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

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Table of Contents

List of Figures

List of Tables

List of Appendices

Abbreviations, Acronyms, and Units of Measure

BLM	Bureau of Land Management
BOR	Bureau of Reclamation
CBBTTAT	Clearwater Basin Bull Trout Recovery Advisory Team
CBI	Clearwater Biostudies, Inc
cfs	cubic feet per second
CHSU	Critical Habitat Subunit
CHU	Critical Habitat Unit
CSKT	Confederated Salish and Kootenai Tribes
DNA	deoxyribonucleic acid
DPS	distinct population segments
ESA	Endangered Species Act
EWEB	Eugene Water and Electric Board
FERC	Federal Energy Regulatory Commission
FLIR	forward looking infrared
FMO	foraging, migration, and overwintering
ha	hectare
IDFG	Idaho Department of Fish and Game
in	inches
km	kilometer
LLID	Longitude Latitude Identification
mi	miles
NMFS	National Marine Fisheries Service
NPS	National Park Service
ODFW	Oregon Department of Fish and Wildlife
ONP	Olympic National Park
PCE	primary constituent elements
RU	Recovery Unit
SACO	*Salvelinus confluentus*
SR	spawning and rearing
USGS	U. S. Geological Survey
WDFW	Washington Department of Fish and Wildlife

Bull Trout Final Critical Habitat Justification: Rationale for Why Habitat is Essential, and Documentation of Occupancy

Introduction

Table of Contents

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 designated 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 78 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 78 CHSUs. Appendix 1 captures rationale for why each of the 118 core areas is or is not essential. Tables 1-97 in the 32 CHU chapters below outline 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 *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 designated 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 review (Service 2008h) 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 (Figure 1):

- Coastal Recovery Unit
- Klamath Recovery Unit
- Mid-Columbia Recovery Unit
- Upper Snake Recovery Unit
- Columbia Headwaters Recovery Unit
- Saint Mary Recovery Unit

