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Yakima River Delta Ecosystem Restoration

RICHLAND, WASHINGTON

Biological Assessment and Consultation Initiation Request Package
for
Threatened and Endangered Species,
Critical Habitat, and Essential Fish Habitat

Under the Jurisdiction of:
National Marine Fisheries Service
and
U.S. Fish and Wildlife Service

ADMINISTRATIVE RECORD – DO NOT DESTROY

U.S. Army Corps of Engineers
Walla Walla District
Environmental Compliance Section

File Number: PPL-C-2019-0039

August 2024

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SUMMARY

The U.S. Army Corps of Engineers, Walla Walla District (USACE), proposes to contribute to the restoration of the ecosystem on the Yakima River Delta degraded by the construction and continuous operation of McNary Lock and Dam and the Tri-Cities Levees. Located in the Lower Yakima River, in Kennewick and Richland, Washington (WA), riparian and aquatic habitat along the Yakima River Delta has supported a variety of woody vegetation and an abundance of aquatic species and various wildlife. Following the construction of McNary Dam and the Federal levee system in the 1950s, many acres of the area were inundated. This change in the hydraulic conditions of the Yakima River resulted in ecosystem loss and degradation, creating a need for restoration notably exacerbated by the construction of a private causeway on the south side of Bateman Island that USACE proposes to remove.

The proposed action includes:

1. The construction duration would be approximately 13 weeks, with 12 weeks of potential in water work.
2. Placement of approximately 600 linear feet (lf) of turbidity curtain on both the upstream and downstream sides of the causeway, for a total of 1,200 lf.
3. Removal of causeway vegetation and preparation of the existing surface along the south shore of the island to facilitate contractor access to the work site and the placement of fill within the area following excavation.
4. Hauling approximately 62 cubic yards (cy) rock and soil materials across the causeway to Bateman Island to a stockpile for later use to stabilize the exposed island shoreline
5. Removal of the entire 560-foot-long causeway using a long reach arm excavator to cut 39,870 cy of material over an 800-foot-long alignment.
6. Stabilization of the Bateman Island shoreline by excavation of 41 cy to create a toe four feet below the river bottom and three feet out for the placement of 62 cy of shoreline stabilization materials.
7. Stabilization of the mainland shoreline by excavation of 51 cy to create a toe four feet below the river bottom and three feet out for the placement of 77 cy of shoreline stabilization materials.

Endangered Species Act-listed species in the area include Middle and Upper Columbia River steelhead, Upper Columbia spring Chinook, and Columbia Basin bull trout. The USACE has determined the proposed action *is likely to adversely affect* those species and *may affect* their designated critical habitats in the short term, and would *benefit* those species in the long-term. Formal consultation is required.

USACE further determined the proposed action “may affect designated critical habitat for these species and would have adverse effects on Essential Fish Habitat (EFH). Ultimately, the

proposed action would result in restored EFH, but due to the immediate effects from construction, EFH consultation is required.

Yellow-billed cuckoo and gray wolf are also listed for the action area, but these species do not occur in the area and no critical habitat has been designated for either species in Washington. Therefore, the proposed action would have *no effect* on yellow-billed cuckoo or their critical habitat, nor on gray wolves or their critical habitat.

Proposed conservation measures:

1. Silt curtains will be deployed prior to construction above and below the causeway to minimize turbidity from construction activities.
2. Begin removal of the causeway in the winter when few, if any, juvenile salmonids would be present. This will occur during the winter in-water work window from December 1 through February 28.
3. During in-water work, turbidity monitoring shall occur. If state water quality standards are exceeded, work shall be modified or ceased until turbidity levels returned to acceptable limits. An extended mixing zone will be employed. Related monitoring would examine sediment mobilization during freshet events.
4. Construction best management practices will be followed to minimize impacts from potential petroleum spills.
5. Construction materials will not be released into the water, except for clean fill or riprap installed to protect the shorelines from erosion.
6. Silt curtains would be used to minimize turbidity from any excavated or stockpiled materials.
7. Interstitial spaces of fill material will be filled with gravel or soil as appropriate to prevent the creation of predator habitat.
8. Use of nature-based designs will be maximized in the development of shoreline stabilization elements.
9. Disturbance of the existing subsurface materials within the boundaries of the disturbed shoreline will be minimized as much as practicable during design and construction by providing requirements and constraints in the construction specifications that require the contractor to protect the existing subsurface materials.
10. During design phase adjustments to the excavated surface will be identified to minimize or eliminate excavation and refine the disturbed footprint, ensuring subsurface materials are protected as much as feasible.

The USACE requests to initiate formal consultation on this Biological Assessment and Consultation Initiation Package. If additional information regarding this document is required, please contact Sabrina Roberts, Biologist in the Environmental Compliance Section of the U.S. Army Corps of Engineers, Walla Walla District, at 509-527-7253, or by email at Sabrina.R.Roberts@usace.army.mil or Karl Anderson, Senior Biologist at 509-527-7264, or by email at Karl.R.Anderson@usace.army.mil. Other correspondence can be mailed to:

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The undersigned certifies that this Consultation Initiation Package was developed by qualified professional scientists using the best available scientific and commercial data.

______________________________	______________________________
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YAKIMA RIVER DELTA ECOSYSTEM RESTORATION
BIOLOGICAL ASSESSMENT

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SECTION 1 - FEDERAL ACTION

1.1 INTRODUCTION

The U.S. Army Corps of Engineers, Walla Walla District (USACE), proposes to improve ecosystem structure, function, and processes of the Yakima River Delta, located in the Lower Yakima River, in Kennewick and Richland, Washington (WA). The construction and ongoing operations and maintenance (O&M) of McNary Lock and Dam and the Tri-Cities Levees on the Columbia River have contributed to the degradation of the ecosystem within the Yakima River Delta.

Prior to the construction of the McNary Dam and Reservoir Project, the Yakima River flowed into the Delta and mixed freely with the Columbia River during both high and low flows to either side of Bateman Island. The Yakima River Delta supported a variety of woody vegetation and shallow water channels that were inundated seasonally. The habitat within the Delta supported an abundance of juvenile salmonids, birds, wildlife, and other aquatic species, a few of which are now listed under the Endangered Species Act (ESA).

In the 1950s, McNary Dam was constructed, and approximately 17 miles of Federal levees were constructed as part of the McNary Dam and Reservoir Project on the banks of the Columbia River to confine the Reservoir and maximize available upland. This provided protection for the cities of Kennewick, Richland, and Pasco, Washington, from inundation, especially during high water events. However, due to this construction, the fish and wildlife habitat in the entire area has been significantly degraded.

The impoundment of Lake Wallula, the Reservoir on the Columbia River formed by McNary Dam, permanently altered the ecosystem functions within the Yakima River Delta. The energy and volume of flows entering the Delta were reduced greatly, and many acres of riparian and aquatic habitat were inundated. A private causeway was constructed between the south shore of the Yakima River and Bateman Island. These factors create a thermal barrier that delays the entrance of adult salmonids into the Yakima River.

Changes in the hydraulic conditions within the Delta have impacted the ability of juvenile and adult salmonids to safely migrate through the hot, stagnant waters of the Delta. This large, shallow backwater environment serves as ideal habitat for invasive plants and non-native and native predatory fish, which prey on juvenile salmon during their outmigration.

Due to blockage in flow, the Yakima River now has very limited ability to carve and maintain shallow side channels. In addition, with sediment transport impaired, the abundance of excess sediments settles in pool areas, covering the gravels used by juvenile salmonids for camouflage and feeding and creating water temperature changes that impedes fish passage.

