fork River CHSU. With the removal of Milltown Dam and fish passage at other downstream facilities, such linkage is increasingly important. The migratory corridor that provides for bull trout from Lake Pend Oreille and the Lower Clark Fork River CHSU to access the Blackfoot River, Rock Creek, and potentially Bitterroot River CHSU and Upper Clark Fork River CHSU is critically important. In addition, a number of important spawning and rearing tributaries (e.g., St. Regis River, Fish Creek, and Rattlesnake Creek) enter the Clark Fork in this CHSU. Long-term protection of water quality and quantity, especially satisfactory thermal conditions, are amongst the critical elements of a recovery strategy in the mainstem Clark Fork River corridor. Protecting water quality is especially relevant given the demonstrated effects of climate change related increases in water temperatures, which are approaching summer thermal maxima largely unsuitable for bull trout in this CHSU (see Appendices 1 and 2 for more detailed information).

e. Upper Clark Fork River Critical Habitat Subunit

The Upper Clark Fork River CHSU is essential to bull trout conservation because it is the uppermost extension of the migratory habitat for bull trout originating in Lake Pend Oreille or

downstream portions of the Clark Fork River. Bull trout population levels are depressed and the habitat is fragmented due mostly to impacts from past land and water use activities. As a result, recovery potential may be limited, but some strongholds remain (e.g., Flint Creek and Warm Springs Creek headwaters) and it's important to secure these strongholds to sustain the genetic attributes those populations may represent. Long-term protection of water quality and quantity, especially satisfactory thermal conditions, are amongst the most important elements of the recovery strategy in the upper Clark Fork River corridor. Recovery is especially relevant given the marginal summer thermal maxima largely unsuitable for bull trout that are frequently recorded in this CHSU (see Appendices 1 and 2 for more detailed information).

f. Bitterroot River Critical Habitat Subunit

The Bitterroot River CHSU is essential to bull trout conservation because it is one of several occupied major watersheds that form the headwaters of the Clark Fork River Basin CHU. Though the migratory form of bull trout is seriously reduced in the Bitterroot River CHSU, an artificially adfluvial population occurs in the Painted Rocks Reservoir core area at the head of the West Fork Bitterroot River and is relatively secure. Improving fish passage conditions in the mainstem Clark Fork River may contribute to a greater future presence of the migratory form of bull trout in the Bitterroot River (see Appendices 1 and 2 for more detailed information).

g. Rock Creek Critical Habitat Subunit

The Rock Creek CHSU is essential to bull trout conservation because it is one of several occupied major watersheds that form the headwaters of the Clark Fork River Basin CHU. Most of the drainage is on National Forest System lands and habitat protection has historically been emphasized. Extensive networks of spawning and rearing habitat have contributed to a relatively strong bull trout population in the watershed. However, concerns exist about declines in bull trout populations and increases in nonnative competitors (e.g., brook trout and brown trout) seen in the past decade. The Rock Creek CHSU remains a strong bull trout refugium in the Clark Fork River headwaters and will become increasingly important as improving fish passage conditions in the mainstem Clark Fork River contribute to greater future presence of the migratory form (see Appendices 1 and 2 for more detailed information).

h. Blackfoot River Critical Habitat Subunit

The Blackfoot River CHSU is essential to bull trout conservation because it is one of several occupied major watersheds that form the headwaters of the Clark Fork River Basin CHU. Several decades of extensive habitat restoration and habitat protection efforts (e.g., Blackfoot Challenge) have led to gradually improving conditions for native fish, especially on private lands. Landownership patterns that include large undeveloped ranches and extensive conservation easements provide long-term habitat security. The Blackfoot River CHSU is the strongest bull trout refugium in the Clark Fork River headwaters and will become increasingly important as improving fish passage conditions in the mainstem Clark Fork River contribute to greater future connectivity for the migratory life history form (see Appendices 1 and 2 for more detailed information).

i. Clearwater River and Lakes Critical Habitat Subunit

The Clearwater River and Lakes CHSU is essential to bull trout conservation and a significant bull trout resource in a somewhat unique habitat, a chain of connected lakes, each with separate bull trout populations that share an interconnected system of spawning and rearing

streams. To date, the lakes have not been compromised by introduction of nonnative lake trout (though northern pike (*Esox lucius*) are problematic), making the CHSU important for the long-term persistence of the naturally occurring adfluvial life history form of bull trout in the Clark Fork River drainage. Improved fish passage over a series of small barrier dams is being implemented and shows promise to increase the security and stability of bull trout populations in this unique stream–lake system (see Appendices 1 and 2 for more detailed information).