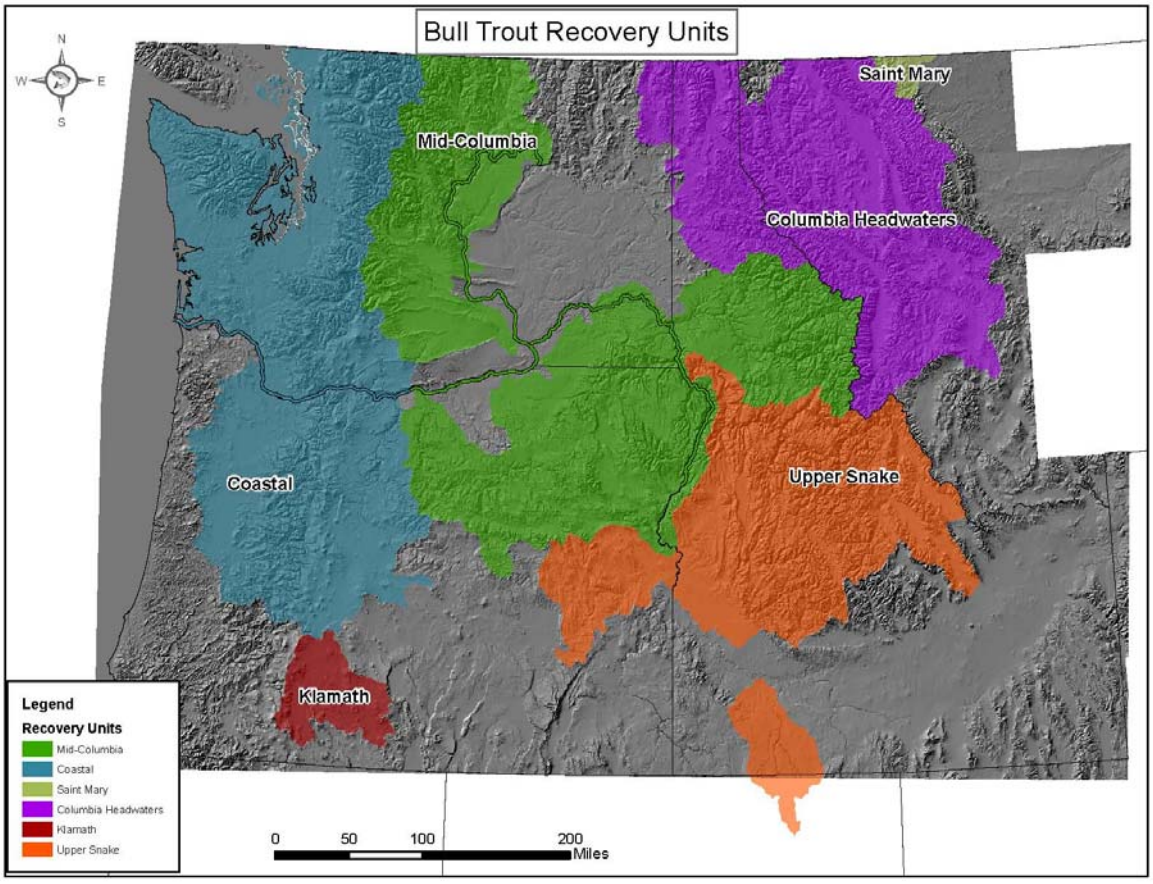

Figure 1. Six draft bull trout recovery units in the Pacific Northwest of the United States

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:

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.

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.

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.

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.

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.

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 (distribution, abundance, trend, and connectivity) derived from the 2002 and 2004 bull trout draft recovery plans (Service 2002a, Service 2004a, Service 2004b) 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 habitats are 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

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 Seventy-eight Subunits Contribute to Conservation

We identified 32 CHUs (Figure 2) and 78 CHSUs within each of the 6 RUs (Figure 1) throughout the range of bull trout based on distribution, connectivity, and proximity among populations.

- Coastal Recovery Unit

1. Olympic Peninsula
   - 1.1. Dungeness River
   - 1.2. Elwha River
   - 1.3. Hoh River
   - 1.4. Queets River
   - 1.5. Quinault River
   - 1.6. Skokomish River
   - 1.7. Hood Canal
   - 1.8. Strait of Juan de Fuca
   - 1.9. Pacific Coast
   - 1.10. Chehalis River/Grays Harbor
2. Puget Sound
   - 2.1. Chilliwack River
   - 2.2. Nooksack River
   - 2.3. Lower Skagit River
   - 2.4. Upper Skagit River
   - 2.5. Stillaguamish River
   - 2.6. Samish River
   - 2.7. Snohomish–Skykomish River
   - 2.8. Lake Washington
   - 2.9. Lower Green River
   - 2.10. Lower Nisqually River
   - 2.11. Chester Morse Lake
   - 2.12. Puyallup River
   - 2.13. Puget Sound Marine
3. Lower Columbia River Basins
   - 3.1. Lewis River

3.2. Klickitat River
3.3. White Salmon River
4. Upper Willamette River
5. Hood River
6. Lower Deschutes River
7. Odell Lake
8. Mainstem Lower Columbia River

- Klamath Recovery Unit

9. Klamath River Basin
9.1. Upper Klamath Lake
9.2. Sycan River
9.3. Upper Sprague River

- Mid-Columbia Recovery Unit

10. Upper Columbia River Basins
10.1. Methow River
10.2. Chelan River
10.3. Entiat River
10.4. Wenatchee River
11. Yakima River
12. John Day River
12.1. Lower Mainstem John Day River
12.2. North Fork John Day River
12.3. Middle Fork John Day River
12.4. Upper Mainstem John Day River
13. Umatilla River
14. Walla Walla River Basin
14.1. Walla Walla River
14.2. Touchet River
15. Lower Snake River Basins
15.1. Tucannan River
15.2. Asotin Creek
16. Grande Ronde River
17. Imnaha River
18. Sheep and Granite Creeks
19. Hells Canyon Complex
19.1. Indian Creek
19.2. Pine Creek
19.3. Wildhorse River
20. Powder River Basin
21. Clearwater River
21.1. Middle–Lower Fork Clearwater River
21.2. South Fork Clearwater River
21.3. Selway River
21.4. Lochsa River (and Fish Lake)
21.5. North Fork Clearwater River (and Fish Lake)