Loss of habitat and impediments to migration have long been recognized as contributing factors to the decline of several salmonid species and native plant species. The restoration of more natural flow conditions and riparian habitat in the Delta could benefit these species.

1.2 PROJECT ACTION AREA

The Yakima River Delta is located at the confluence of the Columbia and Yakima Rivers, approximately Columbia River Mile 335 (Figure 1-1). It is situated within Richland and Kennewick, Washington. Bateman Island is in the eastern extent of the Delta, with an earthen causeway running from the south side of the Delta to Bateman Island. The zone of influence from McNary Dam extends up the Yakima River to just past the Interstate 182 (182) Bridge (around Yakima River Mile 2). The Yakima River flows into the Columbia River by going under the 182 and route 240 bridges, down into the Delta, and then back up around the northern tip of Bateman Island.

Figure 1-1. Map of the Yakima River Delta Action Area at the Confluence of the Columbia River and Yakima River

1.3 PROPOSED ACTION

The USACE proposes to fully remove the 560-foot Bateman Island Causeway without directly creating new or increasing existing riparian habitat along Bateman Island and on shorelines in the backwater (Figure 1-2).

Figure 1-2. Satellite Image of Bateman Island Causeway and the Riparian Habitat Along Bateman Island

A boat-based deployment of standard silt screens would be used both upstream and downstream of the causeway to be removed. Full removal of the causeway would involve contractors utilizing heavy equipment (including a long reach arm excavator, bulldozer, loader, and dump truck to haul the debris to an approved upland disposal site) staged on mainland side, near Columbia Park trail, that will lead to disturbance of the north-most portion of the corridor, (an area measuring roughly 200' x 300') where the causeway abuts the shoreline. Equipment will travel from the mainland side at the staging location with excavation beginning south of Bateman Island working back towards the mainland.

Removal of causeway vegetation, along with prepping of the existing surface along the south shore of the island will be required to facilitate contractor access to the work site and the placement of fill within the area. There will be approximately 39K CY of material with 560 linear feet of causeway removal and 800 linear feet of work area. No excavation is being proposed at the intact sections of the island or shoreline. This is intentional to minimize and eliminate any excavation into the shoreline or island to the greatest extent possible. In-water work done in the action area will include utilizing the long-armed excavator bucket to dig out materials. Construction will be limited to winter to minimize impacts to listed salmon.

It is anticipated that disturbance of the existing subsurface materials within the boundaries of the shoreline can be minimized, if not eliminated, during design and construction by providing requirements and constraints in the construction specifications that require the contractor to protect the existing subsurface materials. Some options available to the designer include requiring the contractor to operate on additional fill or temporary matting placed in the construction area(s) to operate heavy equipment from during construction. The practicability of such options will be assessed during the design phases and implemented as appropriate.

After the causeway and the existing vegetation from the causeway is removed, riprap will be placed along the shoreline of the mainland to provide shoreline stabilization and avoid future erosion (Figure 1-3). At the Bateman Island shoreline bank stabilization is also needed to prevent erosion of cultural resources, but methods would be more environmentally friendly. While the causeway is 40 feet wide, the stabilization zone at Bateman Island is estimated to be as long at 93 feet, while the estimated length of the hardened stabilization in the river shore could be as long as 115 feet.

Excavation will be required at the two stabilization areas to create a foundational toe. A toe is designed to seat riprap or other stabilizing materials in place and will require the excavation of an additional four feet below the bottom and three feet out from the shoreline. Estimates for the amount of excavated material for the Bateman Island shoreline will be 41 cubic yards and for the mainland shoreline 51 cubic yards. The amount of material estimated for placement to stabilize the Bateman Island shoreline will be approximately 62 cubic yards and for the mainland shoreline 77 cubic yards of riprap. Total material placement will be approximately 139 cubic yards. Riprap use would be minimized for the Bateman Island stabilization zone. No excavation is being proposed at the intact sections of the island or shoreline. This is intentional to minimize and eliminate any excavation into the shoreline or island to the extent possible. Refer to Figure 1-4 for details and cross sections.

A portion of the accumulated sediment behind the causeway would mobilize following the proposed action and during 2-3 following freshet events. These sediments have been tested and do not exceed state contaminant thresholds (NHC 2024). The indirect effects of sediment mobilization in the system are included in the effects analysis below. Based on aerial imagery, a very rough estimate of potential incidental sediment mobilization assumes an approximately 150-acre area could generate 250,000 cubic yards of sediment slurry per foot of eroded depth, with the potential of up to three feet of depth mobilized in the new thalweg. Furthermore, an additional 60 acres of sediment north of the Delta could be mobilized because of the additional mixing between the Yakima and Columbia Rivers. Mobilization rates and volumes are directly dependent on future flow rates in both the Columbia and Yakima Rivers.

