

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

Chapter 4. Coastal Recovery Unit—Upper Willamette River Critical Habitat Unit

Chapter 4. Upper Willamette River Critical Habitat Unit

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

The four local populations in the McKenzie and Middle Fork Willamette rivers have been isolated from each other due to the construction and operation of impassable dams. Connecting each of these local populations is important for future connectivity and long-term persistence. Connectivity between local populations in the McKenzie River Subbasin is expected over the next decade due to fish passage modifications planned for Trail Bridge Dam (mainstem McKenzie River) and Cougar Dam (South Fork McKenzie River). The majority of the McKenzie and Middle Fork Willamette rivers provide suitable bull trout spawning and rearing, foraging, migrating and overwintering habitats. Provided connectivity is restored in the near future, the habitat contained in the final rule is likely sufficient to support population viability in the Upper Willamette Core Area (see Appendix 1 for more detailed information).

The Willamette River Basin, situated in northwestern Oregon, is a major tributary of the Columbia River, and enters the Columbia River. It drains an area of approximately 31,080 km², almost one-eighth of Oregon's total area and part or all of ten counties. It is bounded on the north by the Columbia River and on the east, south and west by the summits of the Cascade Range, the Calapooia Mountains, and the Coast Range, respectively. The north-south length of the basin is about 240 kilometers and its average east-west width is about 120 kilometers. Principal streams of the basin head at elevations of 1,830 meters and higher in the bordering Cascades. In higher elevations of the Cascade Range where bull trout occur, precipitation ranges from 229 to 356 centimeters and snowfall is heavy with considerable snowpack accumulation. Major tributaries of the Willamette River include the Clackamas, Tualatin, Molalla, Yamhill, Santiam, Calapooia, Mary's, Long Tom, McKenzie, Middle Fork Willamette, and Coast Fork Willamette rivers. This unit is located primarily within Lane County, but also extends into Linn County.

Bull trout currently occur in the McKenzie and Middle Fork Willamette rivers and occurred historically in the Santiam and Clackamas rivers, all of which originate in the Cascade Mountains. The Willamette River Basin is currently composed of one core area, the Upper Willamette Core Area and includes the McKenzie and Middle Fork Willamette rivers, and one core habitat, the Clackamas Core Habitat. Critical habitat is not designated in the Clackamas River Core Habitat because this area is designated for a reintroduction of bull trout under 10(j) of the ESA (experimental non-essential designation) which by law does not allow for the designation of critical habitat (74 FR 65045). The Santiam subbasin also had historic bull trout populations, but is not considered core habitat.

There are three bull trout local populations in the McKenzie River subbasin and one bull trout local population in the Middle Fork Willamette River subbasin. All four local populations are identified as essential for bull trout recovery in the Service's Draft Bull Trout Recovery Plan (Service 2002). With the exception of a short reach of the mainstem Willamette River and the mainstem Middle Fork Willamette River (including reservoirs) below Hills Creek Dam, segments designated as critical habitat are occupied by bull trout, and are essential to supporting populations in the Coastal Recovery Unit.

Rationale for determining Critical Habitat based on the Seven Guiding Principles

1. Conserve opportunity for diverse life-history expression – Bull trout in the Upper Willamette Core Area were likely fluvial historically but now include several local populations that have adopted an adfluvial life history strategy due to the presence of impassable dams and large reservoirs. The one remaining fluvial local population is the Mainstem McKenzie local population. There is no evidence that a bull trout resident life history expression existed in the core area, nor was there a natural adfluvial life history expression. Over the next decade, fish passage projects in the McKenzie River Subbasin are expected to provide opportunities for each local population to return to their historical fluvial life history expression.

2. Conserve opportunity for genetic diversity – Ardren et al., (2010, p. 26) conducted a genetic analysis of 75 bull trout populations across the species' range in the United States. Their findings, which were consistent with other broad-scale genetic analyses of bull trout and (Spruell et al., 2003) indicated a high level of genetic distinction among local populations of bull trout. These results indicate that gene flow rarely occurs among the major river basins.

Genetic analyses by Ardren et al. (2010, p. 62) and Spruell et al. (2003, p. 23) indicate that the local populations that comprise the Upper Willamette Core Area are part of the Coastal Recovery Unit (evolutionary lineage) but are unique since they share alleles with Klamath River bull trout. Although Ardren et al. (2010, p. 26) highlighted the high level of genetic distinction among local bull trout populations, Spruell et al. (2003, p. 23) suggested among Coastal lineage local populations there is a wide amount of variation relative to that observed among the other major evolutionary lineages in the Snake and Columbia basins. Within the Coastal Recovery Unit, the Willamette populations were unique from those found in neighboring basins such as the Deschutes, Lewis and Hood rivers.

3. Ensure bull trout are distributed across representative habitats – Bull trout that comprise the Upper Willamette Core Area represent the southern and western extreme of the bull trout's range. Habitats at the edge of a species range are often marginal. While some habitat within the core area is highly suitable for bull trout (e.g., the McKenzie and its cold groundwater dominated tributaries) other habitats are less suitable and may prove marginal given habitat degradation and impending climate change (e.g., Middle Fork Willamette River). However, local populations in the McKenzie River are not robust and thus the maintenance and recovery of other local populations in the core area, and the reestablishment of bull trout in historical habitat elsewhere in and outside the core area, are likely required for long-term persistence.

