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

APPENDIX 1— EVALUATING BULL TROUT CORE AREAS AND FORAGING, MIGRATION, AND OVERWINTERING HABITAT IN EACH OF SIX RECOVERY UNITS USING THE SEVEN GUIDING PRINCIPLES FOR BULL TROUT CONSERVATION

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ABBREVIATIONS, ACRONYMS, AND UNITS OF MEASURE

AR	allelic richness
CA	core area
CHU	Critical Habitat Unit
CHSU	Critical Habitat Subunit
CSE	Cavalli-Sforza and Edwards
FMO	foraging, migration, and overwintering
GP	guiding principles
He	heterozygosity
km	kilometer
RU	Recovery Unit
SR	spawning and rearing

INTRODUCTION

The U.S. Fish and Wildlife Service (Service) evaluated bull trout core areas and foraging, migration, and overwintering (FMO) habitat in each of the following 6 Recovery Units (RUs) (Figure 1) and 32 Critical Habitat Units (CHUs) (Figure 2):

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

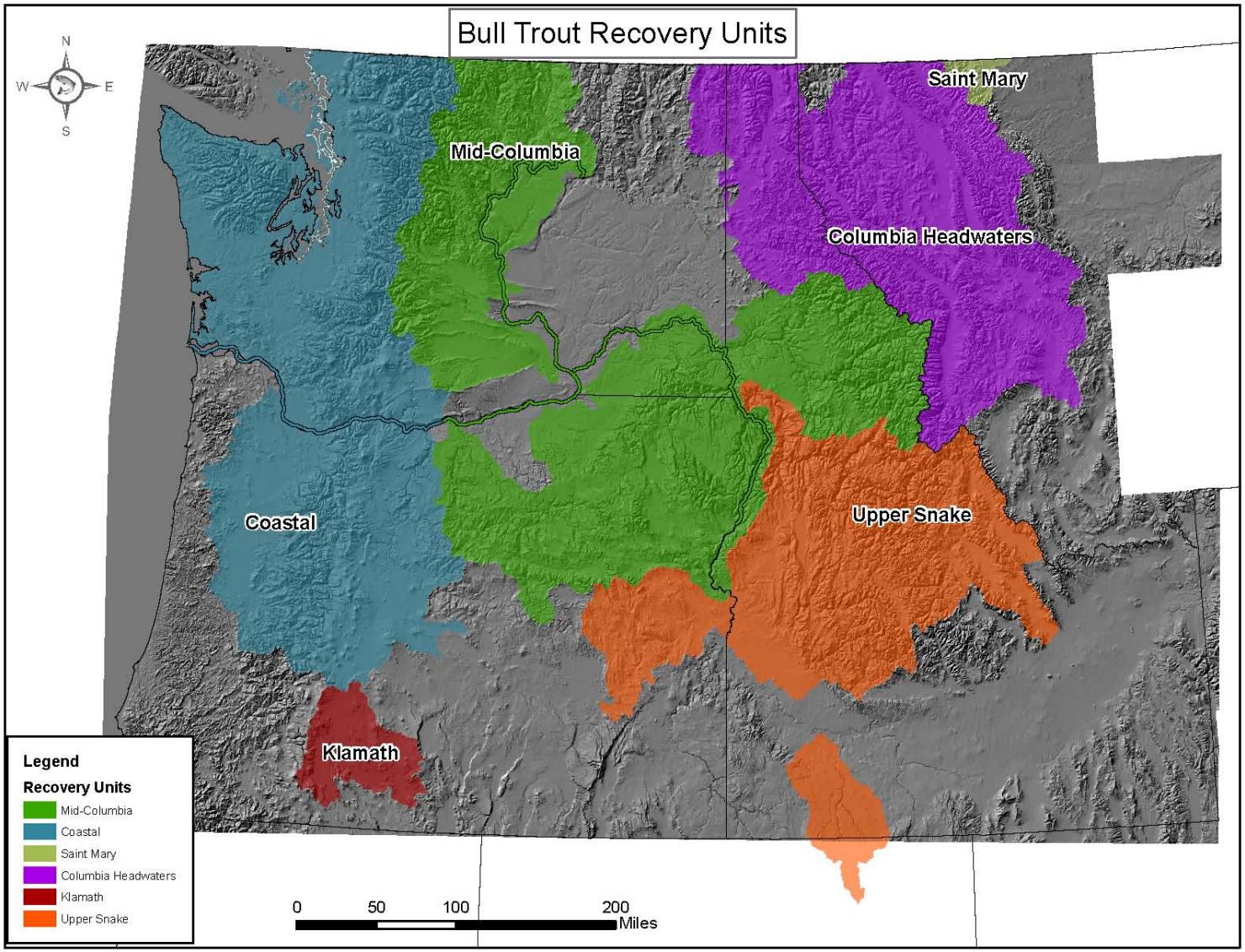

Figure 1. Six draft bull trout Recovery Units in the Pacific Northwest of the United States

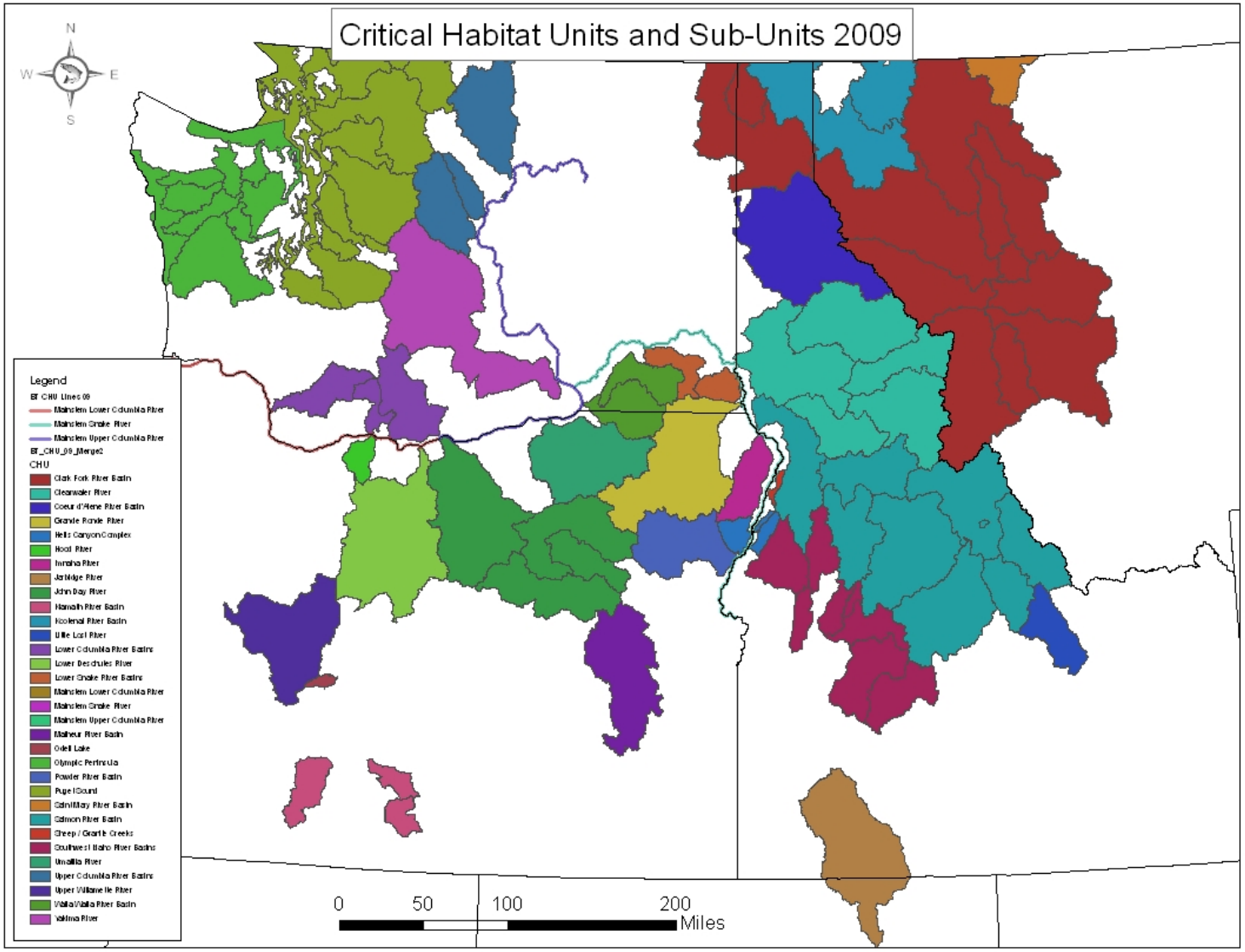

Figure 2. Thirty-two bull trout Critical Habitat Units (colored polygons) with 99 Critical Habitat Subunits delineated within each Unit

EVALUATION TABLES

Areas were evaluated using the following seven Guiding Principles (GPs) for Bull Trout Conservation.