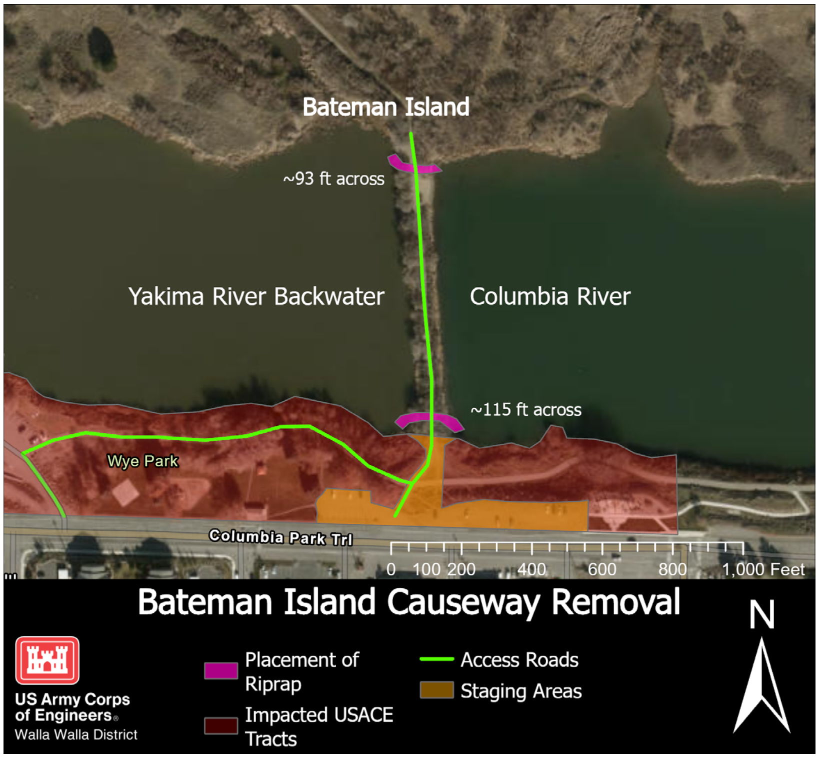

Figure 1-3. Map Displaying the Important Construction Features

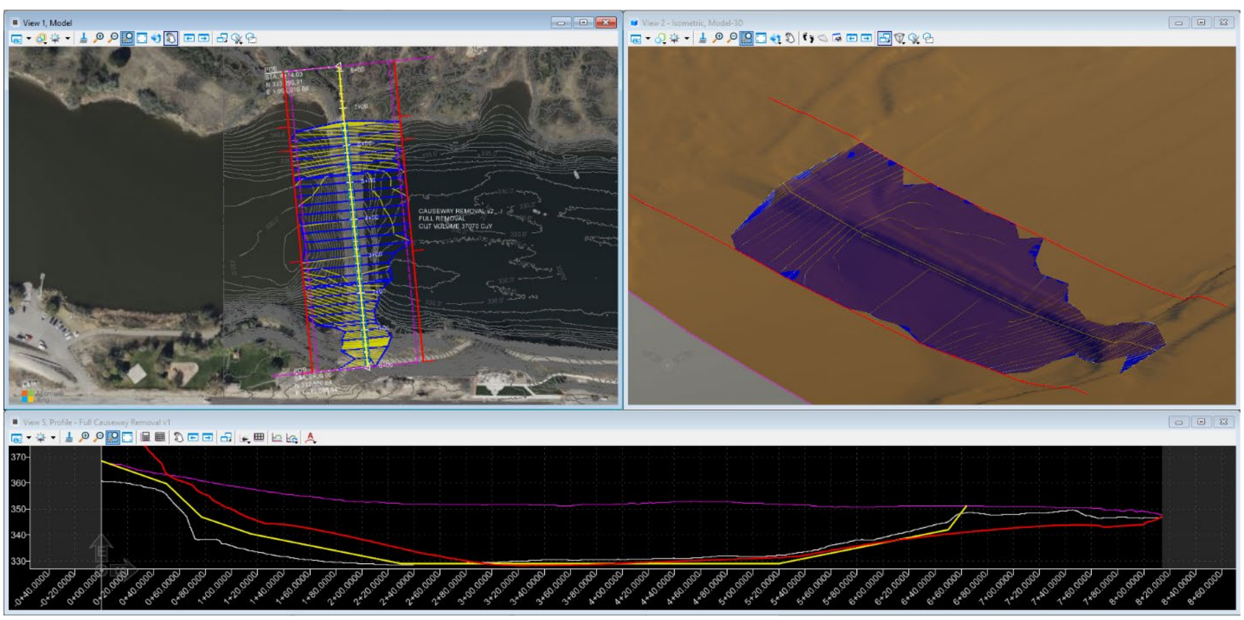

Figure 1-4. Cross Sections for Full Removal of Causeway[1]

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[1] Blue lines represent proposed areas to remove (cut) material from the channel, shown in the plan and 3D model views. The yellow lines in the profile views represent the centerline elevation of the cut section and the white and red lines show the left and right edges of the cut sections—where the design surface intersects with the existing terrain surface. The magenta line represents the existing terrain.

1.4 PROJECT TIMELINE

Removal of the causeway would occur via contract within the NMFS'-recommended winter in-water work window of December 1 through February 28. The project action area, located at the confluence of the Columbia and Yakima Rivers, is within the section of the Columbia River, between Snake River and Priest Rapids Dam, typically requires a scheduled in-water work window between 1 August and 31 August, however the project impacts would be reduced if the winder window were employed. Excavation and construction will take approximately twelve weeks to complete.

Under sustained mid- to high-flow velocities, the accumulated sediment is expected to mobilize over 2 to 6 weeks. Because these are estimated rates calculated assuming sustained velocities over time, a more conservative estimate of the time required to evacuate the sediment under mid- to high-flow velocities is 2 to 3 months following the full breach (NHC 2016, 2016). However, subsequent accumulated sediment natural mobilization would depend upon flow conditions, but it is estimated that the majority of accumulated sediments will do so in the next 2-3 freshet events. The post-sediment mobilization channel can be expected to deepen up to 3 feet (NHC 2015, 2016). It is assumed that this overall change could take 2-3 years before the local thalweg fully stabilizes, depending on the flow conditions from the Yakima and Columbia Rivers.

1.5 PREVIOUS CONSULTATION

No prior ESA Section 7 consultations have been completed for this project.

SECTION 2 - LISTED SPECIES

2.1 SPECIES LISTED FOR THE PROJECT AREA

The USACE reviewed the list of threatened and endangered species that pertain to the action area under the jurisdiction of the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) on 25 April 2022 and updated on 7 December 2022 (Table 2-1).

The USACE determined the proposed action would have "no effect" on yellow-billed cuckoo (*Coccyzus americanus*). There are no known occurrences of yellow-billed cuckoo in the project area. These birds are assumed extirpated from Washington state and critical habitat has not been designated in Washington. As a result, yellow-billed cuckoo will not be discussed in detail.

The USACE determined the proposed action would have "no effect" on the gray wolf (*Canis lupus*). Habitat conditions, the high level of human habitation, and an extremely limited prey base make the project area unsuitable for wolves. Therefore, the potential for gray wolves to occur in any areas included in this proposed action is highly unlikely. As a result, gray wolf will not be discussed in detail.

Table 2-1. Federal Register (FR) Notices for Final Rules That List Threatened and Endangered Species or Designated Critical Habitats

Species	Listing Status and Reference*	Critical Habitat
	NMFS	
Steelhead (*Oncorhynchus mykiss*)		
Upper Columbia River DPS	T:01/05/06; 71 FR 834	Yes: 09/02/2005; 70 FR 52630
Middle Columbia River DPS	T:03/25/1999; 65 FR 14517	Yes: 09/2/2005; 70 FR 52630
Chinook Salmon (*Oncorhynchus tshawytscha*)		
Upper Columbia spring run ESU	E: 06/28/05; 70 FR 37159	Yes: 09/02/2005; 70 FR 52630
	USFWS**	
Bull Trout (*Salvelinus confluentus*)		
Conterminous U.S.	T: 06/10/98; 63 FR 31647	Yes: 09/02/05; 70 FR 56211
Western Yellow-billed Cuckoo (*Coccyzus americanus)*		
Western U.S. DPS	T: 10/3/14; 79 FR 59991	No
Gray Wolf *(Canis lupus)*		
Conterminous U.S.	E: 09/17/2021; 86 FR 51857	No

*T= Threatened; E = Endangered **Washington State Consultation Code 01EWFW00-2022-SLI-0274

2.2 SPECIES STATUS

2.2.1 Upper Columbia River Steelhead

Listing History

Upper Columbia River (UCR) steelhead were listed as endangered in August 1997, changed to threatened in January 2006, then changed back to endangered by court decision in June 2007.

Distribution

The Upper Columbia River steelhead Distinct Population Segment (DPS) consists of naturally spawned anadromous steelhead produced in Columbia River tributary systems upstream of the Yakima River to the Canadian border (Figure 2-1). Also included are steelhead from six artificial propagation programs – the Wenatchee River, Wells Hatchery, Winthrop National Fish Hatchery, Omak Creek, and Ringold hatchery programs (NMFS 2016a).

Life History and Biological Requirements

Range-wide, UCR steelhead biological requirements include food, flowing water (quantity), high quality water (cool, free of pollutants, high dissolved oxygen concentrations, low sediment content), clean spawning substrate and unimpeded migratory access (with resting areas) to and from spawning and rearing areas. Steelhead use Lake Wallula mainly as a migration corridor. Habitat use in the mainstem Columbia River by steelhead is not well known. Unlike other salmonids, which tend to use a smaller portion of the available habitat at a higher density, steelhead tend to disperse widely throughout the available habitat.

Smolt outmigration past Rock Island Dam peaks in mid-May, but ranges from April to early July (Chelan County PUD No. 1 1998). Smolt outmigration past McNary Dam peaks in May, but ranges from April to early July (Griswold et al. 2005). However, periodically a juvenile UCR steelhead is observed passing McNary Dam as late as October (Griswold et al. 2005). Thus, smolt migration past the action area would generally range from April to early July.