4. Ensure sufficient connectivity among populations – The four local populations in the McKenzie and Middle Fork Willamette rivers have been isolated from each other due to the construction and operation of impassable dams. The critical habitat designation connects each of these local populations and thus emphasizes the importance of future connectivity for long-term persistence. Connectivity between local populations in the McKenzie River Subbasin is

expected over the next decade due to fish passage modifications planned for Trail Bridge Dam (mainstem McKenzie River) and Cougar Dam (South Fork McKenzie River). A trap and haul collection facility for upstream passage at Cougar Dam became operational in 2010.

5. *Ensure sufficient habitat to support population viability (e.g., abundance, trend indices)* - This critical habitat designation encompasses the majority of the McKenzie and Middle Fork Willamette rivers that are deemed suitable for bull trout spawning and rearing and for foraging, migrating and overwintering. Provided connectivity is restored in the near future, the habitat contained in the designation is likely sufficient to support population viability in the Upper Willamette Core Area.

6. *Consider threats (e.g., climate change)* – As noted above in #3, bull trout in this core area persist at the edge of the species' range. Inherently, populations at the edge of their natural range are often more vulnerable to threats, natural or otherwise. Climate change will impact bull trout throughout its range but will likely have greater impacts in those habitats that are marginal for the species. In the Upper Willamette Core Area the McKenzie River, due to its abundance of groundwater fed tributaries, may be less vulnerable than the Middle Fork Willamette which does not contain as much cold groundwater dominated flow. Another significant threat, low population size, continues to threaten several of the local populations in this core area although recent efforts to implement conservation actions and rehabilitation programs are proving successful.

7. *Ensure sufficient redundancy in conserving population units* – Bull trout have been extirpated from a large portion of their previous habitat in the Willamette Basin (e.g., Clackamas River, North Santiam River, South Santiam River, and portions of the Middle Fork Willamette River). Efforts are underway to further reestablish bull trout in the Middle Fork Willamette River, and to investigate reintroduction in other subbasins that have been subject to extirpations, namely the Clackamas River. Although the overall trend in the Upper Willamette Core Area is stable, there are not enough bull trout, or local populations, to ensure redundancy. Overall recovery of bull trout in the Willamette Basin will require additional conservation actions to benefit existing local populations and implementation of actions to reintroduce bull trout to areas in the Willamette Basin that were historically occupied and which contain currently suitable habitat.

The following water bodies are included in this CHU (see Table 27)

Willamette River from its confluence with the McKenzie River upstream 19 km (11.8 mi) to its confluence with the Middle Fork Willamette River is FMO habitat. This segment provides for the future maintenance of the migratory life history form of bull trout that is essential to the long-term conservation of the species and is essential for providing future connectivity between the McKenzie River and Middle Fork Willamette River local populations. Occupancy is unknown; however, an adult bull trout was captured near the confluence of the Willamette and McKenzie rivers in March 1999 by the Oregon Department of Fish and Wildlife (Ziller and Taylor 2000, p. 9). This habitat is essential to provide connectivity between local populations in the two major subbasins associated with the Upper Willamette Core Area.

McKenzie River Subbasin

The McKenzie subbasin drains an area of about 3367 km², comprising about 11 percent of the Willamette Basin; more than 80 percent of the subbasin is in Lane County, with the remainder in Linn County. Currently, three bull trout local populations exist: 1) McKenzie River and

tributaries above Trail Bridge Dam including Trail Bridge Reservoir (Trail Bridge local population) 2) McKenzie River and tributaries downstream of Trail Bridge Dam (Mainstem McKenzie local population); and 3) South Fork McKenzie River and tributaries above Cougar Dam (South Fork McKenzie local population).

McKenzie River and side channels from its confluence with the Willamette River upstream 123.8 km (76.9 mi) to Trail Bridge Dam contains essential foraging, migratory and overwintering habitat for the local bull trout population in the McKenzie River and tributaries below Trail Bridge Dam. Most of the Mainstem McKenzie local population occurs upstream of Leaburg Dam although a small number of adult and subadult bull trout are documented ascending Leaburg Dam annually in the Spring and Summer providing evidence of FMO use in the lower McKenzie River (Ziller and Taylor 2000, p. 9; ODFW, in litt. 2008b).

McKenzie River from its confluence with Trail Bridge Reservoir upstream approximately 1.8 (1.1 miles) is utilized for spawning and rearing for the Trail Bridge local population (USFS 2009e, p. 4-6).

Trail Bridge Reservoir is a 23.3 ha (57.6 ac) reservoir on the McKenzie River and is the primary overwintering (FMO) habitat for adults and subadults from the Trail Bridge local population. Due to the close proximity to spawning areas in the mainstem McKenzie River upstream of Trail Bridge Reservoir and in Sweetwater Creek (direct tributary to the reservoir), Trail Bridge Reservoir also serves as an important rearing area for juvenile bull trout (USFS 2009e, p. 4-6).

Smith River from its confluence with Trail Bridge Reservoir upstream 1.0 km (0.6 mi) to Smith River Dam is utilized as FMO for the Trail Bridge local population. Under current conditions bull trout have been observed seasonally in the lower portion of Smith River below Smith River Dam. Increased flows in this reach will likely increase and improve conditions for bull trout in the near future under Eugene Water and Electric Board's new license from FERC (Stillwater Sciences 2006, p. 58).