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

Some areas may be essential for conservation due to life history, genetic, or habitat value or uniqueness or in their connection to adjacent core areas. Beyond these first four guiding principles, we can then use population or habitat quantity, threats, and relative distribution measures to prioritize core areas for protection. The tables below detail the evaluation and contain the following information:

- Colum 1—Name of CHU within the RU and critical habitat subunit (CHUSU) within the CHU
- Column 2—Provides the name of the core area or shared FMO habitat
- Column 3—GP 1, Predominant Life-History, states if the population is resident or migratory and the migratory form (amphidromous, adfluvial, fluvial, allacustrine) in order of dominance
- Column 4—GP 2a, Gene Diversity (He) states the expected heterozygosity of the population (blank = no data; multiple numbers = multiple samples within that area)
- Column 5—GP 2b, Allelic Richness (AR) provides the number of alleles within a population corrected for sample size (blank = no data; multiple numbers = multiple samples within that area)
- Column 6—GP 2c, Genetic Uniqueness (CSE Chord Distance) gives the mean distance of a population compared to all other populations within the Recovery Unit (blank = no data)
- Column 7—GP3, Unique Habitat Type includes unusual habitat type for the RU (e.g., warm, arid climate; natural isolation; unique species assemblage; glacial river system)
- Column 8—GP4, Connectivity to Other Core Areas states the degree to which fish may emigrate from and immigrate to the core area
- Column 9—GP5, Population Size provides a range of the number of adults in the population
- Column 10—GP 5, Area of Occupancy provides the linear distance of stream or shoreline habitat occupied in kilometers (km)
- Column 11—GP 6, Threats ranks threats from NatureServe status assessment (0.26 = highest threat and 3.77 = lowest threat listed in this table)

- Column 12—GPs 3 and 7, Distribution and Redundancy describes the areas similarity to or uniqueness from other core areas and the degree to which this population enhances redundancy of populations in the RU
- Column 13—Summarize how essential each core area is to the recovery unit—integrates all columns, considers geographic location and redundancy, and highlights primary reasons a core area is/is not essential

Coastal Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Olympic Peninsula—Dugeness River	Dungeness River	Migratory—fluvial (has anadromous component)				Yes (rain-shadow dominated system; second steepest river system in the US; sympatric Dolly Varden)	Yes	50–250	200–1,000	1.07	Only core area supporting the anadromous form in Strait of Juan de Fuca. One of two core areas on the northern-Strait of Juan de Fuca side of the Olympic Peninsula region	Essential for conservation because it represents the core amphidromous population of bull trout in the Strait of Juan de Fuca; sympatric distribution with Dolly Varden suggests this may represent a key climate change refugium due to Dolly Varden's expected colder water requirements; extensive portions of headwater habitat are within protected national park and wilderness
Olympic Peninsula—Elwha River	Elwha River	Migratory—fluvial (has remnant anadromous component)	0.47	3.54	0.0838	Yes (glacial runoff dominated system)	No (currently limited by dams)	50–250	40–200	0.94	One of two core areas on the northern-Strait of Juan de Fuca side of the Olympic Peninsula region; comprised largely of protected habitats	Essential for conservation because it represents 1 of only 2 populations of bull trout within the Strait of Juan de Fuca; is key for population redundancy in this region and expansion of the amphidromous life history form once the Elwha Dams are removed; may represent a key climate change refugium due to the extensive glacially influenced habitat and protected nature of the upper watershed (Olympic National Park)
Olympic Peninsula— Hoh River	Hoh River	Migratory—anadromous (has fluvial component)	0.55	4.65	0.082	Yes (glacial runoff dominated system)	Yes	250–1,000	200–1,000	1.71	Northernmost population of anadromous bull trout along Pacific Ocean side of the Olympic Peninsula. One of three core areas on the western-Pacific Ocean side of the Olympic Peninsula Region; headwater area largely within protected habitats	Essential for conservation because it maintains the northernmost population of amphidromous bull trout along the Pacific Coast of the Olympic Peninsula; may represent the stronghold for the 3 Washington coast populations of bull trout; may represent a key climate change refugium due to the extensive glacially influenced habitat; extensive portions of the headwater habitat are within a protected area (Olympic National Park)
Olympic Peninsula— Queets River	Queets River	Migratory-anadromous (has fluvial component)					Yes	Unknown	200–1,000	2.14	One of three core areas on the western-Pacific Ocean side of the Olympic Peninsula Region; comprised largely of protected habitats.	Essential for 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)
Olympic Peninsula—Quinault River	Quinault River	Migratory—adfluvial (has anadromous and possibly fluvial component)				Yes (sympatric Dolly Varden)	Yes	Unknown	200–1,000	1.82	Southernmost population of anadromous bull trout along Pacific Coast. One of three core areas on the western-Pacific Ocean side of the Olympic Peninsula Region; headwater area largely within protected habitats	Essential for conservation because it maintains the southernmost population of amphidromous bull trout along the Pacific Coast; sympatric distribution with Dolly Varden suggests this may represent a key climate change refugium due to Dolly Varden's expected colder water requirements; extensive portions of the headwater habitat are within protected national park and wilderness

Coastal Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Olympic Peninsula— Skokomish River	Skokomish River	Migratory—fluvial (may still have remnant anadromous component)	0.5	3.19	0.0838		Possibly (partially limited by dams; also relatively large distance through marine habitats to nearest core area)	50–250	200–1,000	1.24	Sole core area on the eastern-Hood Canal side of the Olympic Peninsula region	Essential for 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)
Olympic Peninsula— Hood Canal	Hood Canal Marine FMO	Migratory—anadromous	NA	NA	NA	Yes (large inland fjord used by the anadromous form)	Yes	NA	NA	NA	Provides the only accessible marine habitat for an anadromous life history form in the Skokomish core area	Essential for conserving the amphidromous life history form in the Hood Canal region of the Olympic Peninsula
Olympic Peninsula— Strait of Juan de Fuca	Strait of Juan de Fuca FMO	Migratory—anadromous	NA	NA	NA	Yes (inland strait connecting Puget Sound to the Pacific Ocean used by the anadromous form)	Yes	NA	NA	NA	Provides the only accessible marine habitat for the anadromous life history form in the Dungeness and Elwha core areas	Essential for conservation because it supports the expression of the amphidromous life history form in the Strait of Juan de Fuca
Olympic Peninsula— Strait of Juan de Fuca	Bell Creek FMO	Migratory—anadromous	NA	NA	NA	Yes (small independent tributary used by the anadromous form)	Yes	NA	NA	NA	Provides additional freshwater FMO habitat outside of core area for the Dungeness core area	Nonessential for conservation, even though it may provide FMO habitat for the amphidromous life history form, because habitat has been severely degraded, especially in upper reaches
Olympic Peninsula— Strait of Juan de Fuca	Morse, Siebert, Ennis, and Valley Creeks FMO	Migratory—anadromous	NA	NA	NA	Yes (small independent tributaries used by the anadromous form)	Yes	NA	NA	NA	Provides additional freshwater FMO habitat outside of core area for the Dungeness and possibly Elwha core areas	Important for conservation because it provides primary freshwater FMO habitat outside of core areas for the amphidromous life history form from Strait of Juan de Fuca core areas; habitat is degraded to various degrees
Olympic Peninsula— Pacific Coast	Goodman and Mosquito Creeks FMO	Migratory—anadromous	NA	NA	NA	Yes (small independent tributaries used by the anadromous form)	Yes	NA	NA	NA	Provides freshwater FMO habitat outside of the core area for the Hoh and possibly Queets and Quinault core areas	Important for conservation because it provides primary freshwater FMO habitat outside of core areas for the amphidromous life history form from Washington Coast core areas
Olympic Peninsula— Pacific Coast	Cedar Creek, Steamboat Creek FMO	Migratory—anadromous	NA	NA	NA	Yes (small coastal tannic water systems used by the anadromous form)	Yes	NA	NA	NA	Provides freshwater FMO habitat outside of the core area for the Hoh and possibly Queets and Quinault core areas	Important for conservation because it provides primary freshwater FMO habitat outside of core areas for the amphidromous life history form from Washington Coast core areas; telemetry studies and follow-up surveys indicate these are key overwintering streams for amphidromous bull trout