Spawning in the Wenatchee, Entiat, and Methow Rivers occurs from late March through June, and fry emerge and disperse from late spring through August (Chelan County PUD No. 1 1998). UCR steelhead in the Methow River exhibit a wide range of life history types. Juveniles spend two to seven years rearing in headwater streams and/or the mainstem of each river, and some juveniles from any year class would be almost continually out-migrating during this period (Chelan County PUD No. 1 1998). Most smolts emigrate at age 2+ or age 3+ years.

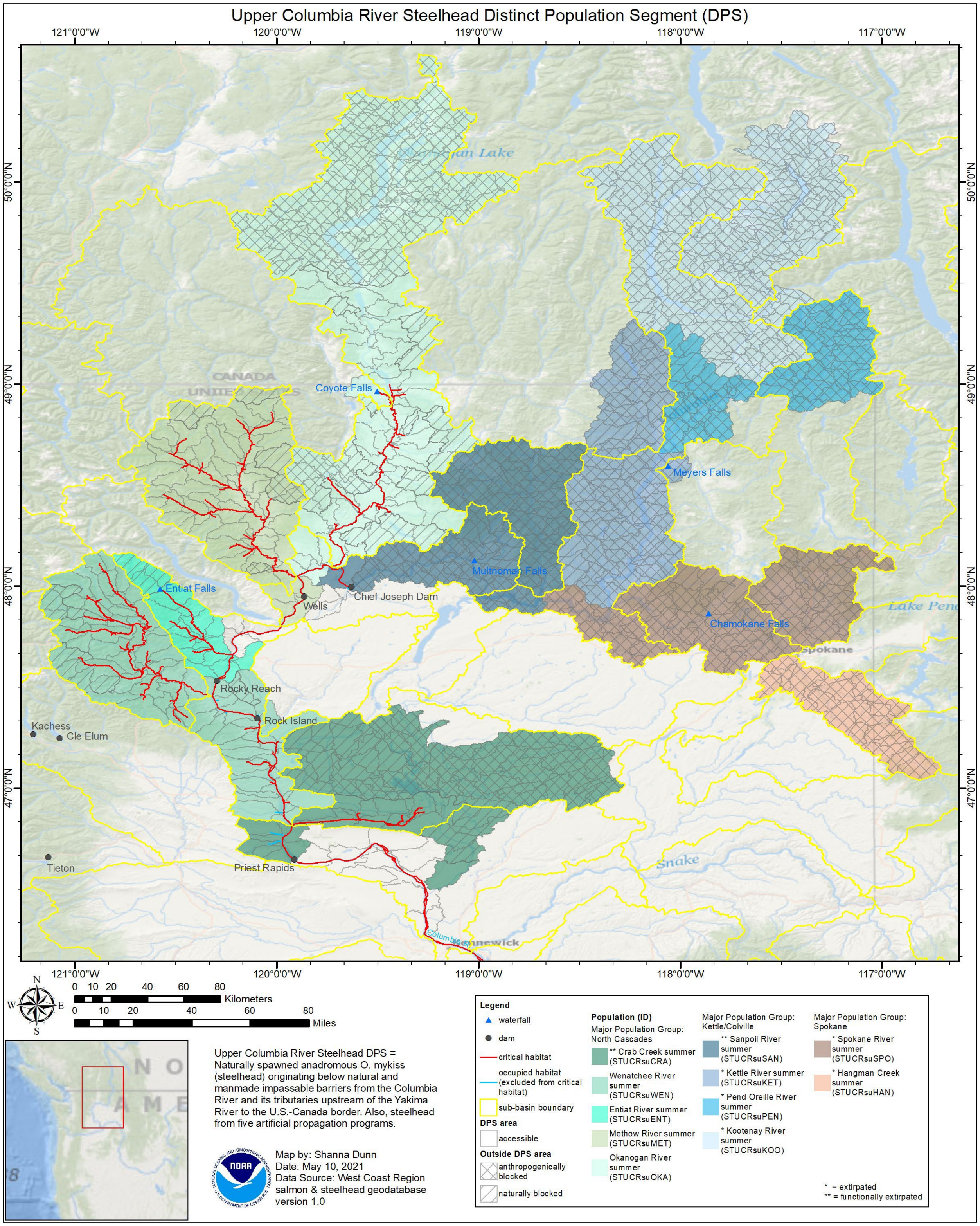


Figure 2-1. Upper Columbia River Steelhead Distribution

Steelhead adults prefer temperatures between approximately 39.2 Fahrenheit (°F) and 48.2°F, respectively [4 degrees Centigrade (°C) and 9°C (Bell 1990)], but easily withstand temperatures between 50°F and 55.4°F (10°C and 13°C); the upper lethal limit for steelhead is 75°F [23.9°C (Spence et al. 1996)] (Table 2-2).

Table 2-2. The Steelhead Life History Timing and Thermal Requirements

MCR Steelhead Mill Creek Population	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Temperature	Time	Lethal Limits
Upstream adult migration			P	P									0-20°C	After 1-4 years in ocean	0/23.9°C
Adult spawning													3.9-9.4°C		
Egg incubation															
Alevin													8.5-14°C	50-150 days	>17.5 C
Fry emergence															
Juvenile rearing													7.3-20°C	1-3 Avg 2 years	
Downstream Kelts															0/23.9°C
Downstream juvenile migration				P									<14.4°C		

P=Primary

Local Population Information

Ten-year-average adult steelhead passage at McNary is approximately 119,000 fish passing in a given year, and these fish include the Middle Columbia River and Snake River DPSs (Figure 2-2). Adult passage typically begins in earnest in early April and continues October, although steelhead pass McNary in small numbers at all times of the year.

Five–year median daily PIT tag observations of out-migrating juvenile Columbia River steelhead peak in late April with the majority of juveniles passing April – June (Figure 2-3).