Sweetwater Creek from its confluence with Trail Bridge Reservoir upstream 1.0 km (0.6 mi) to a natural barrier is spawning and rearing habitat. Sweetwater Creek provides one of only two spawning areas for bull trout associated with the Trail Bridge Reservoir local population (the other being the mainstem McKenzie River upstream of Trail Bridge Reservoir). From 2006-2008, Sweetwater Creek averaged 20 redds (USFS 2009e, p. 10).

Carmen-Smith Spawning Channel from its confluence with the McKenzie River upstream approximately 0.3 kilometers (0.2 miles) serves as spawning and rearing habitat. It is located just downstream of Trail Bridge Dam and includes the Chinook salmon spawning channel constructed by Eugene Water and Electric Board (EWEB) for mitigation of fish habitat impacts from construction and operation of the Carmen-Smith Hydroelectric Project. Several bull trout redds have been observed in this reach in recent years (USFS 2009e, p. 11).

South Fork McKenzie River from its confluence with the McKenzie River below Cougar Dam upstream 26.1 km (16.3 mi) to Roaring River is FMO habitat. This segment includes the South Fork McKenzie River below Cougar Dam and above Cougar Reservoir up to Roaring River. The South Fork McKenzie River below Cougar Dam provides quality foraging, migration and overwintering habitat for adult and subadult bull trout from the Mainstem McKenzie local population and for bull trout from above Cougar Dam (South Fork McKenzie local population)

that are occasionally entrained through Cougar Dam turbines or regulating outlets. The quality of habitat has improved in recent years due largely to the return to normative stream temperatures from operation of temperature control beginning at Cougar Dam in 2005 (Service 2007, p. 27-28). A fish collection facility at the base of Cougar Dam is operable as of 2010 and will provide a means of capturing and transferring bull trout to habitat above Cougar Dam. The critical habitat segment above Cougar Dam provides high quality foraging, migration and overwintering habitat for the South Fork McKenzie River local population of bull trout.

Roaring River from its confluence with the South Fork McKenzie River upstream 4.2 km (2.6 miles) is utilized for spawning and rearing by the South Fork McKenzie River local population. Roaring River is a large spring-fed stream which provides the only known spawning habitat for the South Fork McKenzie local population of bull trout. Redd counts in 2007 totaled 54 and 41 in 2008 (USFS 2009e).

Cougar Reservoir with 559.9 ha (1,383.5 ac) surface area at full pool is FMO habitat. Intensive monitoring of the South Fork McKenzie River local population by ODFW indicates Cougar Reservoir provides essential foraging, migratory and overwintering habitat for adult, subadult and older juvenile bull trout (Service 2007, p. 26). A majority of adult and subadult bull trout from this local population utilize the reservoir (and the lower half mile of the East Fork McKenzie River) to stage for spawning from fall through spring prior to migrating upstream into the South Fork McKenzie River.

East Fork South Fork McKenzie River from its confluence with Cougar Reservoir upstream 0.8 km (0.5 mi) is foraging, migration and overwintering habitat. Use is seasonal based on water temperatures and reservoir elevations that influence accessibility.

Blue River from its confluence with the McKenzie River upstream 2.8 km (1.7 mi) to Blue River Dam is occupied seasonally and utilized as FMO habitat.

Horse Creek including side channels, from its confluence with the McKenzie River upstream 14.2 kilometers (8.9 miles) to Separation Creek is used for foraging, migration and overwintering by the Mainstem McKenzie local population. A 95mm bull trout was seined by ODFW during the summer of 2009 in a side channel of Horse Creek at RM 7.0 (K. Kenaston, pers. comm. 2009).

East Fork Horse Creek including side channels, from its confluence with Horse Creek upstream 0.7 kilometers (0.4 miles) is used for foraging, migration and overwintering by the Mainstem McKenzie local population.

West Fork Horse Creek including side channels, from its confluence with Horse Creek upstream 2.8 kilometers (1.7 miles) is used for foraging, migration and overwintering by the Mainstem McKenzie local population.

Lost Creek from the McKenzie River confluence upstream 6.2 km (3.9 miles) to White Branch Creek provides spawning and rearing habitat for the Mainstem McKenzie local population. Although spawning has not been documented, seasonal use has been reported and suitable habitat exists and it is possible that limited spawning may be occurring (D. Bickford, USFS Willamette National Forest, pers. comm. 2010).

White Branch Creek from its confluence with Lost Creek upstream 1.3 km (0.8 miles) to approximately the road 242 crossing provides spawning and rearing habitat for the Mainstem McKenzie local population. Although spawning has not been documented,

seasonal use has been reported and suitable habitat exists and it is possible that limited spawning may be occurring (D. Bickford, USFS Willamette National Forest, pers. comm. 2010).

Deer Creek from its confluence with the McKenzie River upstream for 2.2 km (1.4 miles) is FMO habitat for the Mainstem McKenzie River local population. It is possible bull trout utilize habitat farther upstream as no barriers inhibit upstream migration, however, they have not been documented beyond 2.2 km (1.4 RM) upstream of the mouth.