Coastal Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Olympic Peninsula— Pacific Coast	Raft River FMO	Migratory—anadromous	NA	NA	NA	Yes (coastal tannic water system used by the anadromous form)	Yes	NA	NA	NA	Provides freshwater FMO habitat outside of the core area for the Hoh and likely Queets and Quinault core areas	Important for conservation because it provides primary freshwater FMO habitat outside of core areas for the amphidromous life history form from Washington Coast core areas
Olympic Peninsula— Pacific Coast	Moclips and Copalis Rivers and Joe Creek FMO	Migratory—anadromous	NA	NA	NA	Yes (coastal tannic water systems)	Yes	NA	NA	NA	Provides freshwater FMO habitat outside of core area for the Hoh, Queets, and Quinault core areas	Important for conservation because it provides primary freshwater FMO habitat outside of core areas for the amphidromous life history form from Washington Coast core areas
Olympic Peninsula— Pacific Coast	Kalaloch Creek FMO	Migratory—anadromous	NA	NA	NA	Yes (coastal tannic water system used by the anadromous form)	Yes	NA	NA	NA	Provides freshwater FMO habitat outside of the core area for the Hoh and possibly Queets and Quinault core areas	Essential for conservation because it provides primary freshwater FMO habitat outside of core areas for the amphidromous life history form from Washington Coast core areas; a key overwintering stream for amphidromous bull trout from the Hoh core area
Olympic Peninsula— Chehalis River/Grays Harbor	Chehalis River FMO	Migratory—anadromous	NA	NA	NA		Yes	NA	NA	NA	Provides freshwater FMO habitat outside of core area for the Hoh, Queets, and Quinault core areas	Important for conservation because the second largest river basin in Washington provides the primary freshwater FMO habitat outside of core areas for amphidromous life history form from Washington coast core areas
Olympic Peninsula— Chehalis River/Grays Harbor	Grays Harbor FMO	Migratory—anadromous	NA	NA	NA	Yes (large coastal estuary-bay used by the anadromous form)	Yes	NA	NA	NA	Provides marine FMO habitat for the Hoh, Queets, and Quinault core areas.	Essential for conservation and supporting the amphidromous life history form along the Pacific Coast; 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
Olympic Peninsula— Chehalis River/Grays Harbor	Wishkah River FMO	Migratory—anadromous	NA	NA	NA		Yes	NA	NA	NA	Provides freshwater FMO habitat outside of core area for the Hoh, Queets, and Quinault core areas	Important for consrvation because it povides secondary freshwater FMO habitat within the Chehalis River Basin for Washington coast core areas
Olympic Peninsula— Chehalis River/Grays Harbor	Humptulips River FMO	Migratory—anadromous	NA	NA	NA		Yes	NA	NA	NA	Provides freshwater FMO habitat outside of core area for the Hoh, Queets, and Quinault core areas	Important for conservation because it provides secondary freshwater FMO habitat outside of core areas for Washington coast core areas
Olympic Peninsula— Chehalis River/Grays Harbor	Wynoochee River FMO	Migratory—anadromous	NA	NA	NA		Yes	NA	NA	NA	Provides freshwater FMO habitat outside of core area for the Hoh, Queets, and Quinault core areas	Important for conservation because it provides secondary freshwater FMO habitat within the Chehalis River Basin for Washington coast core areas

Coastal Recovery Unit

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Olympic Peninsula—Chehalis River/Grays Harbor	Satsop River FMO	Migratory—anadromous (historically may have had fluvial component)	NA	NA	NA		Yes	NA	NA	NA	Provides freshwater FMO habitat outside of core area for the Hoh, Queets, and Quinault core areas.	Important for conservation because it provides secondary freshwater FMO habitat within the Chehalis River Basin for Washington coast core areas; historic evidence indicates this was likely a core area, so has also been identified as important for future conservation efforts (i.e., possible reintroduction) to expand natal distribution of anadromous populations
Olympic Peninsula—	Willapa Bay and R. FMO	Migratory—anadromous	NA	NA	NA		Yes	NA	NA	NA	Provides freshwater FMO habitat outside of core area for the Hoh, Queets, and Quinault core areas	Nonessential for conservation because it provides secondary freshwater FMO habitat for Washington coast core areas, and evidence suggests it is rarely used. It does, however, represent the southernmost occurrence of the amphidromous life history form
Olympic Peninsula—Chehalis River/Grays Harbor	Pacific Ocean Marine FMO	Migratory—anadromous	NA	NA	NA	Yes (nearshore ocean habitat necessary for the amphidromous form)	Yes	NA	NA	NA	Provides the only accessible marine habitat for the anadromous life history form in the Hoh, Queets, and Quinault core areas	Essential for conservation and supporting the expression of the amphidromous life history form along the Pacific Coast
Puget Sound—Chilliwack River	Chilliwack River	Migratory—adfluvial (has fluvial and anadromous component in BC part of core area)				Yes (lake system with connection via river corridor to Strait of Georgia, able to support 3 migratory life history behaviors)	Yes	1,000–2,500	200–1,000	1.94	Represents the only portion of the U.S. distribution within the Fraser River/Strait of Georgia geographic region of the RU	Essential for conservation because it represents unique geographic distribution within the RU (Fraser River Basin) and supports multiple migratory life history forms. Chilliwack Lake and significant portions of the headwaters upstream of the lake are in protected parks and reserves.
Puget Sound—Nooksack River	Nooksack River	Migratory—anadromous (has fluvial component)				Yes (sympatric Dolly Varden and historic connection with the Fraser River system)	Yes	250–1,000	1,000–5,000	1.72	Northernmost distribution of anadromous bull trout in Puget Sound. One of five anadromous core areas in Puget Sound	Essential for conservation because it represents the northernmost distribution of amphidromous bull trout in Puget Sound. Its sympatric distribution with Dolly Varden suggests this may represent a key climate change refugium for the species due to Dolly Varden's expected colder water requirements. Portions of the headwaters are within protected areas (Mount Baker Wilderness).

Coastal Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Puget Sound—Lower Skagit River	Lower Skagit River	Migratory—anadromous (has fluvial and adfluvial components)	1)0.72 2)0.65	1)6.97 2)5.42	1)0.0719 2)0.0763		Yes	2,500–10,000	1,000–5,000	2.77	Represents the core distribution of anadromous bull trout within the Puget Sound region of the RU; significant portions of the upper watershed are within protected habitats. One of five anadromous core areas in Puget Sound	Essential for conservation because it represents the stronghold for the amphidromous life history form and the species within the Coastal RU; 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 parks and wilderness
Puget Sound—Upper Skagit River	Upper Skagit River	Migratory—adfluvial (historically fluvial)				Yes (large lake system; sympatric Dolly Varden)	No	1,000–2,500	1,000–5,000	2.2	Represents a core part of the distribution of bull trout within the Puget Sound region of the RU; comprised largely of protected habitats	Essential for conservation because it represents a significant portion of the distribution of bull trout in Puget Sound; sympatric distribution with Dolly Varden suggests it may represent a key climate change refugium due to Dolly Varden's expected colder water requirements; core area habitats are largely within protected areas (North Cascades National Park and Pasayten Wilderness)
Puget Sound—Stillaguamish River	Stillaguamish River	Migratory—anadromous (has fluvial component)				Yes (sympatric Dolly Varden)	Yes	50–250	1,000–5,000	1.15	Connected to the core distribution of anadromous bull trout in Puget Sound. One of five anadromous core areas in Puget Sound	Essential for conservation because it represents part of the core distribution of amphidromous bull trout in Puget Sound; sympatric distribution with Dolly Varden suggests it may represent a key climate change refugium due to Dolly Varden's expected colder water requirements; small section of headwaters is within a protected area (Boulder River Wilderness)
Puget Sound—Samish River	Samish River FMO	Migratory—anadromous	NA	NA	NA		Yes	NA	NA	NA	Provides freshwater habitat link among northern core areas of anadromous bull trout within Puget Sound	Important for conservation because it provides important FMO habitat for the anadromous life history form
Puget Sound—Snohomish-Skykomish River	Snohomish-Skykomish River	Migratory—anadromous (has fluvial and resident component)					Yes	1,000–2,500	1,000–5,000	1.58	Connected to the core distribution of andromous bull trout in Puget Sound; headwater area largely within protected habitats. One of five anadromous core areas in Puget Sound	Essential for conservation because it represents the second stronghold for the anadromous life history form within the Coastal RU; also represents part of the core distribution of anadromous bull trout in Puget Sound; extensive portions of the habitat are within protected areas (Henry Jackson Wilderness, Wild Sky Wilderness, and Alpine Lakes Wilderness)
Puget Sound— Lake Washington	Lake Washington FMO	Migratory—anadromous	NA	NA	NA	Yes (large productive natural lake system)	Yes	NA	NA	NA	Provides freshwater habitat link between northern and southern core areas of anadromous bull trout within Puget Sound	Important for conservation because it provides important FMO habitat outside of core areas for the anadromous life history form

Coastal Recovery Unit

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Puget Sound—Lower Green River	Lower Green River FMO	Migratory—anadromous	NA	NA	NA		Yes	NA	NA	NA	Provides freshwater habitat link between northern and southern core areas of anadromous bull trout within Puget Sound	Important for conservation because it provides the primary FMO habitat outside of core areas for the amphidromous life history form
Puget Sound—Lower Nisqually River	Lower Nisqually River FMO	Migratory—anadromous	NA	NA	NA		Yes (also believed to be a historic core area)	NA	NA	NA	Southernmost distribution of anadromous bull trout in Puget Sound, and based on historical accounts was most likely a core area. Represents best opportunity for increasing the number of natal populations in south Puget Sound	Important for conservation because it provides important FMO habitat for the amphidromous life history form, especially in southern Puget Sound; is important for future conservation efforts (i.e., recolonization or reintroduction) as anadromous populations increase in abundance
Puget Sound—Chester Morse Lake	Chester Morse Lake	Migratory—adfluvial	0.61	5.63	0.0905	Yes (only naturally occurring bull trout lake system within Puget Sound)	No	1,000–2,500	200–1,000	1.84	Represents the only core area within central Puget Sound; distribution protected within a municipal watershed	Essential for 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 in the RU from any threat that would largely affect anadromous populations; the core area is encompassed by a municipal watershed managed under the Cedar River Watershed Habitat Conservation Plan so habitat is largely protected
Puget Sound—Puyallup River	Puyallup River	Migratory—fluvial (has significant resident and remnant anadromous component)	0.42	2.9	0.088	Yes (glacial runoff dominated system)	Yes (although limited by dams)	50–250	1,000–5,000	1.32	Represents the only core area within south Puget Sound; headwater area largely within protected habitats. One of five anadromous core areas in Puget Sound	Essential for 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 due to the extensive glacially influenced habitat; extensive portions of the habitat are within a protected area (Mount Rainier National Park)
Puget Sound—Puget Sound Marine	Puget Sound Marine FMO	Migratory—anadromous	NA	NA	NA	Yes (large inland estuary used by anadromous form)	Yes	NA	NA	NA	Key FMO corridor for maintaining distribution of anadromous life form within Puget Sound by providing opportunity of genetic exchange and refounding of locally extirpated populations	Essential for supporting the expression of the amphidromous life history form in the Puget Sound region