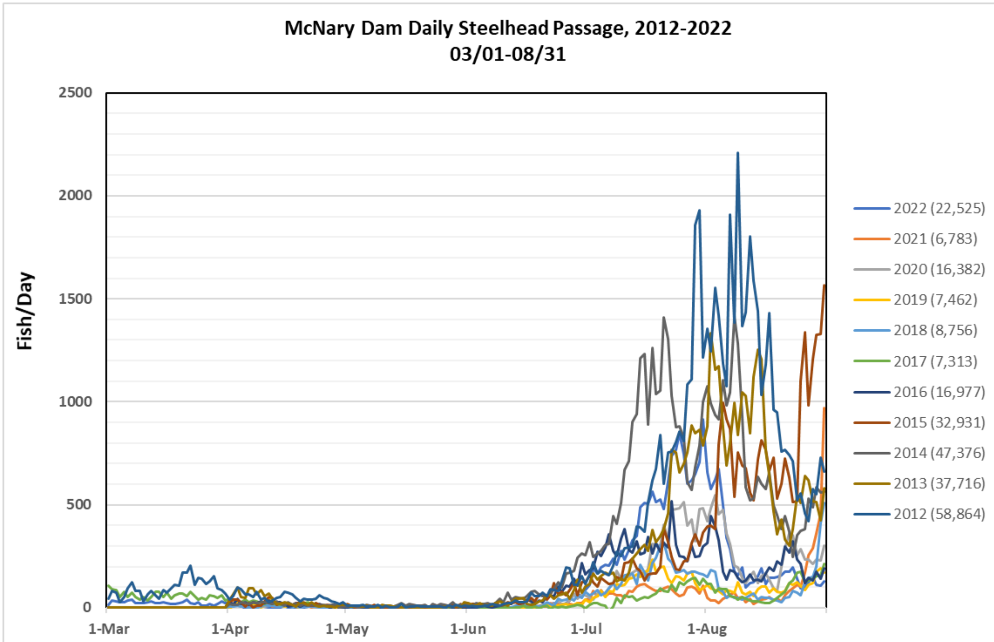


Figure 2-2. Adult Steelhead Passage and Timing at McNary Dam

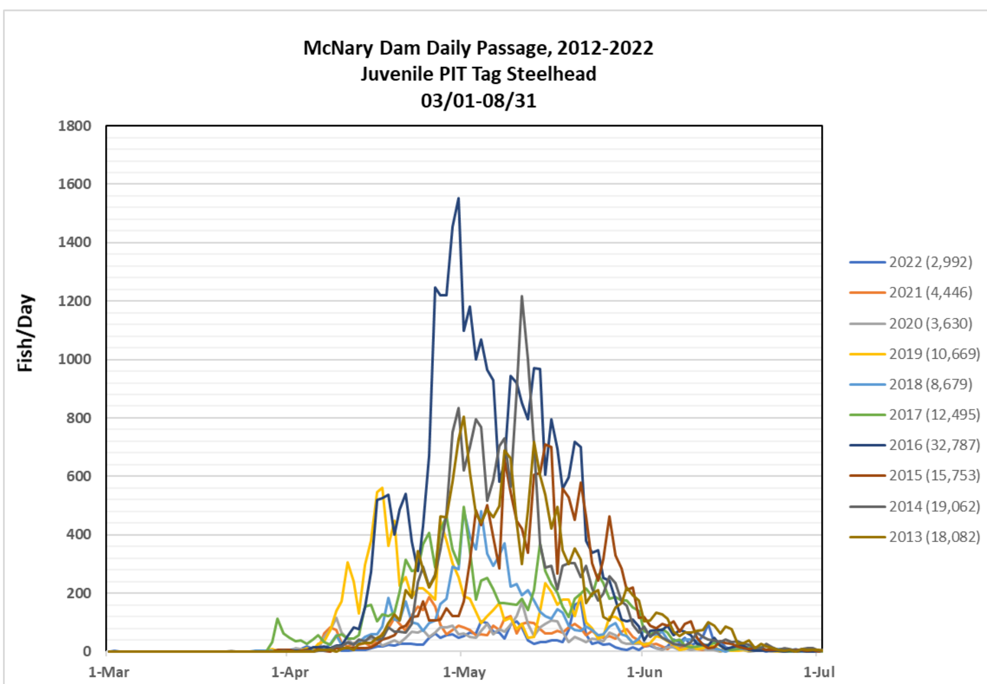


Figure 2-3. Juvenile Steelhead Run Timing at McNary Dam

Factors for Decline

Historic fishing pressure began the decline of salmon populations over 100 years ago. Construction of dams, roads, railroads, and levees/shoreline protection, as well as irrigation withdrawals has altered the rearing habitat of juvenile steelhead and the migratory habitat of juveniles and adults. Increased predation on juvenile salmonids due to the habitat changes is also a contributor to the declining salmonid population. Prior to the construction of McNary Dam, a large percentage of the shoreline consisted of shallow water with a small particle size substrate. Today, much of the shoreline consists of deeper water bordered by riprap. This change in habitat type is likely a factor in the decline of the Columbia Basin steelhead populations.

Current pressures on Upper Columbia River steelhead include loss of quality habitat, predation, poor ocean conditions and limited fishing pressure. The limited amount of suitable habitat available, caused by habitat degradation and passage barriers is the main factor limiting recovery.

Ongoing Monitoring

Passage of adult and juvenile steelhead is monitored at the Columbia and Snake River dams. There are also several other monitoring programs by other federal, state and Tribal organizations throughout the watershed.

2.2.2 Middle Columbia River Steelhead

Listing History

On March 25, 1999, Middle Columbia River (MCR) steelhead were listed as threatened under the ESA. Protective regulations for MCR steelhead were issued under the ESA, Section 4(d), June 28, 2005 (70 FR 37159). The listing was confirmed as threatened January 5, 2006 (71 FR 834), then updated on April 14, 2014. As defined, the MCR steelhead DPS does not include the resident form (rainbow trout), which co-occur with these steelhead.

Distribution

Middle Columbia River steelhead include all naturally spawning populations of steelhead in drainages upstream of the Wind River, Washington, and the Hood River, Oregon, up to, and including, the Yakima River, Washington. Major drainages in this DPS are the Deschutes, John Day, Umatilla, Walla Walla, Yakima, and Klickitat river systems (Figure 2-4). The Cascade Mountains form the western border of the plateau in both Oregon and Washington, while the Blue Mountains form the eastern edge. The southern border is marked by the divides that separate the upper Deschutes and John Day basins from the Oregon High Desert and drainages to the south. The Wenatchee Mountains and Palouse areas of eastern Washington border the Middle Columbia on the north (NMFS 2016b).