Olallie Creek from its confluence with the McKenzie River upstream 2.1 km (1.3 mi) to a natural barrier is spawning and rearing habitat. Olallie Creek is one of only three known spawning and early juvenile rearing areas for bull trout from the Mainstem McKenzie River local population, the other two being Anderson Creek and the spawning channel immediately below Trail Bridge Dam in the mainstem McKenzie River. Olallie Creek has averaged 13 redds a year between 2003 and 2007 (USFS 2009e, p. 10).

Anderson Creek from its confluence with the McKenzie River upstream 3.1 km (1.9 mi) to a natural barrier is spawning and rearing habitat. Anderson Creek is the primary tributary utilized for spawning and rearing by the Mainstem McKenzie River local bull trout population. From 2000 to 2007 Anderson Creek averaged approximately 60 redds a year (USFS 2009e, p.10).

Middle Fork Willamette River Subbasin

The Middle Fork Willamette subbasin covers 3496 km², or about 11 percent of the Willamette Basin; 94 percent of the subbasin is in Lane County, 6 percent in Douglas County. Historic distribution in the Middle Fork Willamette subbasin likely included the mainstem Middle Fork Willamette, North Fork of the Middle Fork Willamette, Salt Creek, Swift Creek, and Staley Creek. Today bull trout are only known to exist in the Middle Fork Willamette River and tributaries above Hills Creek Dam as a result of a relocation project where fry from Anderson Creek in the McKenzie River were placed in multiple tributaries and springs above Hills Creek Dam (ODFW 2007b, p.1). Currently the population is estimated to be less than 20 adults (ODFW 2007b, p. 8).

Middle Fork Willamette River from its confluence with the Willamette River upstream 48 km (29.8 mi) to Hills Creek Dam is unoccupied FMO habitat. It is considered an essential migratory corridor for future connectivity between local populations in the Middle Fork Willamette River Subbasin and local populations in the McKenzie River Subbasin. Connectivity Criteria contained in the Willamette River Recovery Unit Chapter of the draft recovery plan (Service 2002a, p. v11-v12) includes connectivity between local populations within the Upper Willamette Core Area. Connecting the local population in the Middle Fork Willamette River above Hills Creek Dam with local populations in the McKenzie River will require fish passage at all three dams owned and operated by the Corps of Engineers in the Middle Fork Willamette River (Dexter, Lookout Point, Hills Creek dams). The feasibility of fish passage at these facilities will be assessed in the near future as required by biological opinions issued by the Service and by NMFS in 2008 (Service 2008g, NMFS 2008).

Middle Fork Willamette River from the top of Hills Creek Reservoir upstream 27.2 km (16.9 miles) to Swift Creek is utilized as FMO habitat and from the confluence of Swift Creek 5.1 km (3.1 miles) to approximately Paddy's Valley provides for the spawning and rearing habitat for the Middle Fork Willamette River local population. The majority of documented spawning

occurs in small springs adjacent to the Middle Fork Willamette River but some spawning has been documented in the mainstem Middle Fork Willamette River itself. The majority of documented spawning occurs in small springs adjacent to the Middle Fork Willamette River (e.g., Chuckle and Iko springs) but some spawning has been documented in the mainstem Middle Fork Willamette River as well (ODFW 2007b, p. 21). The majority of the subadult and adult bull trout population in the Middle Fork Willamette is thought to utilize Hills Creek Reservoir for overwintering and foraging.

Dexter Reservoir, (343.4 ha (848.5 ac) is unoccupied FMO habitat and essential for future connectivity between local populations in the Middle Fork Willamette River Subbasin and local populations in the McKenzie River Subbasin. Connectivity Criteria contained in the Willamette River Recovery Unit Chapter of the draft recovery plan (Service 2002a, p. v11-v12) includes connectivity between local populations within the Upper Willamette Core Area. Connecting the local population in the Middle Fork Willamette River above Hills Creek Dam with local populations in the McKenzie River will require fish passage at all three dams owned and operated by the Corps of Engineers in the Middle Fork Willamette River (Dexter, Lookout Point, Hills Creek dams). The feasibility of fish passage at these facilities will be assessed in the near future as required by biological opinions issued by the Service and by NMFS in 2008 (Service 2008g, NMFS 2008).

Lookout Point Reservoir, (1,615.8 ha (3,992.6 ac) is unoccupied FMO habitat and essential for future connectivity between local populations in the Middle Fork Willamette River Subbasin and local populations in the McKenzie River Subbasin. Connectivity Criteria contained in the Willamette River Recovery Unit Chapter of the draft recovery plan (Service 2002a, p. v11-v12) includes connectivity between local populations within the Upper Willamette Core Area. Connecting the local population in the Middle Fork Willamette River above Hills Creek Dam with local populations in the McKenzie River will require fish passage at all three dams owned and operated by the Corps of Engineers in the Middle Fork Willamette River (Dexter, Lookout Point, Hills Creek dams). The feasibility of fish passage at these facilities will be assessed in the near future as required by biological opinions issued by the Service and by NMFS in 2008 (Service 2008g, NMFS 2008).

Hills Creek Reservoir (1,059.2 ha (2,617.4 ac) provides essential foraging, migratory and overwintering habitat for adult, subadult and older juvenile bull trout. A majority of adult and subadult bull trout from the local population utilize the reservoir from fall through spring prior to migrating upstream into the Middle Fork Willamette River (ODFW 2007b, p. 19).