22. Mainstem Upper Columbia River
23. Mainstem Snake River

- Upper Snake Recovery Unit

24. Malheur River Basin
25. Jarbidge River Basin
26. Southwest Idaho River Basins
    - 26.1. Weiser River
    - 26.2. Squaw Creek
    - 26.3. North Fork Payette River
    - 26.4. Middle Fork Payette River
    - 26.5. Upper South Fork Payette River
    - 26.6. Deadwood River
    - 26.7. Arrowrock Reservoir
    - 26.8. Anderson Ranch Reservoir
27. Salmon River Basin
    - 27.1. Little-Lower Salmon
    - 27.2. South Fork Salmon River
    - 27.3. Middle Salmon River–Chamberlain River
    - 27.4. Middle Fork Salmon River
    - 27.5. Middle Salmon–Panther River
    - 27.6. Lake Creek
    - 27.7. Opal Lake
    - 27.8. Lemhi River
    - 27.9. Pahsimeroi River
    - 27.10. Upper Salmon River
28. Little Lost River

- Columbia Headwaters Recovery Unit

29. Coeur d'Alene River Basin
30. Kootenai River Basin
    - 30.1. Kootenai River
    - 30.2. Lake Koocanusa
31. Clark Fork River Basin
    - 31.1. Priest Lakes
    - 31.2. Lake Pend Oreille
    - 31.3. Lower Clark Fork River
    - 31.4. Middle Clark Fork River
    - 31.5. Upper Clark Fork River
    - 31.6. Bitterroot River
    - 31.7. Rock Creek
    - 31.8. Blackfoot River
    - 31.9. Clearwater River and Lakes
    - 31.10. Flathead Lake, Flathead River and Headwater Lakes
    - 31.11. Swan River
    - 31.12. South Fork Flathead River and Hungry Horse Reservoir