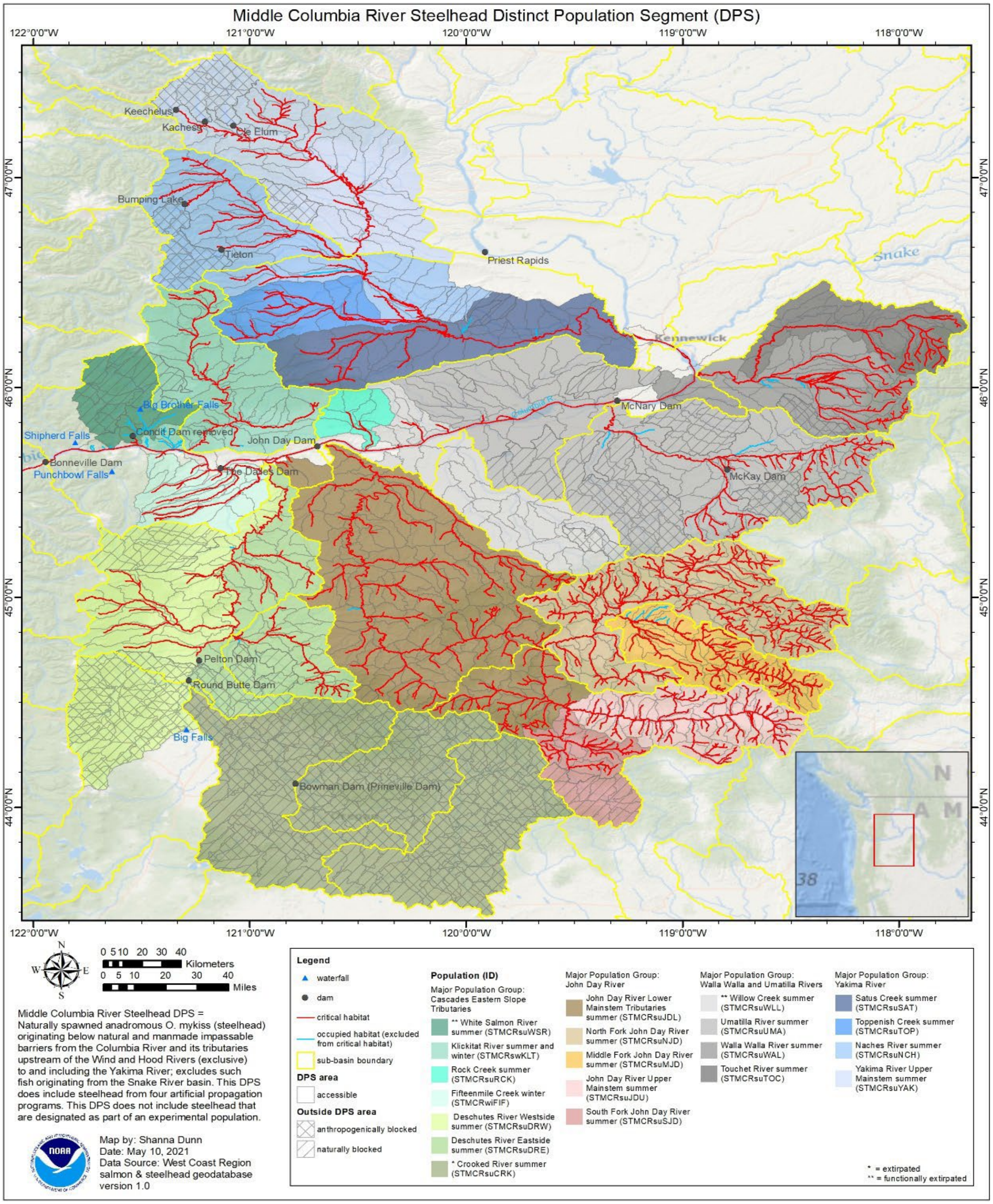


Figure 2-4. Middle Columbia River Steelhead Distribution

Life History and Biological Requirements

Steelhead exhibit one of the most complex groups of life history traits of any species of Pacific salmonid. These fish can be anadromous (migratory) or freshwater residents. Steelhead can also spawn more than once (iteroparous), whereas most other anadromous salmonids spawn once and then die (semelparous).

Within the range of West Coast steelhead, spawning migrations occur throughout the year, with seasonal peaks of activity. Most steelhead can be categorized as one of two run types, based on their sexual maturity when they re-enter freshwater and how far they go to spawn. In the Columbia River, summer steelhead enter freshwater between May and October and require several months to mature before spawning; winter steelhead enter freshwater between November and April with well-developed gonads and spawn shortly thereafter. Winter steelhead are called ocean-maturing or coastal type, and summer steelhead, stream-maturing or inland type. The Middle Columbia River steelhead DPS includes the only populations of inland winter steelhead in the United States in the Klickitat River, White Salmon River, Fifteenmile Creek, and possibly Rock Creek.

Steelhead spawn in clear, cool streams with suitable gravel size, depth, and current velocity. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small woody structure. Steelhead may enter streams and arrive at spawning grounds weeks or even months before they spawn and are therefore vulnerable to disturbance and predation. They need cover, in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water, turbulence, and turbidity.

Young steelhead typically rear in streams for some time before migrating to the ocean as smolts. Steelhead smolts have been shown to migrate at ages ranging from 1 to 5 years throughout the Columbia Basin, but most steelhead generally smolt after 2 years in freshwater (Busby et al. 1996). Most steelhead spend 2 years in the ocean before migrating back to their natal streams. Adults rarely eat or grow upon returning to freshwater.

Factors for Decline

All populations of MCR steelhead use the mainstem Columbia River to migrate to and from the ocean, and all are affected by the mainstem Federal dams, as well as by other forms of development that alter the river environment. Mainstem Columbia River conditions include impaired fish passage, altered water temperature and thermal refuges, and changes in mainstem nearshore habitat (NMFS 2009). In addition, changes in the Columbia River have altered the relationships between salmonids and other fish, bird, and pinniped species. Increases in competition with other fish species and predation from non-native fishes, birds, and pinnipeds continues to limit recovery of salmonid species in the Columbia River.

Current pressures on MCR steelhead include loss of quality habitat, predation, poor ocean conditions and limited fishing pressure. The limited amount of suitable habitat available, caused by habitat degradation and passage barriers is the main factor limiting recovery.

Local Population Information

Adult Middle Columbia River steelhead have been regularly counted at McNary Dam fish ladders since the dam's completion. Ten-year-average adult steelhead passage at McNary is approximately 118,700 fish passing in a given year, and these fish include the Upper Columbia River and Snake River DPSs (Figure 2-2). Adult passage typically begins in earnest in early April and continues October, although steelhead pass McNary in small numbers at all times of the year.

Five–year median daily PIT tag observations of out-migrating juvenile Columbia River steelhead peak in late April with the majority of juveniles passing April – June (Figure 2-3).

The Yakima River Delta is highly altered because of pooling upstream of McNary Dam. The lower 2.1 miles of the historic Yakima River are inundated, reducing the extent of historic distributaries and off-channel rearing areas for Middle Columbia River steelhead (Board 2004).

Ongoing Monitoring

Passage of adult and juvenile steelhead is monitored at the Columbia and Snake River dams. There are also several other monitoring programs by other federal, state and Tribal organizations throughout the watershed.

2.2.3 Upper Columbia River Spring Chinook

Listing History

The UCR spring Chinook salmon were listed as an endangered species on March 24, 1999 and their endangered status was reaffirmed on June 28, 2005.

Distribution

The UCR spring-run Chinook Evolutionarily Significant Unit (ESU) includes all natural-origin, stream-type Chinook salmon originating from Columbia River tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam, excluding the Okanogan River subbasin (Figure 2-5). Six artificial supplementation programs also contribute to the Upper Columbia River spring Chinook salmon ESU: the Twisp River Program; Chewuch River Program; Methow Program; Winthrop National Fish Hatchery Program; Chiwawa River Program; and the White River (NMFS 2016a).