Swift Creek from its confluence with the Middle Fork Willamette River upstream 14.7 km (9.1 miles) to its headwaters is spawning and rearing habitat. Swift Creek was used by bull trout historically based on 1960 field notes from a fish eradication project prior to filling Hills Creek Reservoir (ODFW 2007b, p. 35-38). Consequently, and in associated with the Middle Fork Willamette Bull Trout Rehabilitation Project, ODFW and the USFS have been transplanting fry and wild captive-reared bull trout juveniles from Anderson Creek on the McKenzie River to various habitats in the Middle Fork Willamette River, including Swift Creek. The transplanted fish have been documented rearing in these habitats but spawning has not yet been observed.

Bear Creek from its confluence with Swift Creek upstream 3.2 km (2 miles) is spawning and rearing habitat. Bear Creek was used by bull trout historically based on 1960 field notes from a fish eradication project prior to filling Hills Creek Reservoir (ODFW 2007b,

p. 35-38). Consequently, and in associated with the Middle Fork Willamette Bull Trout Rehabilitation Project, ODFW and the USFS have been transplanting fry and wild captive-reared bull trout juveniles from Anderson Creek on the McKenzie River to various habitats in the Middle Fork Willamette River, including Bear Creek. The transplanted fish have been documented rearing in these habitats but spawning has not yet been observed.

Indigo Springs from its confluence with the Middle Fork Willamette River upstream 0.5 km (0.3 mi) is spawning and rearing habitat. Associated with the Middle Fork Willamette Bull Trout Rehabilitation Project, ODFW and the USFS have been transplanting fry and wild captive-reared bull trout juveniles from Anderson Creek on the McKenzie River to various habitats in the Middle Fork Willamette River, including Indigo Springs. Indigo Springs is a cold-water spring that likely contained historical spawning and rearing habitat for bull trout prior to construction of a road crossing that created a fish passage barrier. Bull trout are currently rearing in this habitat and it is anticipated that a new fish friendly culvert and restored side-channel, completed in 2009, will allow bull trout to access spawning and rearing habitat in the upper half of the stream segment (USFS 2009e, p. 9).

Table 27. Water body segments designated as critical habitat for bull trout, including documentation of occupancy and site-specific rationale in the Upper Willamette River CHU/CHSU

CHU—CHSU	Water Body Name	State	Information Documenting Bull Trout Occupancy	Essential Habitat Rationale	LLID
Upper Willamette River—None	Anderson Creek	OR	Anderson Creek from its confluence with the McKenzie River upstream 3.1 km (1.9 mi) to a natural barrier is spawning and rearing habitat. Anderson Creek is the primary tributary utilized for spawning and rearing by the Mainstem McKenzie River local bull trout population. From 2000 to 2007 Anderson Creek averaged approximately 60 redds a year (USFS 2009e, p.10).	See text for this CHU	1220453 442625
Upper Willamette River—None	Bear Creek	OR	Bear Creek from its confluence with Swift Creek upstream 3.2 km (2 miles) is spawning and rearing habitat. Bear Creek was used by bull trout historically based on 1960 field notes from a fish eradication project prior to filling Hills Creek Reservoir (ODFW 2007b, p. 35-38). Consequently, and in associated with the Middle Fork Willamette Bull Trout Rehabilitation Project, ODFW and the USFS have been transplanting fry and wild captive-reared bull trout juveniles from Anderson Creek on the McKenzie River to various habitats in the Middle Fork Willamette River, including Bear Creek. The transplanted fish have been documented rearing in these habitats but spawning has not yet been observed.	See text for this CHU	1222435 435439
Upper Willamette River—None	Blue River	OR	Blue River from its confluence with the McKenzie River upstream 2.8 km (1.7 mi) to Blue River Dam is occupied seasonally and utilized as FMO habitat.	See text for this CHU	1223436 441532
Upper Willamette River—None	Carmen-Smith Spawning Channel	OR	Carmen-Smith Spawning Channel from its confluence with the McKenzie River upstream approximately 0.3 kilometers (0.2 miles) serves as spawning and rearing habitat. It is located just downstream of Trail Bridge Dam and includes the Chinook salmon spawning channel constructed by Eugene Water and Electric Board (EWEB) for mitigation of fish habitat impacts from construction and operation of the Carmen-Smith Hydroelectric Project. Several bull trout redds have been observed in this reach in recent years (USFS 2009e, p. 11).	See text for this CHU	1220520 442710