Coastal Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Lower Columbia River Basins—Lewis River	Lewis River	Migratory—adfluvial (historically fluvial)	0.57	3.76	0.0861	Yes (volcanic)	No (currently limited by dams)	250–1,000	200–1,000	1.75	One of only two core areas on the Washington side of the lower Columbia River region of the RU, and likely the only one containing a significant migratory population	Essential for conservation because it has relatively one of the most abundant populations in the lower Columbia region of the RU; recent FERC settlement agreement will provide future connectivity to mainstem Columbia
Lower Columbia River Basins—Klicktat River	Klickitat River	Resident (may still have remnant fluvial component)					No for resident component; Yes for fluvial component	Unknown	40–200	1.5	One of only twp core areas on the Washington side of the lower Columbia River region of the RU	Essential for conservation because headwater resident population represents possible refugia in lower Columbia region
Lower Columbia River Basins—White Salmon River	White Salmon River FMO/Core Habitat	None (currently)	NA	NA	NA		Partially (currently limited by dams)	NA	NA	NA	Would increase redundancy for this geographic region of the RU if a core population is reestablished within this core habitat	Essential for conservation because it is important for future conservation efforts (i.e. reintroduction) once Condit Dam is removed; appears to provide only limited FMO habitat
Upper Willamette River	Upper Willamette River Core Area	Fluvial— artificial adfluvial	Anderson 0.46 Roaring River 0.35	Anderson 3.63 Roaring River 2.81	Anderson 0.90906 Roaring River 0.0964	Cold water system. McKenzie is the highest quality and most essential habitat in the basin.	No	250–1,000/ ~300 (4 pops)	200–1,000	2.25	Southwest distribution within RU	The entire occupied area and the lower unoccupied Middle Fork is essential for conservation because of its potential to connect location populations and provide important FMO habitat
Hood River	Hood River Core Area	Artificial adfluvial and fluvial	Clear Branch 0.49	Clear Branch 2.96	Clear Branch 0.0899	Stochastic system, glacial river system	Yes	1–50/40–100 (2 pops)	40–200	1.32	Colonizers from upper Columbia/Snake and costal lineages may use habitat	The entire occupied area and unoccupied West Fork and tributaries is essential for conservation because of connectedness to the mainstem Columbia River and additional suitable habitat once passage is restored
Lower Deschutes River	Lower Deschutes River Coe Area	Fluvial and resident	Shitike Creek 0.59 Whitewater River 0.53 Canyon Creek 0.58	Shitike Creek 5.26 Whitewater River 4.47 Canyon Creek 4.82	Shitike Creek 0.0825 Whitewater River 0.0824 Canyon Creek 0.0800	High desert and high Cascades glacially fed headwater streams and springs	Not yet, but passage issues are being addressed under FERC license negotiation	1,000–2,500/ 1,100 (5 pops)	200–1,000	1.85	Stronghold within the Lower Columbia River Coastal Unit. Key for refounding of other areas. Connected to Columbia River. Need all pops since 3 of the 5 pops have less than 100 spawners	The entire occupied area is essential for conservation because two populations here are a stronghold in Oregon and support conservation of other, nearby populations adapted to unique high desert/Cascade habitats
Odell Lake	Odell Lake	Adfluvial with downstream and outlet spawning adaptations.	0.38	2.75	0.0991	Only naturally adfluvial population in Oregon	No	1–50 / 24 (1 pop)	4–40	1.08	The Odell Lake bull trout population is the southernmost population in the Coastal RU	The entire occupied area and upper Trapper Creek is essential for conserving an isolated core area and the only natural adfluvial population in Oregon
Mainstem Lower Columbia River	Columbia River Mainstem FMO	Fluvial (possibly historically amphidromous)	NA	NA	NA	Yes (large mainstem river foraging corridor, key to connecting core areas	Yes	NA	NA	NA	Key for maintaining connectivity among core areas in the lower Columbia River geographic region of the RU to ensure the potential for refounding	Essential for conservation of lower Columbia River core areas; key FMO area and for maintaining connectivity and providing for the expression of historic migratory life history forms in the lower Columbia region of the RU

Klamath Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Klamath River—Upper Klamath Lake	Upper Klamath Lake	Resident—historically had fluvial component	0.32	2.23	0.0896	Southern margin of range; isolated from other basins	No	250–1,000	4–40	2.24; top threats are exotic species and lack of connectivity; value of 'A'	Westernmost core area; only two local populations that are not connected	Essential for conservation and redundancy—number of local populations reduced from historic level; need to establish connectivity for conservation of the species
Klamath River—Sycan River	Sycan River	Resident with fluvial component	0.52	3.86	0.0910	Southern margin of range; isolated from other basins	No	250–1,000	4–40	1.90; top threats are exotic species and lack of connectivity; value of 'A'	Only one local population	Essential for conservation and redundancy—number of local populations reduced from historic level; need to establish connectivity for conservation of the species; diverse life history expression (resident and fluvial)
Klamath River—Upper Sprague River	Upper Sprague River	Resident with fluvial component	0.46	3.65	0.0898	Southern margin of range; isolated from other basins	No	1,000–2,500	4–40	1.85; top threats are exotic species and lack of connectivity; value of 'A'	Easternmost core area; five local populations	Essential for conservation and redundancy—number of local populations reduced from historic level; need to establish connectivity for conservation of the species; diverse life history expression (resident and fluvial)

[a]The rank is relative to other core areas; a higher number indicates less risk. 'A' indicates highest threat.

Mid-Columbia Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Upper Columbia River Basins—Methow River	Methow Core Area	Migratory—Fluvial with resident and adfluvial; allucustrine	0.57	4.5	0.0847	Most northern area in RU, glacial areas provide lowest risk for climate; allucustrine populations	Yes (most populations)	370 average (2007); 10 local populations but only 2 have ~50 redds/100 adults	200–1,000	2.16	Northernmost portion of RU; unique genetics and geology	Essential to conservation of upper portions of RU; fluvial and adfluvial life history; unique in range/distribution/ geology and genetics; key FMO for maintaining connectivity and providing for the expression of migratory life history forms; allucustrine populations; lake and glacial geology may be a key climate change refugium
Upper Columbia River Basins—Chelan River	Chelan River FMO	Fluvial	N/A	N/A	N/A	Unique in location; direct input of cold water; forage hot spot	Yes (at least 3 core area and populations that migrate can use this)	N/A	N/A	N/A	Unique in location and cold water influence	Essential for conservation of Upper Columbia River core areas; key FMO area and essential in maintaining connectivity and providing for the migratory life history forms in the RU
Upper Columbia River Basins—Entiat River	Entiat Core Area	Migratory—100% Fluvial (Depends on Columbia River mainstem)	0.58	4.41	0.0788	Smallest core area in Upper Columbia, unique use of the Columbia River FMO; wildfire regime	Yes (both populations)	65 average (2007); only 2 local populations, variable	200–1,000	1.61	Not similar; small drainage; all use Col R FMO; located between two larger core areas	Essential for conservation of upper portions of RU; fluvial life history; unique in use of the mainstem Columbia River; key FMO for maintaining connectivity, FMO, and providing for the expression of migratory life history forms; at risk for climate change
Upper Columbia River Basins—Wenatchee River	Wenatchee Core Area	Migratory—adfluvial/fluvial some residents; allucustrine	0.59	4.15	0.0726	Largest population, allucustrine function	Yes (all populations)	890 average (2007); 7 pops w/ only one supporting the core area with 90% of fish	1,000–5,000	2.2	Unique genetics; large adfluvial lake is natural; core area connectivity for other core area pop use as FMO	Essential for conservation of upper portions of RU; fluvial and adfluvial life history; unique in numbers for the RU/ range/distribution/geology and genetics; key FMO provides connectivity for the expression of multiple life history forms; lake and glacial geology may provide climate change refugia
Yakima River	Yakima Core Area	Migratory—artificially and historically adfluvial or fluvial	0.59 Avg	4.32 Avg	0.0711 Avg	Largest Core Area in WA; unique distribution; anadromous fish assemblages; historically connected adfluvial/fluvial; glacial and spring fed systems; wildfire regime	Marginal to none (because of dams only 25% of the populations could migrate both ways, thermal barriers)	1,050 average (2007); 16 populations, but only 3 >50 redds/ 100 adults	200–1,000	2.35	Largest core area in WA; unique in location and genetics; multiple habitat types	Essential for conservation of upper and middle portions of RU; both fluvial and adfluvial life history; unique in location/genetics; largest core area; key FMO for maintaining connectivity and providing for the expression of historic migratory life history forms; reservoirs may be both a risk and a help for climate change
John Day River—Lower Mainstem John Day River	Mainstem John Day River FMO Habitat	Fluvial	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		Corridor essential for conservation to maintain opportunity for John Day River core areas to connect to the mainstem Columbia River FMO habitat