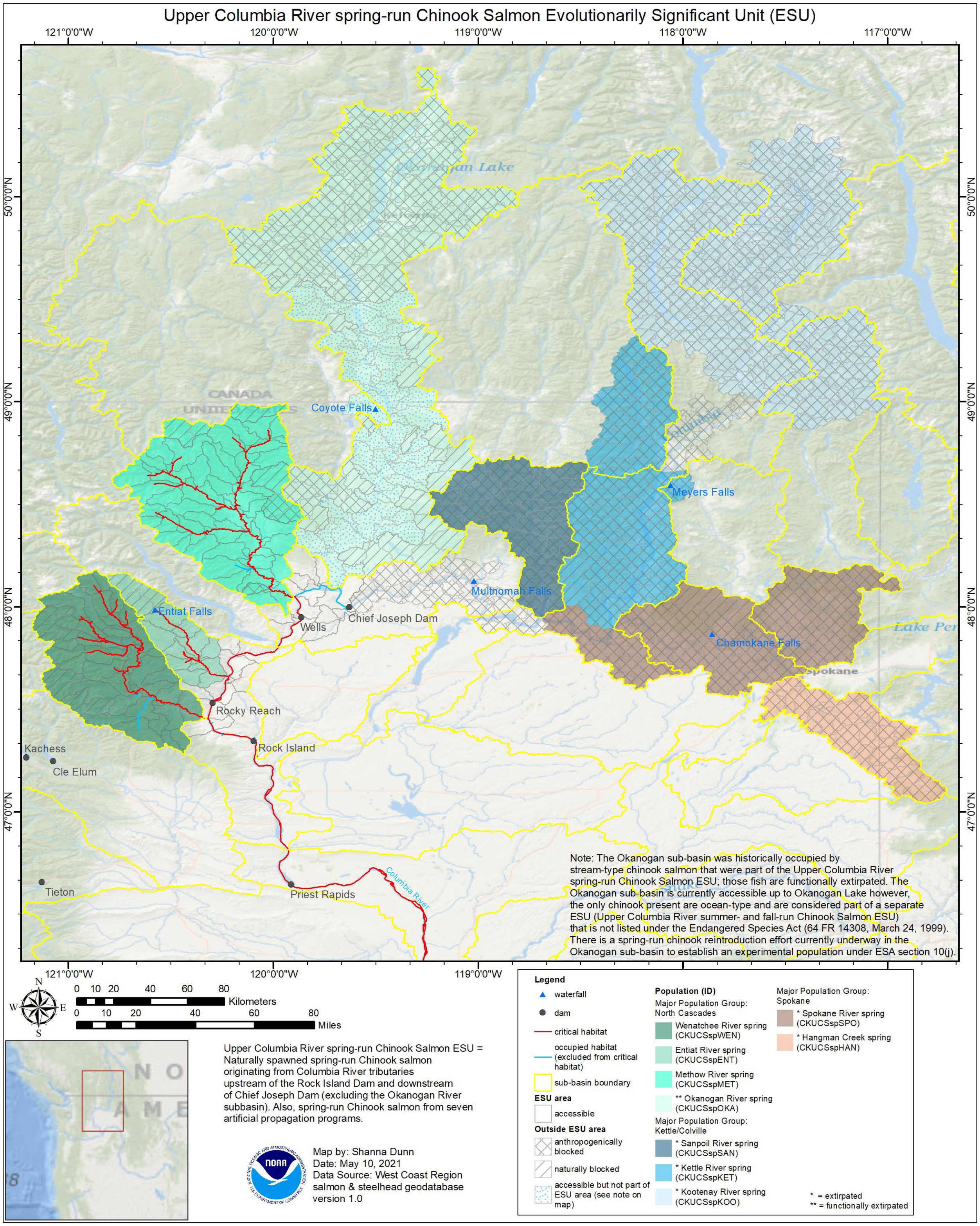


Figure 2-5. Upper Columbia River Spring Chinook Salmon Distribution

Life History and Biological Requirements

Several different strains of Chinook salmon can be found in Lake Wallula during part of the year. Unlisted UCR fall Chinook salmon are the most common. However, UCR spring Chinook, Snake River spring/summer Chinook salmon, and Snake River fall Chinook salmon are also present. Migration timing and life stage development can be different between the strains as they migrate through and use the lake. Upper Columbia River spring Chinook salmon biological requirements include food; high quality, flowing water; clean spawning substrate, resting habitat and unimpeded migratory access to and from spawning and rearing areas.

Adults enter the rivers from mid-April through July, and hold in deep pools with cover until spawning, with spawning occurring from late July through September (Bugert et al. 1998). Spawning occurs in the Wenatchee, Entiat, and Methow watersheds at elevations from 500 to 1,500 meters (Myers et al. 1998). Spawners return to the Wenatchee River from late April through June, and to the Methow and Entiat Rivers from late May through July (Bugert et al. 1998). Adults would be passing the action area from mid-April to mid-June (Chelan County PUD No. 1 1998).

In the Wenatchee, Entiat, and Methow watersheds, fry emergence occurs from late March through early May, and juveniles usually remain in the subbasins through the summer (Bugert et al. 1998). The majority of juveniles out-migrate in their second spring, with the peak occurring from late April through May (Bugert et al. 1998). Multiple life-history strategies have been observed in the Methow and Wenatchee watersheds, ranging from spawning, rearing, and overwintering in the upper watershed, to spawning and rearing in the upper watershed and out-migrating (to the Columbia River) in fall/winter (Bugert et al. 1998). Although fewer than in the Methow and Wenatchee Rivers, multiple life-history strategies (five) have also been observed in the Entiat River. The pertinence of the multiple life-history strategy information to the proposed project is that juvenile Upper Columbia River spring Chinook could be in the Columbia River from winter through June, although it is highly improbable that they would be in the action area as pre-smolts.

Factors for Decline

Current pressures on Upper Columbia River spring Chinook salmon include loss of quality habitat, predation, poor ocean conditions and limited fishing pressure. The limited amount of suitable habitat available, caused by habitat degradation and passage barriers is the main factor limiting recovery.

Local Population Information

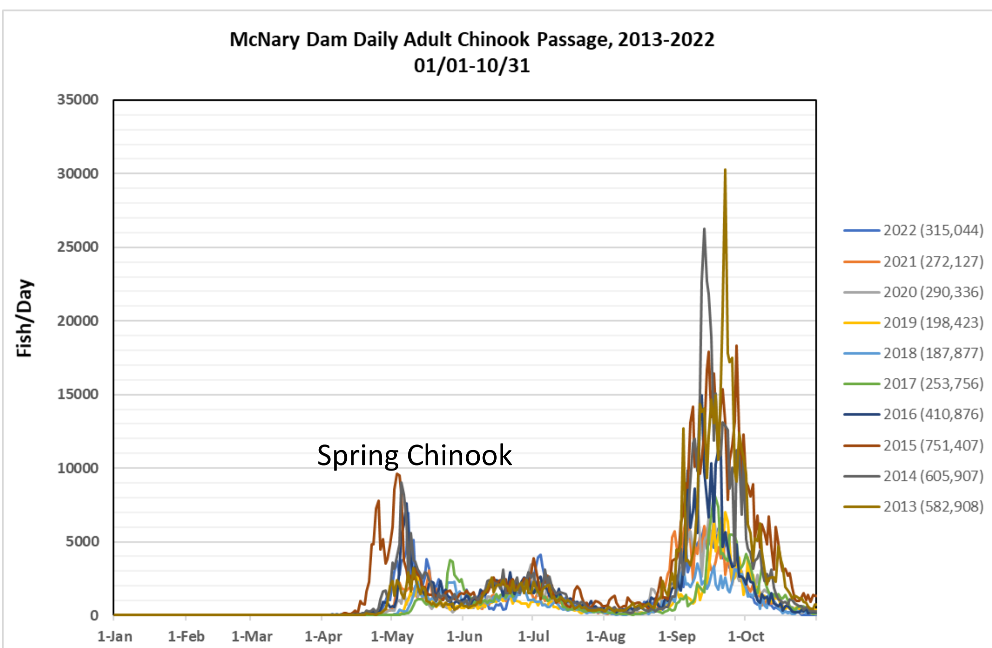
Most juvenile Upper Columbia River spring Chinook migrate downstream through Lake Wallula from late April through early June. Most adults migrate upstream through Lake Wallula during the same timeframe and generally take four to seven days to get through the lake. Three important spawning populations have been identified within this ESU: the Wenatchee, Entiat and Methow populations.

Ten-year-average adult spring Chinook salmon passage at McNary is approximately 70,000 fish passing in a given year, and these fish include the Snake River spring Chinook ESU (Figure 2-6).

Five –year median daily PIT tag observations of out-migrating juvenile Upper Columbia spring Chinook salmon peak in mid-May with the majority of spring Chinook salmon passing April – June (Figure 2-7).