CHU—CHSU	Water Body Name	State	Information Documenting Bull Trout Occupancy	Essential Habitat Rationale	LLID
Upper Willamette River—None	Deer Creek	OR	Currently occupied by foraging and overwintering adults and subadults from the McKenzie River Population (Ziller and Taylor 2000). It is likely bull trout exist farther upstream as no barriers inhibit their movement; however, they have not been documented beyond 2.2 km (1.4 RM) upstream of the mouth.	See text for this CHU	1220576 442407
Upper Willamette River—None	Deer Creek	OR	Deer Creek from its confluence with the McKenzie River upstream for 2.2 km (1.4 miles) is FMO habitat for the Mainstem McKenzie River local population. It is possible bull trout utilize habitat farther upstream as no barriers inhibit upstream migration, however, they have not been documented beyond 2.2 km (1.4 RM) upstream of the mouth.	See text for this CHU	1220576 442407
Upper Willamette River—None	East Fork Horse Creek	OR	East Fork Horse Creek including side channels, from its confluence with Horse Creek upstream 0.7 kilometers (0.4 miles) is used for foraging, migration and overwintering by the Mainstem McKenzie local population.	See text for this CHU	1221788 441756
Upper Willamette River—None	East Fork South Fork McKenzie River	OR	East Fork South Fork McKenzie River from its confluence with Cougar Reservoir upstream 0.8 km (0.5 mi) is foraging, migration and overwintering habitat. Use is seasonal based on water temperatures and reservoir elevations that influence accessibility.	See text for this CHU	1222353 441153
Upper Willamette River—None	Horse Creek	OR	Horse Creek including side channels, from its confluence with the McKenzie River upstream 14.2 kilometers (8.9 miles) to Separation Creek is used for foraging, migration and overwintering by the Mainstem McKenzie local population. A 95mm bull trout was seined by ODFW during the summer of 2009 in a side channel of Horse Creek at RM 7.0 (K. Kenaston pers. comm., 2009).	See text for this CHU	1221750 441703

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CHU—CHSU	Water Body Name	State	Information Documenting Bull Trout Occupancy	Essential Habitat Rationale	LLID
Upper Willamette River—None	Indigo Creek	OR	Indigo Springs from its confluence with the Middle Fork Willamette River upstream 0.5 km (0.3 mi) is spawning and rearing habitat. Associated with the Middle Fork Willamette Bull Trout Rehabilitation Project, ODFW and the USFS have been transplanting fry and wild captive-reared bull trout juveniles from Anderson Creek on the McKenzie River to various habitats in the Middle Fork Willamette River, including Indigo Springs. Indigo Springs is a cold-water spring that likely contained historical spawning and rearing habitat for bull trout prior to construction of a road crossing that created a fish passage barrier. Bull trout are currently rearing in this habitat and it is anticipated that a new fish friendly culvert and restored side-channel, completed in 2009, will allow bull trout to access spawning and rearing habitat in the upper half of the stream segment (USFS 2009e, p. 9).	See text for this CHU	1222682 434954

CHU—CHSU	Water Body Name	State	Information Documenting Bull Trout Occupancy	Essential Habitat Rationale	LLID
Upper Willamette River—None	McKenzie River	OR	<p>The McKenzie subbasin drains an area of about 3367 km², comprising about 11 percent of the Willamette Basin; more than 80 percent of the subbasin is in Lane County, with the remainder in Linn County. Currently, three bull trout local populations exist: 1) McKenzie River and tributaries above Trail Bridge Dam including Trail Bridge Reservoir (Trail Bridge local population) 2) McKenzie River and tributaries downstream of Trail Bridge Dam (Mainstem McKenzie local population); and 3) South Fork McKenzie River and tributaries above Cougar Dam (South Fork McKenzie local population). McKenzie River and side channels from its confluence with the Willamette River upstream 123.8 km (76.9 mi) to Trail Bridge Dam contains essential foraging, migratory and overwintering habitat for the local bull trout population in the McKenzie River and tributaries below Trail Bridge Dam. Most of the Mainstem McKenzie local population occurs upstream of Leaburg Dam although a small number of adult and subadult bull trout are documented ascending Leaburg Dam annually in the Spring and Summer providing evidence of FMO use in the lower McKenzie River (Ziller and Taylor 2000, p. 9; ODFW, in litt. 2008b). McKenzie River from its confluence with Trail Bridge Reservoir upstream approximately 1.8 (1.1 miles) is utilized for spawning and rearing for the Trail Bridge local population (USFS 2009e, p. 4-6).</p>	See text for this CHU	1230673 441173

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CHU—CHSU	Water Body Name	State	Information Documenting Bull Trout Occupancy	Essential Habitat Rationale	LLID
Upper Willamette River—None	Middle Fork Willamette River	OR	<p>Bull trout are only known to exist in the Middle Fork Willamette River and tributaries above Hills Creek Dam as a result of a relocation project where fry from Anderson Creek in the McKenzie River were placed in multiple tributaries and springs above Hills Creek Dam (ODFW 2007a, p.1). Currently the population is estimated to be less than 20 adults (ODFW 2007a, p. 8).</p> <p>Middle Fork Willamette River from its confluence with the Willamette River upstream 48 km (29.8 mi) to Hills Creek Dam is unoccupied FMO habitat. It is considered an essential migratory corridor for future connectivity between local populations in the Middle Fork Willamette River Subbasin and local populations in the McKenzie River Subbasin.</p> <p>Middle Fork Willamette River from the top of Hills Creek Reservoir upstream 27.2 km (16.9 miles) to Swift Creek is utilized as FMO habitat and from the confluence of Swift Creek 5.1 km (3.1 miles) to approximately Paddy’s Valley provides for the spawning and rearing habitat for the Middle Fork Willamette River local population. The majority of documented spawning occurs in small springs adjacent to the Middle Fork Willamette River but some spawning has been documented in the mainstem Middle Fork Willamette River itself. The majority of documented spawning occurs in small springs adjacent to the Middle Fork Willamette River (e.g., Chuckle and Iko springs) but some spawning has been documented in the mainstem Middle Fork Willamette River as well (ODFW 2007a, p. 21). The majority of the subadult and adult bull trout population in the Middle Fork Willamette is thought to utilize Hills Creek Reservoir for overwintering and foraging.</p>	See text for this CHU	1230144 440225