Mid-Columbia Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
John Day River—North Fork John Day River	North Fork John Day River Core Area	Primarily resident but a fluvial life history has been documented	0.62	5.01	0.0616	Granitic soils make unique habitats for this RU—presence of historic fish species assemblage	Yes (no major dams in the John Day basin)	1–50 / largely unknown estimated at 40 (7 populations)	200–1,000	1.63	Southern end of the Mid-Columbia RU	Entire occupied area is essential for conservation since there is connectivity to the Columbia River due to an absence of major dams in the basin; the presence of historic fish species assemblage increases the potential of the John Day to contribute to the conservation of bull trout in the RU
John Day River—Middle Fork John Day River	Middle Fork John Day River Core Area	Primarily resident but a fluvial life history has been documented	0.53	3.76	0.0624	Presence of historic fish species assemblage	Yes (no major dams in the John Day basin)	1–50 / largely unknown estimated at 50 (3 populations)	200–1,000	1.49	Southern end of Mid-Columbia RU	Entire occupied area is essential for conservation and unoccupied habitat in Vinegar and Butte Creek
John Day River—Upper Mainstem John Day River	Upper Mainstem John Day River Core Area	Primarily resident but a fluvial life history has been documented	0.38	2.86	0.0697	Presence of historic fish species assemblage	Yes (no major dams in the John Day basin)	250–1,000 / largely unknown estimated to be at 260 (2 populations)	200–1,000	1.48	Southern end of Mid-Columbia RU	Entire occupied and presumed occupied area of the mainstem is essential for conservation because a need for redundancy–number of local populations that are reduced from historic levels and a need to re-establish local populations in adjacent John Day Core areas; is the core area within the John Day River basin with the most bull trout (~250)
Umatilla River	Umatilla River Basin Core Area	Fluvial	0.52	3.32	0.0616		Population currently too small to demonstrate connectivity to other CAs. Improved passage facilities needed.	1–50	200–1,000	1.27		Entire occupied and some possibly unoccupied area of North Fork Meacham Creek areas is essential for conservation because bull trout in this core area have been significantly reduced since the time of listing
Walla Walla River Basin—Walla Walla River	Walla Walla River Core Area	Fluvial and one small resident population—fish move throughout system and utilize the Columbia River	0.57	4.4	0.0526	No brook trout in this basin	Yes (movement of adults to/from the Columbia River has been well documented)	250–1,000		1.82		The Walla Walla Basin population is one of the most productive in eastern OR/WA; the entire occupied and presumed occupied areas are essential for conservation
Walla Walla River Basin—Touchet River	Touchet River Core Area	Fluvial	0.54	4.32	0.0565	No brook trout in this basin	Yes (recent project to provide fish passage at Hofer Dam on Lower Touchet may restore connectivity)	250–1,000	40–200	1.27		The entire occupied area is essential for conservation

Mid-Columbia Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Lower Snake River Basins—Tucannon River	Tucannon River Core Area	Fluvial	0.62	5.46	0.0506		Movement from Tucannon to Snake River documented.	200–500	40–200	1.27		The entire occupied area is essential; the Tucannon River population is one of the larger in eastern OR/WA and conditions in the basin seem well suited for recovery
Lower Snake River Basins—Asotin Creek	Asotin Creek Core Area	Fluvial	0.58	4.58	0.0526		Unknown, probably limited	50–250 small. Only 12 redds found in spawning areas in 2006, down from 68 redds in 1999.	40–200	0.64		The entire occupied area is essential for conservation because Asotin Creek bull trout are genetically distinct from populations in the Tucannon, Walla Walla, and Wenaha Rivers
Grande Ronde River	Grande Ronde River Core Area	Fluvial and resident	Lostine 0.49 SF Wenaha 0.61 NF Catherine 0.49	Lostine 3.57 SF Wenaha 5.11 NF Catherine 4.07	Lostine 0.0599 SF Wenaha 0.0505 NF Catherine 0.0539	Large geographical area through a variety of habitats	Yes	250–1,000/690 (10 pops)	200–1,000	2.19	Ten populations that include both fluvial and resident life histories spread over a large geographical area	The entire occupied and some unoccupied areas are essential for conservation to keep this diverse core area functional; is somewhat of a stronghold in Oregon
Grande Ronde River	Little Minan Core Area	Resident	ND	ND	ND		Yes (one way)	250–1,000/ 420 (1 pop)	4–40	1.29		The entire occupied area is essential for conservation because this is a stable, relatively strong resident population with few threats that is located above a natural barrier
Imnaha River	Imnaha River Basin Core Area	Fluvial and resident	0.56	4.79	0.0539	Large geographical area through a variety of habitats	Yes	1,000–2,500 / estimated at 1,500 (4 populations)	200–1,000	1.94	Four healthy populations with excellent habitat conditions (overall); fluvial and resident populations; spread over a large geographic area.	The entire occupied area is essential for conservation in part because it is a stronghold in Oregon
Sheep and Granite Creeks	Granite Creek	Fluvial and resident				No	Yes	50–250	<4	1.01	Southweasternmost extent of the RU	Essential for conservation because the location of the core area in the RU provides redundancy
Sheep and Granite Creeks	Sheep Creek	Fluvial and resident				No	Yes	50–250	<4	1.01	Southweasternmost extent of the RU	Essential for conservation because the location of the core area in the RU provides redundancy
Hells Canyon Complex	Pine, Indian, and Wildhorse	Resident and fluvial				No	No	400	4–40	1.83	Southeasternmost extent of the RU; located at the upper extent of the RU	Essential for conservation because the location of the core area in the RU provides redundancy
Powder River	Powder River Core Area	Resident	ND	ND	ND	Upper Elkhorn Mountains—limited to remaining intact habitat	No (isolated by Powder River reservoirs and Snake River dams)	250–1,000 / abundance is unknown; the last estimate made in 1991 was 500	200–1,000	2.05	Forms the southeastern boundary of the Mid-Columbia RU	Entire occupied area is essential for conservation; presumed occupied area of Eagle Creek and unoccupied FMO to connect local populations in the upper Powder drainages
Clearwater River—Middle-Lower Fork Clearwater River	Lower/Middle Forks Clearwater River	Fluvial				No	Yes	1–250	294	2.09	Provides connectivity for multiple core areas	Essential for conservation because it is necessary to maintain connectivity within the unit

Mid-Columbia Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Clearwater River—South Fork Clearwater River	South Fork Clearwater River	Resident and fluvial				No	Yes	50–250	523	2.23	Contains a moderate number of local populations in the RU	Essential for conservation because of location of area in RU and moderate abundance
Clearwater River—Selway River	Selway River	Resident and fluvial				No	Yes	250–2,500	781	2.98	Contains a large number of local populations in the RU	Essential for conservation because of large abundance
Clearwater River—Lochsa River	Lochsa River	Fluvial and resident				No	Yes	50–1,000	532	2.88	Contains a moderate number of local populations in the RU	Essential for conservation because of large abundance
Clearwater River—Lochsa River	Fish Lake (Lochsa River)	Adfluvial				Yes	Yes	1–250	8	2.23	One of a few naturally adfluvial populations in the RU	Essential for conservation because of adfluvial population
Clearwater River—North Fork Clearwater River	North Fork Clearwater River	Resident, fluvial, and adfluvial (adfluvial form not natural)				No	Yes	1,000–10,000	918	3.51	Contains a large number of local populations in the RU	Essential for conservation because of large abundance
Clearwater River—North Fork Clearwater River	Fish Lake (North Fork Clearwater River)	Adfluvial				Yes	Yes	1–250	6	2.23	One of a few naturally adfluvial populations in the RU	Essential for conservation because of adfluvial population
Mainstem Upper Columbia River	Mid-Columbia River Mainstem FMO	Fluvial	N/A	N/A	N/A	Large riverine waterbody with lake like environment near dams	Yes (all populations in adjacent core areas)	N/A	N/A	N/A	Unique in location as corridor between core areas	Essential to conservation of mid-Columbia River core areas; key FMO area, and for maintaining connectivity and providing for the expression of historic migratory life history forms throughout the RU
Mainstem Snake River	Lower Snake River Mainstem FMO	Fluvial	N/A	N/A	N/A		Yes	N/A		N/A		Area from the mouth to the upper end of Brownlee Reservoir is essential for the conservation of mid-Columbia River and Snake River core areas; key FMO area and for maintaining connectivity and providing for the expression of historic migratory life history forms in the RU