j. Flathead Critical Habitat Subunit

The Flathead CHSU is essential to bull trout conservation and includes Flathead Lake (the largest freshwater lake in the western United States), which historically provided FMO habitat for a very large population of adfluvial migratory bull trout that traveled up to 241 km (150 mi) upstream in three major forks (North, Middle, and South) to spawn and rear in over 20 streams, including a portion of the North Fork Flathead River in British Columbia, Canada. Along with Lake Pend Oreille in Idaho, it could be argued that Flathead Lake represents the evolutionary heart of the migratory adfluvial bull trout life history form. Due to the size and scope of this bull trout core area, it is essential to recovery. In addition, about 20 separate headwater lakes are arrayed in 15 core areas with varying degrees of connectivity, and they provide resiliency and redundancy to support the bull trout network in this CHSU. Many of these are in protected and unaltered habitat within Glacier National Park. An extensive network of high-quality spawning and rearing habitat, including many streams with groundwater influence, have historically contributed to a relatively strong bull trout population in the CHSU and may make this CHSU one of the more important bull trout complexes under a variety of changing climate scenarios. However, widespread negative influence of nonnative lake trout introduction and their ongoing expansion has seriously curtailed the existing bull trout productivity in much of this CHSU (see Appendices 1 and 2 for more detailed information).

k. Swan Critical Habitat Subunit

The Swan CHSU is essential to bull trout conservation because this CHSU has historically been robust bull trout resource in Montana and includes three lakes, each with a separate bull trout core population, that share an interconnected system of spawning and rearing streams. An extensive network of high-quality spawning and rearing habitat, with strong groundwater influences, historically contributed to the strong bull trout population in the watershed and may enable this CHSU to remain one of the more resistant systems under changing climate scenarios. In the 1990s, Swan Lake was compromised by nonnative lake trout, which subsequently expanded dramatically and the CHSU is now the site of an important lake trout suppression experiment that has implications for the longer-term persistence of the adfluvial life history form of bull trout in the Flathead drainage. The strong bull trout population has provided a harvestable surplus, allowing angler utilization of the bull trout resource to continue despite ESA listing. The core area populations (Swan Lake, Holland Lake, and Lindbergh Lake) represent working models for creating and sustaining bull trout recovery opportunities in heavily managed timber-producing watersheds (see Appendices 1 and 2 for more detailed information).

l. South Fork Flathead Critical Habitat Subunit

The South Fork Flathead CHSU is essential to bull trout conservation because it is among the most secure and stable bull trout refugium across the range of the species. This CHSU is essential for bull trout recovery as a very important stronghold against potential extinction. The

adfluvial population of bull trout that is the sole life history form present in the CHSU originated from Flathead Lake from adult and juvenile fish trapped upstream of Hungry Horse Dam, which adapted to the new habitat and have provided a strong and resilient core area population. Few nonnative fish occur in this CHSU, and most of the spawning and rearing habitat is in protected and unaltered habitat within the Bob Marshall Wilderness, including two of three core areas. The strong bull trout population and high level of habitat security has provided an opportunity to allow anglers to utilize the bull trout resource, harvesting a closely regulated number of fish, despite ESA listing. An extensive network of high-quality spawning and rearing habitat, including many streams with groundwater influence, makes this CHSU one of the more resistant systems under a variety of changing climate scenarios. See Appendices 1 and 2 for more detailed information.

F. Saint Mary Recovery Unit

32. Saint Mary River Basin Critical Habitat Unit

The Saint Mary River Basin CHU is essential maintaining bull trout distribution within this unique geographic region of the Saint Mary RU because it represents the only bull trout population east of the Continental Divide in the United States. The genetic information to date indicates bull trout in the Saskatchewan River basin (primarily of Alberta, Canada) originated from a cross-divide transfer of fish from the Columbia Basin, probably during the Wisconsin Glaciation, which ended about 10,000 years ago. The headwaters of the South Saskatchewan system include the Crowsnest, Carbondale, Castle, Belly, and Saint Mary Rivers. Of these, only the Saint Mary River system has extensive bull trout habitat in the United States, with much of the spawning and rearing habitat occurring in Montana. FMO habitat occurs primarily downstream in portions of the watershed in southwestern Alberta. Thus, preservation of the southernmost extension of bull trout east of the Continental Divide is dependent on actions in the Saint Mary River Basin CHU. See Appendices 1 and 2 for more detailed information.

BULL TROUT HABITAT OCCUPANCY

Bull trout occupied many habitats at the time of listing that include some or all of the nine PCEs. There is additional habitat not occupied at the time of listing that may be essential for recovery, and is proposed as critical habitat by the Service. Appendix 2 lists over 3,500 specific water bodies organized by RU, CHU, and CHSU and includes the following site-specific information: name; location; occupancy status with citations; and any water body-specific rationale, if available.