CHU—CHSU	Water Body Name	State	Information Documenting Bull Trout Occupancy	Essential Habitat Rationale	LLID
Upper Willamette River—None	Olallie Creek	OR	Olallie Creek from its confluence with the McKenzie River upstream 2.1 km (1.3 mi) to a natural barrier is spawning and rearing habitat. Olallie Creek is one of only three known spawning and early juvenile rearing areas for bull trout from the Mainstem McKenzie River local population, the other two being Anderson Creek and the spawning channel immediately below Trail Bridge Dam in the mainstem McKenzie River. Olallie Creek has averaged 13 redds a year between 2003 and 2007 (USFS 2009e, p. 10).	See text for this CHU	1230144 440225.2
Upper Willamette River—None	Roaring River	OR	Roaring River from its confluence with the South Fork McKenzie River upstream 4.2 km (2.6 miles) is utilized for spawning and rearing by the South Fork McKenzie River local population. Roaring River is a large spring-fed stream which provides the only known spawning habitat for the South Fork McKenzie local population of bull trout. Redd counts in 2007 totaled 54 and 41 in 2008 (USFS 2009e).	See text for this CHU	1230144 440225.3
Upper Willamette River—None	Smith River	OR	Smith River from its confluence with Trail Bridge Reservoir upstream 1.0 km (0.6 mi) to Smith River Dam is utilized as FMO for the Trail Bridge local population. Under current conditions bull trout have been observed seasonally in the lower portion of Smith River below Smith River Dam. Increased flows in this reach will likely increase and improve conditions for bull trout in the near future under Eugene Water and Electric Board's new license from FERC (Stillwater Sciences 2006, p. 58).	See text for this CHU	1220407 442574

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CHU—CHSU	Water Body Name	State	Information Documenting Bull Trout Occupancy	Essential Habitat Rationale	LLID
Upper Willamette River—None	South Fork Mckenzie River	OR	<p>South Fork McKenzie River from its confluence with the McKenzie River below Cougar Dam upstream 26.1 km (16.3 mi) to Roaring River is FMO habitat. This segment includes the South Fork McKenzie River below Cougar Dam and above Cougar Reservoir up to Roaring River. The South Fork McKenzie River below Cougar Dam provides quality foraging, migration and overwintering habitat for adult and subadult bull trout from the Mainstem McKenzie local population and for bull trout from above Cougar Dam (South Fork McKenzie local population) that are occasionally entrained through Cougar Dam turbines or regulating outlets. The quality of habitat has improved in recent years due largely to the return to normative stream temperatures from operation of temperature control beginning at Cougar Dam in 2005 (Service 2007, p. 27-28). A fish collection facility at the base of Cougar Dam is operable as of 2010 and will provide a means of capturing and transferring bull trout to habitat above Cougar Dam. The critical habitat segment above Cougar Dam provides high quality foraging, migration and overwintering habitat for the South Fork McKenzie River local population of bull trout.</p>	See text for this CHU	1220916 439554
Upper Willamette River—None	Sweetwater Creek	OR	<p>Sweetwater Creek from its confluence with Trail Bridge Reservoir upstream 1.0 km (0.6 mi) to a natural barrier is spawning and rearing habitat. Sweetwater Creek provides one of only two spawning areas for bull trout associated with the Trail Bridge Reservoir local population (the other being the mainstem McKenzie River upstream of Trail Bridge Reservoir). From 2006-2008, Sweetwater Creek averaged 20 redds (USFS 2009e, p. 10).</p>	See text for this CHU	1220489 442768

CHU—CHSU	Water Body Name	State	Information Documenting Bull Trout Occupancy	Essential Habitat Rationale	LLID
Upper Willamette River—None	Swift Creek	OR	Swift Creek from its confluence with the Middle Fork Willamette River upstream 14.7 km (9.1 miles) to its headwaters is spawning and rearing habitat. Swift Creek was used by bull trout historically based on 1960 field notes from a fish eradication project prior to filling Hills Creek Reservoir (ODFW 2007b, p. 35-38). Consequently, and in associated with the Middle Fork Willamette Bull Trout Rehabilitation Project, ODFW and the USFS have been transplanting fry and wild captive-reared bull trout juveniles from Anderson Creek on the McKenzie River to various habitats in the Middle Fork Willamette River, including Swift Creek. The transplanted fish have been documented rearing in these habitats but spawning has not yet been observed.	See text for this CHU	1222958 441593
Upper Willamette River—None	West Fork Horse Creek	OR	West Fork Horse Creek including side channels, from its confluence with Horse Creek upstream 2.8 kilometers (1.7 miles) is used for foraging, migration and overwintering by the Mainstem McKenzie local population.	See text for this CHU	1220443 442794
Upper Willamette River—None	Willamette River	OR	Willamette River from its confluence with the McKenzie River upstream 19 km (11.8 mi) to its confluence with the Middle Fork Willamette River is FMO habitat. This segment provides for the future maintenance of the migratory life history form of bull trout that is essential to the long-term conservation of the species and is essential for providing future connectivity between the McKenzie River and Middle Fork Willamette River local populations. Occupancy is unknown; however, an adult bull trout was captured near the confluence of the Willamette and McKenzie rivers in March 1999 by the Oregon Department of Fish and Wildlife (Ziller and Taylor 2000, p. 9). This habitat is essential to provide connectivity between local populations in the two major subbasins associated with the Upper Willamette Core Area.	See text for this CHU	1223003 435020