Upper Snake Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Malheur River Basin	Malheur River	Fluvial and resident	Little Crane 0.51 Meadow Fork 0.53	Little Crane 3.4 Meadow Fork 3.85	Little Crane 0.0716 Meadow Fork 0.0677	Desert system	No	50–250 / 250	200–1,000	1.38	Westernmost in this RU and only representation from Oregon and west of the Snake River; all populations help ensure redundancy	The entire occupied area is essential for conservation, as well as unoccupied habitat in Corral Basin and McCoy Creeks; is the only core area in Oregon within this RU and west of the Snake River
Jarbidge River Basin	Jarbidge River	Resident, some fluvial	Dave Creek 0.45 WF Jarbidge 0.49	Dave Creek 3.08 WF Jarbidge 3.58	Dave Creek 0.0703 WF Jarbidge 0.0690	Yes, southern extent of species, includes semi-arid desert habitat	No	50–250	40–201	2.40	Isolated, contains moderate number of local pops in the RU; contains both resident and fluvial life histories; southernmost distribution in the RU and the species' range	Essential for conservation because is the southernmost population in the RU and species' range; has resident and fluvial life histories; is the only core area in Nevada; much habitat is in protected wilderness; provides potential refuge from pervasive threats like invasive species
Southwest Idaho River Basins—Weiser River	Weiser River	Resident				No	No	3–200	36	0.94	Isolated area that only contains resident fish	Essential for conservation because it has only resident life history expression, low numbers, low amount of habitat, no connectivity to other core areas, and low NatureServe scores
Southwest Idaho River Basins—Squaw Creek	Squaw Creek	Resident				No	No	250	113–190	0.94	Isolated area that only contains resident fish	Essential for conservation because of only resident life history expression, low numbers, low amount of habitat, no connectivity to other core areas, and low NatureServe scores
Southwest Idaho River Basins—North Fork Payette River	North Fork Payette River	Resident				No	No	160	48	0.38	Isolated area that only contains resident fish	Essential for conservation because of only resident life history expression, low numbers, low amount of habitat, no connectivity to other core areas, and low NatureServe scores
Southwest Idaho River Basins—Middle Fork Payette River	Middle Fork Payette River	Resident, some fluvial				No	Yes	250	26–195	1.11	Contains a fluvial population	Essential for conservation because of numbers of fish, amount of habitat, and moderate NatureServe score
Southwest Idaho River Basins—Upper South Fork Payette River	Upper South Fork Payette River	Resident, some fluvial	0.54	4.52	0.0739	No	Yes	2100	113–190	1.77	Contains a fluvial population and a moderate number of local populations	Essential for conservation because of fluvial population, large abundance, and moderate NatureServe score
Southwest Idaho River Basins—Deadwood River	Deadwood River	Resident, some adfluvial	0.44	2.81	0.0759	No	Yes	400	129	1.11	One of a few adfluvial populations in the RU	Essential for conservation because of adfluvial population and high number of adults
Southwest Idaho River Basins—Arrowrock	Arrowrock	Resident, adfluvial, some fluvial	0.48	3.67	0.0768	No	Yes	5300	654	2.53	Contains a moderate number of local populations for the RU and one of the stronger areas in SW Idaho with adfluvial fish	Essential for conservation because of the number of local populations in this areas, high abundance values, large amount of habitat, and high NatureServe score

Upper Snake Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Southwest Idaho River Basins—Anderson Ranch	Anderson Ranch	Resident and some fluvial	0.62	5.3	0.0647	No	Yes	1041	141–411	2.71	Contains a moderate number of local populations for the RU and one of the stronger areas in SW Idaho with adfluvial fish	Essential for conservation because of the number of local populations in this area, high abundance values, large amount of habitat, and high NatureServe score
Southwest Idaho River Basins	Lucky Peak	Resident and some adfluvial	0.48	3.67	0.0768	No	No	5–170	34–58	0.81	Contains a fluvial population	Nonessential for conservation because of the low number of adults, low amount of habitat, no connectivity to other core areas, and low NatureServe score
Salmon River Basin—Little-Lower Salmon River	Little-Lower Salmon River	Fluvial				No	Yes	600	492	2.88	Represents the northwesternmost extent of the RU	Essential for conservation because of the location of area in RU, high number of adults, large amount of habitat, and high NatureServe score
Salmon River Basin—South Fork Salmon River	South Fork Salmon River	Resident and some fluvial	0.63	6	0.0675	No	Yes	5000	832	3.11	Contains a large number of local populations in the RU	Essential for conservation because of the location of area in RU, high number of adults, large amount of habitat, and high NatureServe score
Salmon River Basin—Middle Salmon–Chamberlain River	Middle Salmon River-Chamberlain	Fluvial and resident				No	Yes	250–2,500	1025	3.39	Represents the northernmost extent of the RU	Essential for conservation because of the location of area in RU, high number of adults, large amount of habitat, and high NatureServe score
Salmon River Basin—Middle Fork Salmon River	Middle Fork Salmon River	Resident and some fluvial	0.7	6.84	0.064	No	Yes	1,000–10,000	1906	3.65	Contains the largest number of local populations in the RU	Essential for conservation because of the location of area in RU, high number of adults, large amount of habitat, and high NatureServe score
Salmon River Basin—Middle Salmon–Panther River	Middle Salmon River-Panther	Fluvial and resident				No	Yes	2,500–10,000	1025	2.31	Represents the northeasternmost extent of the RU	Essential for conservation because of the location of area in RU, high number of adults, large amount of habitat, and high NatureServe score
Salmon River Basin—Lake Creek	Lake Creek	Adfluvial				Yes, hydro sink	No	50	13	1.68	One of a few adfluvial populations in the RU	Essential for conservation because of adfluvial population, unique habitat type, and moderate NatureServe score
Salmon River Basin—Opal Lake	Opal Lake	Adfluvial				Yes, hydro sink	No	1–50	3	1.24	One of a few adfluvial populations in the RU	Essential for conservation because of the adfluvial population, unique habitat type, and moderate NatureServe score
Salmon River Basin—Lemhi River	Lemhi River	Resident and fluvial	0.68	5.68	0.0703	No	Yes	250–1,000	542	2.60	Represents the easternmost area of the RU	Essential for conservation because of the location of area in RU, high number of adults, large amount of habitat, and high NatureServe score
Salmon River Basin— Pahsimeroi River	Pahsimeroi River	Resident	0.69	5.97	0.0661	No	Yes	1,000–5,000	356	2.07	Represents the southeasternmost extent of the RU that is still hyrdologically connected	Essential for conservation because of the location of area in RU, high number of adults, large amount of habitat, and high NatureServe score

Upper Snake Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Salmon River Basin—Upper Salmon River	Upper Salmon River	Fluvial, resident, and adfluvial	0.66 0.43	5.44 3.31	0.071 0.83	No	Yes	5000	1217	2.96	Contains a large number of local populations in the RU	Essential for conservation because of the location of area in RU, high number of adults, large amount of habitat, and high NatureServe score
Little Lost River Basin	Little Lost River	Resident	0.58	3.54	0.0794	Yes, hydro sink	No	6250	181–361	2.40	Southeasternmost distribution in the RU	Essential for conservation because of the unique habitat type, high number of adults in this core area, large amount of habitat, and high NatureServe score

Columbia Headwaters Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Coeur d'Alene River Basin	Coeur d'Alene Lake (ID)	Migratory (adfluvial)	0.62 0.61	5.87 5.68	0.0736 0.0759		No	250–1,000	200–1,000	2.19	One of about nine relatively large (3,000–125,00 acres) headwaters lakes and reservoirs, each with unique conditions	Essential for conservation, both as SR and FMO habitat for local populations; has been isolated from other bull trout populations for at least 10,000 years and losing this CHU would create a significant gap in range with no opportunity for natural recolonization
Kootenai River Basin—Kootenai River (i.)	Kootenai River (MT/ID)	Migratory (fluvial)	0.66 0.68	6.06 5.86	0.0568 0.0548		Yes	250–1,000	200–1,000	2.15	The only remaining fluvial habitat in the Kootenai River drainage	Essential for conservation because the core area conserves a relatively rare "big river fluvial" life history form in the RU, portions of which extend into B.C. Canada; 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 species' range
Kootenai River Basin—Kootenai River (i.)	Bull Lake (MT)	Migratory (adfluvial); downstream migration					No	250–1,000	40–200	2.55	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions.	Essential for conservation because the Bull Lake core area conserves a relatively rare adfluvial population that exhibits downstream spawning migration
Kootenai River Basin(ii.)	Sophie Lake (MT/BC)	Migratory (adfluvial)				SR in British Columbia	No	<50	4–40	1.24	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions.	Nonessential for conservation because the core area is very isolated and has a tenuous population status heavily compromised by nonnative species, with all of the SR habitat in British Columbia, Canada
Kootenai River Basin—Lake Koocanusa (ii.)	Lake Koocanusa (MT/BC)	Migratory (artificially adfluvial)	0.66 0.68	5.40 6.29	0.0575 0.0531	Reservoir expands habitat beyond natural capacity	Yes	2,500–10,000	1,000–5,000	3.41	One of about nine relatively large (3,000 - 125,00 acres) headwaters lakes and reservoirs, each with unique conditions	Essential for conservation because the core area is among the most secure and stable bull trout refugia across the range of the species; 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; there are low numbers of nonnative fish and most of the SR habitat, which is in excellent condition, is in British Columbia, Canada; conservation of this CHSU in the U.S. provides strong incentive for continued Canadian cooperation in broader bull trout recovery efforts