- Saint Mary Recovery Unit

  32. Saint Mary River Basin

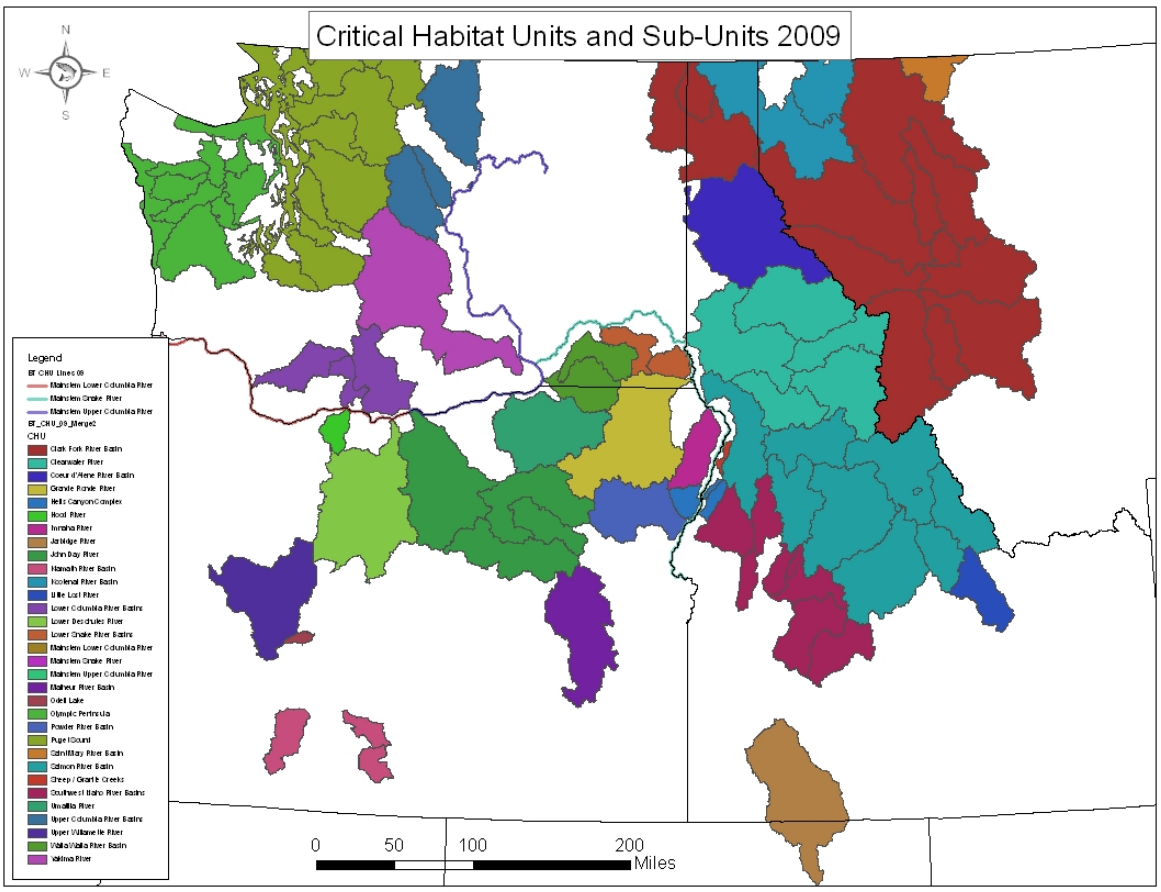

Figure 2. Thirty-two bull trout Critical Habitat Units.

Bull Trout Habitat Occupancy

We determined individually that each of the 32 CHUs and 78 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. 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 designated as critical habitat by the Service. Tables 1-97 list 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.

Evaluation Tables

The following definitions can be important for understanding the tables included:

Occupied

Presence of bull trout documented within approximately the last four bull trout generations (roughly 20 years), or within approximately the last eight generations (roughly 40 years) if information suggests they could still be present but no significant survey effort has been made to detect them within approximately the past 20 years, throughout similarly suitable and connected habitat contiguous with the point of documentation.

Unoccupied

Areas where bull trout occurred but their presence has not been documented within approximately the last 20 years where significant survey effort has been expended throughout portions of suitable habitat that would detect bull trout if present.

Presumed

Bull trout may be present based on historical, anecdotal, or evidential information including factors such as likely suitable habitat adjacent to occupied habitat.

Rule set for “presumed”:

1. Waterbody does not meet the definition of "occupied"; and
2. Waterbody is connected to a waterbody that meets the definition of "occupied"; and
3. Waterbody likely is accessible to bull trout with habitat conditions comparable to the "connected-occupied" waterbody, including at least seasonal habitat conditions adequate to support bull trout; and
4. Waterbody is mapped at the 100k level

For the three “occupancy” definitions above:

Presence: Indication of a population of bull trout, such as: evidence of reproduction, detection of multiple adult bull trout within a year, or of individual bull trout over multiple years, in potentially suitable habitat.

Significant survey effort: Defined by Service field biologists based on scientific parameters including: frequency of effort, effectiveness of techniques, amount of area, quality of habitat, and timing of sampling.

Spawning and Rearing habitat (SR)

Stream reaches and the associated watershed areas that provide all habitat components necessary for spawning and juvenile rearing for a local bull trout population. Spawning and rearing habitat generally supports multiple year classes of juveniles of resident or migratory fish and may also support subadults and adults from local populations of resident bull trout.

Foraging, Migrating, and Overwintering habitat (FMO)

Relatively large streams and mainstem rivers, including lakes or reservoirs, estuaries, and nearshore environments, where subadult and adult migratory bull trout forage, migrate, mature, or overwinter. This habitat is typically downstream from spawning and rearing habitat and contains all the physical elements to meet critical overwintering, spawning migration, and subadult and adult rearing needs. Although use of foraging, migrating, and overwintering habitat by bull trout may be seasonal or very brief (as in some migratory corridors), it is a critical habitat component.