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CHU—CHSU	Water Body Name	State	Information Documenting Bull Trout Occupancy	Essential Habitat Rationale	LLID
Upper Willamette River—None	Cougar Reservoir	OR	Cougar Reservoir with 559.9 ha (1,383.5 ac) surface area at full pool is FMO habitat. Intensive monitoring of the South Fork McKenzie River local population by ODFW indicates Cougar Reservoir provides essential foraging, migratory and overwintering habitat for adult, subadult and older juvenile bull trout (Service 2007, p. 26). A majority of adult and subadult bull trout from this local population utilize the reservoir (and the lower half mile of the East Fork McKenzie River) to stage for spawning from fall through spring prior to migrating upstream into the South Fork McKenzie River.	See text for this CHU	1222070 441720
Upper Willamette River—None	Dexter Reservoir	OR	Dexter Reservoir, (343.4 ha (848.5 ac) is unoccupied FMO habitat and essential for future connectivity between local populations in the Middle Fork Willamette River Subbasin and local populations in the McKenzie River Subbasin. Connectivity Criteria contained in the Willamette River Recovery Unit Chapter of the draft recovery plan (Service 2002a, p. v11-v12) includes connectivity between local populations within the Upper Willamette Core Area. Connecting the local population in the Middle Fork Willamette River above Hills Creek Dam with local populations in the McKenzie River will require fish passage at all three dams owned and operated by the Corps of Engineers in the Middle Fork Willamette River (Dexter, Lookout Point, Hills Creek dams). The feasibility of fish passage at these facilities will be assessed in the near future as required by biological opinions issued by the Service and by NMFS in 2008 (Service 2008g, NMFS 2008).	See text for this CHU	1227618 456580
Upper Willamette River—None	Hills Creek Reservoir	OR	Hills Creek Reservoir (1,059.2 ha (2,617.4 ac) provides essential foraging, migratory and overwintering habitat for adult, subadult and older juvenile bull trout. A majority of adult and subadult bull trout from the local population utilize the reservoir from fall through spring prior to migrating upstream into the Middle Fork Willamette River (ODFW 2007b, p. 19).	See text for this CHU	1222300 441004

CHU—CHSU	Water Body Name	State	Information Documenting Bull Trout Occupancy	Essential Habitat Rationale	LLID
Upper Willamette River—None	Lookout Point Reservoir	OR	Lookout Point Reservoir, (1,615.8 ha (3,992.6 ac) is unoccupied FMO habitat and essential for future connectivity between local populations in the Middle Fork Willamette River Subbasin and local populations in the McKenzie River Subbasin. Connectivity Criteria contained in the Willamette River Recovery Unit Chapter of the draft recovery plan (Service 2002a, p. v11-v12) includes connectivity between local populations within the Upper Willamette Core Area. Connecting the local population in the Middle Fork Willamette River above Hills Creek Dam with local populations in the McKenzie River will require fish passage at all three dams owned and operated by the Corps of Engineers in the Middle Fork Willamette River (Dexter, Lookout Point, Hills Creek dams). The feasibility of fish passage at these facilities will be assessed in the near future as required by biological opinions issued by the Service and by NMFS in 2008 (Service 2008g, NMFS 2008).	See text for this CHU	1227887 439150
Upper Willamette River—None	Trail Bridge Reservoir	OR	Trail Bridge Reservoir is a 23.3 ha (57.6 ac) reservoir on the McKenzie River and is the primary overwintering (FMO) habitat for adults and subadults from the Trail Bridge local population. Due to the close proximity to spawning areas in the mainstem McKenzie River upstream of Trail Bridge Reservoir and in Sweetwater Creek (direct tributary to the reservoir), Trail Bridge Reservoir also serves as an important rearing area for juvenile bull trout (USFS 2009e, p. 4-6).	See text for this CHU	1224274 436714
Upper Willamette River—None	Lost Creek	OR	Lost Creek from the McKenzie River confluence upstream 6.2 km (3.9 miles) to White Branch Creek provides spawning and rearing habitat for the Mainstem McKenzie local population. Although spawning has not been documented, seasonal use has been reported and suitable habitat exists and it is possible that limited spawning may be occurring (D. Bickford, pers. comm. 2010).	See text for this CHU	1220673 441894

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CHU—CHSU	Water Body Name	State	Information Documenting Bull Trout Occupancy	Essential Habitat Rationale	LLID
Upper Willamette River—None	White Branch Creek	OR	White Branch Creek from its confluence with Lost Creek upstream 1.3 km (0.8 miles) to approximately the road 242 crossing provides spawning and rearing habitat for the Mainstem McKenzie local population. Although spawning has not been documented, seasonal use has been reported and suitable habitat exists and it is possible that limited spawning may be occurring (D. Bickford, pers. comm. 2010).	See text for this CHU	1220302 441665