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CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Clark Fork River Basin (ii.)—Priest Lakes and Upper Priest River	Priest Lakes (ID)	Migratory (adfluvial)	0.62	6.06	0.0585		No	50–250	200–1,000	1.07	One of about nine relatively large (3,000–125,00 acres) headwaters lakes and reservoirs, each with unique conditions	Essential for conservation both as SR and FMO habitat for local populations in Priest Lake and Upper Priest Lake; high elevation with relatively secure and unmanaged SR habitat in headwater reaches of the Upper Priest River, may support cold-water refugia during ongoing climate change
Clark Fork River Basin (i.)—Lake Pend Oreille, Pend Oreille River and lower Priest River	Lake Pend Oreille (ID)	Migratory (adfluvial and allacustrine)	0.63 0.71	4.92 5.31	0.0557 0.0549	2nd largest adfluvial core in range	Yes	2,500–10,000	200–1,000	2.40	One of about nine relatively large (3,000–125,00 acres) headwaters lakes and reservoirs, each with unique conditions	Essential for conservation as habitat for local populations spawning in Lake Pend Oreille tribs, Pend Oreille River, and Clark Fork River; with enhanced fish passage at Clark Fork River facilities, linkage for bull trout from Lake Pend Oreille to access the upstream CHSUs is critically important; the size and scope of this core area make it essential to recovery
Clark Fork River Basin (iii.)—Lower Clark Fork River	Lower Clark Fork R. (MT) (Flathead R. to T Falls)	Migratory (adfluvial)	0.73 0.66	6.57 5.09	0.0481 0.0568		Yes	50–250	200–1,000	2.23	A formerly isolated and fragmented combination of poor fluvial and reservoir FMO habitats currently being reconnected by passage to more robust populations	Essential for conservation both as nearby SR habitat for LPO bull trout populations and, with removal of Milltown Dam and enhanced fish passage at other downstream facilities, as a migratory linkage to the Middle Clark Fork and Upper Clark Fork core areas
Clark Fork River Basin(iv.) Middle Clark Fork River	Middle Clark Fork R. (MT) (T Falls to Milltown)	Migratory (fluvial)	0.76	6.49	0.051		Yes	50–250	40–200	2.15	One of four increasingly interconnected riverine habitat patches capable of supporting migratory bull trout in the Clark Fork River basin	Essential for conservation both as SR habitat and as a migratory linkage between the Lower Clark Fork and Upper Clark Fork; with removal of Milltown Dam and enhanced fish passage at other downstream facilities, linkage for bull trout from Lake Pend Oreille to access upstream CHSUs is critically important to recovery
Clark Fork River Basin(v.)—Upper Clark Fork River	Upper Clark Fork River (MT) (Upstream of Milltown)	Migratory (Fluvial)					Yes	50–250	200–1,000	1.42	One of four increasingly interconnected riverine habitat patches capable of supporting migratory bull trout in the Clark Fork River basin	Essential for conservation both as SR habitat and as a migratory linkage to the Lower and Middle Clark Fork; with removal of Milltown Dam and enhanced fish passage at other downstream facilities, linkage for bull trout from Lake Pend Oreille to access upstream CHSUs is critically important to recovery

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CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Clark Fork River Basin (ix.)—Bitterroot River	West Fk Bitterroot River (MT)	Migratory (Artificially Adfluvial)					No	50–250	40–200	2.01	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation as one of several occupied major watersheds that forms the headwaters of the Clark Fork River CHU; though the migratory form of bull trout is seriously reduced in the Bitterroot, the artificially adfluvial population in Painted Rocks Reservoir core area at the head of the West Fork Bitterroot River is relatively secure and important to persistence of bull trout in the drainage
Clark Fork River Basin (ix.)—Bitterroot River	Bitterroot River (MT)	Resident, remnant of naturally fluvial	0.65	5.1	0.0608		Yes	250–1,000	200–1,000	2.10	One of four increasingly interconnected riverine habitat patches capable of supporting fluvial adult bull trout in the Clark Fork River basin	Essential for conservation as one of several occupied major watersheds that forms the headwaters of the Clark Fork River CHU; improving fish passage conditions in the mainstem Clark Fork River may contribute to increased future presence of the migratory form in the Bitterroot River
Clark Fork River Basin (xii.)—Rock Creek	Rock Creek (MT)	Migratory (fluvial)					Yes	250–1,000	200–1,000	2.25	One of four increasingly interconnected riverine habitat patches capable of supporting fluvial/adfluvial migratory bull trout in the Clark Fork River basin	Essential for conservation as one of several occupied major watersheds that forms the headwaters of the Clark Fork River CHU; most of the drainage is on National Forest lands and habitat protection has historically been emphasized; extensive networks of SR habitat have contributed to a relatively strong bull trout population in the watershed; Rock Creek CHSU remains a 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 presence of the migratory form
Clark Fork River Basin (x.)—Blackfoot River	Blackfoot River (MT)	Migratory (fluvial)	0.64	5.2	0.0589		Yes	250–1,000	200–1,000	2.27	One of four increasingly interconnected riverine habitat patches capable of supporting fluvial adult bull trout in the Clark Fork River basin	Essential for conservation as one of several occupied major watersheds that forms the headwaters of the Clark Fork River CHU; several decades of extensive habitat restoration and protection efforts have led to gradually improving conditions and long-term habitat security; 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

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Clark Fork River Basin (xi.)—Clearwater River and Lakes	Clearwater River & Lakes (MT)	Migratory (adfluvial)					Yes	250–1,000	200–1,000	2.49	A rather unique chain of interconnected lakes sharing common migratory population life histories.	Essential for conservation as a significant resource in somewhat unique habitat (a chain of connected lakes), each with separate populations that share an interconnected system of SR streams; the lakes have not yet been compromised by nonnative lake trout (though northern pike are problematic); the CHU is important for the longer-term persistence of the naturally occurring adfluvial life history form of bull trout in the headwaters of the Clark Fork River drainage
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Flathead Lake (MT/BC)	Migratory (adfluvial)				Largest adfluvial core in range	Yes	1,000–2,500	1,000–5,000	3.11	One of about nine relatively large (3,000–125,00 acres) headwaters lakes and reservoirs, each with unique conditions	Essential for conservation because the Flathead Lake core area (the largest freshwater lake in the western United States) historically provided FMO habitat for a very large population of adfluvial migratory bull trout that traveled up to 150 miles 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 B.C. Canada; the size and scope of this core area make it essential to recovery; an extensive network of high-quality SR habitats, including many streams with groundwater influence, may make this CHSU one of the more important bull trout complexes under a variety of changing climate scenarios
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Upper Whitefish Lake (MT)	Migratory (adfluvial)					Yes	<50	40–200	1.15	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions.	Important for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; however, low population levels, angler overexploitation, and restricted habitat make this core area vulnerable to potential extirpation

Columbia Headwaters Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Whitefish Lake (MT)	Migratory (adfluvial)					Yes	<50	40–200	1.30	One of about nine relatively large (3,000 - 125,00 acres) headwaters lakes and reservoirs, each with unique conditions	Important for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; however, low population levels, high nonnative species impacts, and restricted habitat make this core area vulnerable to potential extirpation
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Lake McDonald (MT)	Migratory (adfluvial)					Yes	<50	4–40	1.60	One of about nine relatively large (3,000–125,00 acres) headwaters lakes and reservoirs, each with unique conditions	Important for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; however, low population levels, high nonnative species impacts, and restricted habitat make this core area vulnerable to potential extirpation, despite relatively high-quality habitat in Glacier National Park
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Lincoln Lake (MT)	Migratory (adfluvial)					Yes	50–250	4–40	1.65	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions.	Important for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; however, low population levels, high nonnative species impacts, and restricted habitat make this core area vulnerable to potential extirpation, despite relatively high-quality habitat in Glacier National Park
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Kintla Lake (MT)	Migratory (adfluvial)					Yes	<50	4–40	1.68	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Important for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; however, low population levels, high nonnative species impacts, and restricted habitat make this core area vulnerable to potential extirpation, despite relatively high-quality habitat in Glacier National Park

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CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Bowman Lake (MT)	Migratory (adfluvial)					Yes	<50	4–40	1.82	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Important for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; however, low population levels, high nonnative species impacts, and restricted habitat make this core area vulnerable to potential extirpation, despite relatively high-quality habitat in Glacier National Park
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Harrison Lake (MT)	Migratory (adfluvial)					Yes	<50	200–1,000	1.82	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; low population levels and high nonnative species impacts make this core area vulnerable to potential extirpation; this core area is thought to be recoverable, due in part to relatively high-quality habitat existing in Glacier National Park
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Logging Lake (MT)	Migratory (adfluvial)					Yes	50–250	4–40	1.90	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; low population levels and high nonnative species impacts make this core area vulnerable to potential extirpation; this core area is thought to be recoverable, due in part to relatively high-quality habitat existing in Glacier National Park
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Cyclone Lake (MT)	Migratory (adfluvial)					Yes	<50	4–40	2.01	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Important for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; however, low population levels, high nonnative species impacts, possible angler overexploitation and restricted habitat make this core area vulnerable to potential extirpation

Columbia Headwaters Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Lower Quartz Lake (MT)	Migratory (adfluvial)					Yes	50–250	4–40	2.04	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; low population levels and recently detected nonnative species impacts make this core area vulnerable to potential extirpation; this core area is thought to be recoverable, due in part to relatively high-quality habitat existing in Glacier National Park
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Quartz Lake(s) (MT)	Migratory (adfluvial)					Yes	250–1,000	40–200	2.12	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; recently detected nonnative species impacts make this core area vulnerable to potential extirpation; this core area is thought to be recoverable, due in part to relatively high-quality habitat existing in Glacier National Park
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Frozen Lake (MT)	Migratory (adfluvial)					No	50–250	40–200	2.27	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; small size and scope makes this core area vulnerable, but limited information indicates it has not been impacted by nonnative fish or habitat changes and may be an important component of recovery
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Arrow Lake (MT)	Migratory (adfluvial)				Bull trout /cutthroat only	No	50–250	40–200	2.31	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; this core area supports strong bull trout population levels protected by a barrier from nonnative lake trout invasion and is of high value for protection and recovery, in part because of high-quality habitat in Glacier National Park

Columbia Headwaters Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Isabel Lakes (MT)	Migratory (adfluvial)				Dwarf form	No	250–1,000	4–40	2.37	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; this core area supports strong bull trout population levels protected by a barrier from nonnative lake trout invasion and is of high value for protection and recovery, in part because of high-quality habitat in Glacier National Park
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Upper Stillwater Lake (MT)	Migratory (adfluvial)					Yes	50–250	40–200	2.41	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; high nonnative species impacts and restricted habitat make this core area increasingly fragmented and vulnerable to extirpation, though a fluvial or resident population currently persists in high quality SR habitat in the headwaters
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Trout Lake (MT)	Migratory (adfluvial)				Bull trout /cutthroat only	No	250–1,000	4–40	2.45	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; this core area supports strong bull trout population levels protected by a barrier from nonnative lake trout invasion and is of high value for protection and recovery, in part because of high-quality habitat in Glacier National Park

Columbia Headwaters Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Akokala Lake (MT)	Migratory (adfluvial)					Yes	50–250	4–40	2.47	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; this core area supports strong bull trout population levels despite its small scope and is of high value for protection and recovery, in part because of high-quality habitat in Glacier National Park; potential for nonnative lake trout invasion makes this core area vulnerable and a high priority for protection
Clark Fork River Basin (vi.)—Flathead Lakes, Flathead River and Headwater Lakes	Upper Kintla Lake (MT)	Migratory (adfluvial); downstream migration				Unique—single species	No	250–1,000	40–200	2.81	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of about 20 separate headwater lakes (with varying degrees of connectivity to Flathead Lake) that provide resiliency and redundancy to support the bull trout network in this CHSU; this core area supports strong bull trout population levels protected by a barrier from nonnative lake trout invasion and is of high value for protection and recovery, in part because of high-quality habitat in Glacier National Park; unique in that bull trout are the only salmonid in the core area and outlet spawning occurs
Clark Fork River Basin (vii.)—Swan River and Lakes (Swan)	Swan Lake (MT)	Migratory (adfluvial)	0.71	6.59	0.0591		Yes	1,000–2,500	1,000–5,000	2.78	One of about nine relatively large (3,000–125,00 acres) headwaters lakes and reservoirs, each with unique conditions	Essential for conservation because this core area represents the primary stronghold of 3 lakes arrayed in separate core areas in this CHSU that provide resiliency and redundancy to support strong bull trout populations; an extensive network of high-quality SR habitat make this core area of high value for protection and recovery, despite recent and perhaps increasing impacts from invasive lake trout and brook trout populations

Columbia Headwaters Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Clark Fork River Basin (vii.)—Swan River and Lakes (Swan)	Lindbergh Lake (MT)	Migratory (adfluvial)					Yes	50–250	40–200	2.27	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because this core area represents one of 3 lakes arrayed in separate core areas in this CHSU that provide resiliency and redundancy to support strong bull trout populations; high-quality SR habitat makes this core area high value for protection and recovery, despite recent and perhaps increasing impacts from invasive lake trout and brook trout populations
Clark Fork River Basin (vii.)—Swan River and Lakes (Swan)	Holland Lake (MT)	Migratory (adfluvial)					Yes	50–250	4–40	2.57	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Important for conservation because this core area represents one of 3 lakes arrayed in separate core areas in this CHSU that provide resiliency and redundancy to support strong bull trout populations; very restricted SR habitat makes this core area vulnerable to potential impacts from invasive lake trout populations established in the CHSU, but not yet detected in Holland Lake
Clark Fork River Basin (viii.)—Hungry Horse reservoir, South Fork Flathead River and Headwater Lakes	Hungry Horse Res. (MT)	Migratory (adfluvial)					Yes	2,500–10,000	1,000–5,000	3.71	One of about nine relatively large (3,000–125,00 acres) headwaters lakes and reservoirs, each with unique conditions	Essential for conservation because the Hungry Horse Reservoir core area now provides an important regional refugium from nonnative species impacts for a significant segment of the historically connected Flathead Lake ecosystem; an extensive network of high-quality SR habitat arrayed throughout the Bob Marshall Wilderness and the security from invasion provided by Hungry Horse Dam produce very high long-term values for bull trout protection and recovery efforts in the CHU
Clark Fork River Basin (viii.)—Hungry Horse reservoir, South Fork Flathead River and Headwater Lakes	Doctor Lake (MT)	Migratory (adfluvial)					No	50–250	40–200	2.41	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because the Doctor Lake core area provides resiliency and redundancy for an important regional refugium from nonnative species impacts for a significant segment of the historically connected Flathead Lake ecosystem; the core area location within the Bob Marshall Wilderness and the security from invasion provided by Hungry Horse Dam downstream produce very high long-term values for bull trout protection and recovery efforts in the CHU

Columbia Headwaters Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Clark Fork River Basin (viii.)—Hungry Horse reservoir, South Fork Flathead River and Headwater Lakes	Big Salmon Lake (MT)	Migratory (adfluvial)					Yes	250–1,000	40–200	2.68	One of approximately 20 small headwater lakes in core area, many of which have uniquely different fish species assemblages and habitat conditions	Essential for conservation because the Big Salmon Lake core area provides resiliency and redundancy for an important regional refugium from nonnative species impacts for a significant segment of the historically connected Flathead Lake ecosystem; the core area location within the Bob Marshall Wilderness and the security from invasion provided by Hungry Horse Dam downstream produce very high long-term values for bull trout protection and recovery efforts in the CHU

Saint Mary Recovery Unit

CHU—CHSU	Core Area or Shared FMO Habitat	Predominant Life History (1)	Genetic Diversity (He) (2a)	Genetic Diversity (AR) (2b)	Genetic Uniqueness (CSE Chord Distance) (2c)	Unique Habitat Type (3)	Connectivity to Other Core Areas (4)	Population Size (NatureServe Value Range) (5)	Area of Occupancy (km) (NatureServe Value Range) (5)	Threats-based Risk Score (NatureServe Rank Factor Value) (6)	Distribution and Redundancy (3&7)	Summarize How Essential Each Core Area is to the Recovery Unit
Saint Mary River Basin	Lee Creek (MT/AB)	Migratory (Fluvial)	0.44	3.08	0.0315	FMO in Alberta	Marginally		4–40	1.24	SR only, with migratory fish returning to Alberta	Important for conservation because of historic contribution to the metapopulation; however, much of the SR habitat and all of the FMO for this core is in Alberta and seemingly weakly connected, if at all, to U.S. populations under existing conditions
Saint Mary River Basin	Saint Mary River (MT/AB)	Migratory (Fluvial)	0.49 0.44	3.58 3.61	0.0240 0.0237	Portion of FMO in Alberta	Yes	250–1,000	40–200	2.60	Southernmost extension of bull trout range in the Hudson Bay Watershed	Essential for conservation because this core area represents the major portion of the only U.S. bull trout population east of the Continental Divide; much of the SR habitat occurs in Montana, but FMO habitat occurs primarily downstream in portions of the watershed in southwestern Alberta; conservation of this CHSU in the U.S. provides strong incentive for continued Canadian cooperation in broader bull trout recovery efforts
Saint Mary River Basin	Red Eagle Lake (MT)	Migratory (Adfluvial)					Yes	50–250	4–40	2.45	One of three small, isolated adfluvial core areas	Essential for conservation because this core area represents one of three headwater lake basins with connectivity to the Saint Mary River, providing some resiliency and redundancy to support the bull trout network in this CHU; core area supports moderate bull trout population levels protected by a partial barrier from nonnative species invasion (though lake trout are native downstream) and occurs in high quality habitat in Glacier National Park
Saint Mary River Basin	Slide Lake (MT)	Migratory (Adfluvial)					Marginally		4–40	2.45	One of three small, isolated adfluvial core areas	Essential for conservation because this core area represents one of three headwater lake basins with connectivity to the Saint Mary River, providing some resiliency and redundancy to support the bull trout network in this CHU; core area supports moderate bull trout population levels protected by a partial barrier from nonnative species invasion (though lake trout are native downstream) and occurs in high quality habitat in Glacier National Park

Saint Mary Recovery Unit												
CHU—CHSU	**Core Area or Shared FMO Habitat**	**Predominant Life History (1)**	**Genetic Diversity (He) (2a)**	**Genetic Diversity (AR) (2b)**	**Genetic Uniqueness (CSE Chord Distance) (2c)**	**Unique Habitat Type (3)**	**Connectivity to Other Core Areas (4)**	**Population Size (NatureServe Value Range) (5)**	**Area of Occupancy (km) (NatureServe Value Range) (5)**	**Threats-based Risk Score (NatureServe Rank Factor Value) (6)**	**Distribution and Redundancy (3&7)**	**Summarize How Essential Each Core Area is to the Recovery Unit**
Saint Mary River Basin	Cracker Lake (MT)	Migratory (Adfluvial)				High elevation, possibly introduced	No	250–1,000	40–200	2.37	One of three small, isolated adfluvial core areas—possibly introduced	Essential for conservation because this core area represents one of three headwater lake basins with connectivity to the Saint Mary River, providing some resiliency and redundancy to support the bull trout network in this CHU; core area supports moderate bull trout population levels protected by a partial barrier from nonnative species invasion (though lake trout are native downstream) and occurs in high quality habitat in Glacier National Park