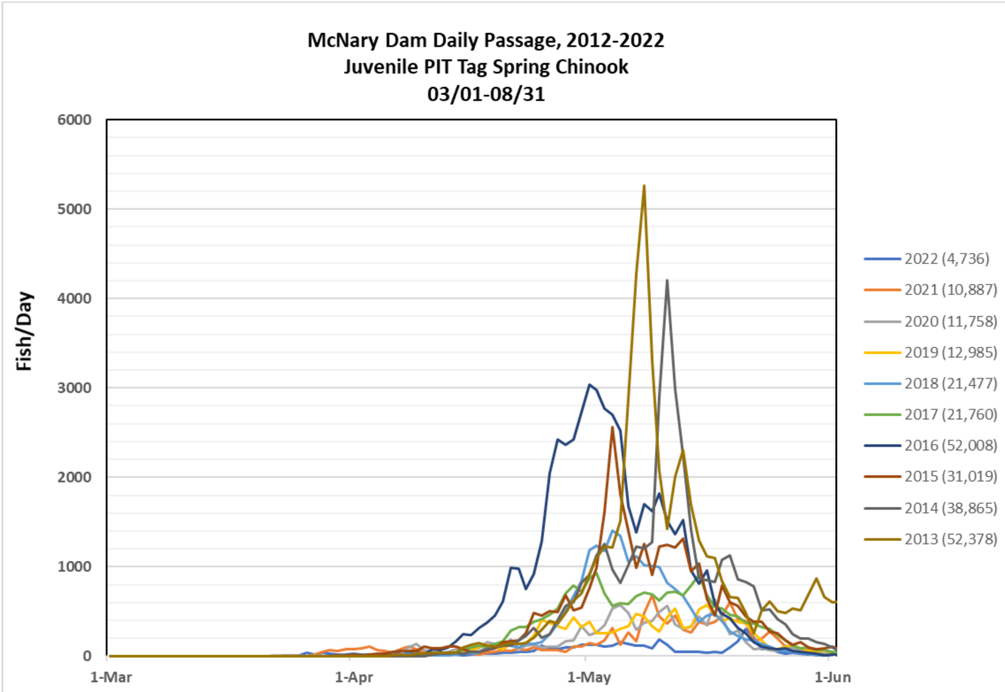
Adults migrate upstream into the Yakima River basin during the late spring months from May through June, and spawning begins in the early fall from September through October. The spawning area of the upper Yakima River spring Chinook salmon population encompasses approximately 200 km of the main-stem Yakima River and its tributaries (Koch 2022).

The spring-run Upper Yakima River Chinook salmon are included in the Upper Columbia River Spring Chinook ESU. With the proposed work window in August, Chinook salmon is not likely be present in the project area during that time.



Data Source: www.cbr.washington.edu/dart/query/adult_graph_text

Figure 2-6. Adult Chinook Salmon Passage and Timing at McNary Dam



Data Source: www.cbr.washington.edu/dart/query/pit_obs_graph_text

Figure 2-7. Juvenile Chinook Salmon Run Timing at McNary Dam

Ongoing Monitoring

Passage of adult and juvenile Chinook salmon is monitored at the Columbia and Snake River dams. There are also several other monitoring programs by other federal, state and Tribal organizations throughout the watershed.

2.2.4 Bull Trout

Listing History

The USFWS issued a final rule listing the Columbia River population of bull trout as threatened on June 10, 1998 (63 FR 31647), while critical habitat for this species was listed on September 30, 2010. Bull trout are currently listed throughout their range in the United States as a threatened species.

Distribution

In the Columbia River Basin, bull trout historically were found in about 60 percent of the basin. They now occur in less than half of their historic range. Populations remain in portions of Oregon, Washington, Idaho, Montana, and Nevada (Figure 2-8).

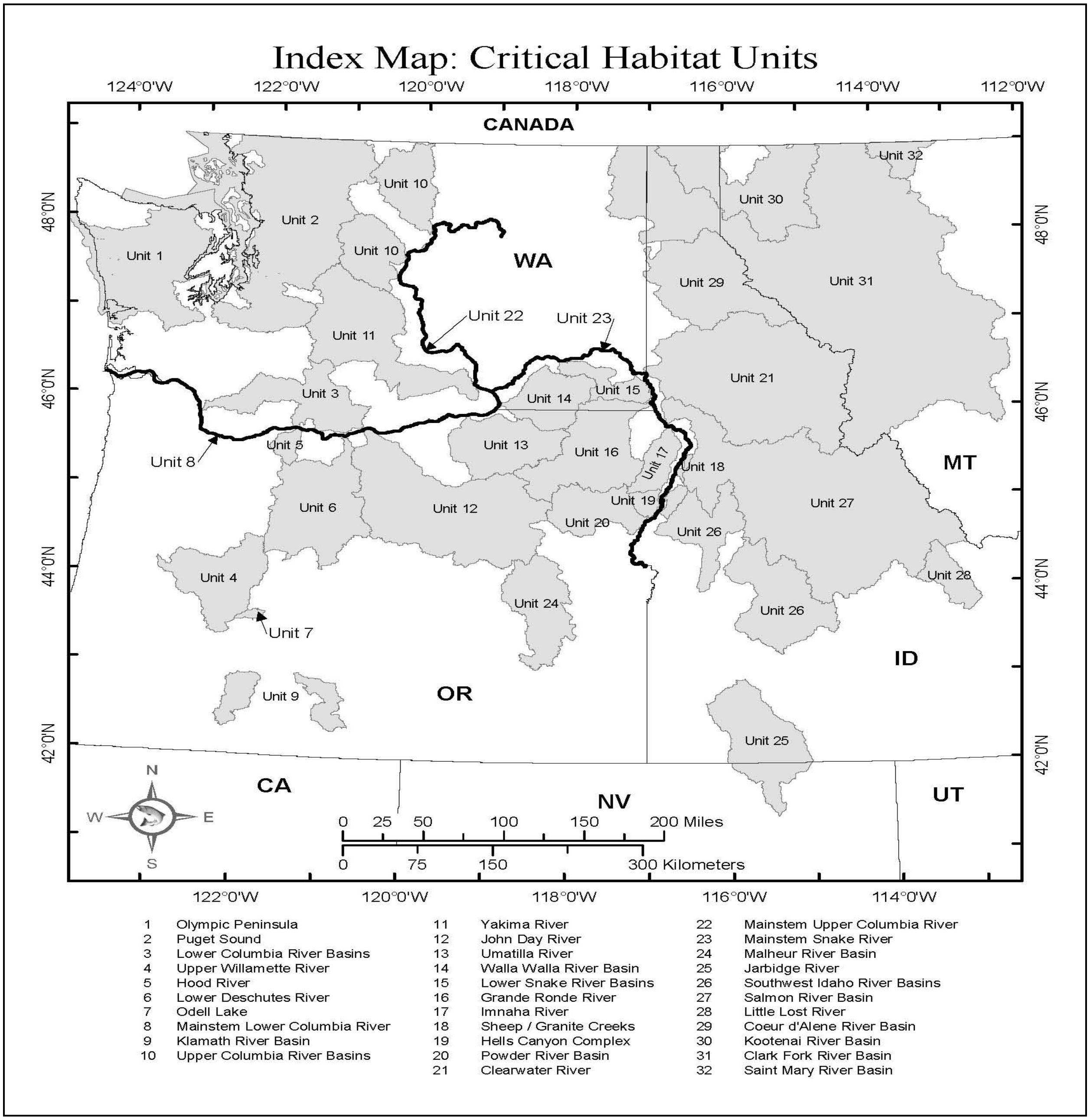


Figure 2-8. Columbia Basin Bull Trout Distribution and Critical Habitat Units

Life History and Biological Requirements

Bull trout exhibit four distinct life history patterns: anadromous, adfluvial, fluvial, and resident. Anadromous populations spend the early portion of their life in streams, grow to adulthood in the ocean, and eventually return to the tributaries in which they were born to spawn. Adfluvial populations spend between one and four years growing in their natal stream and then migrate to lakes. Fluvial populations spend about the same amount of time in their natal streams as their adfluvial siblings but migrate to larger rivers and streams instead of lakes (Fish 2004). Resident bull trout remain in the stream where they were spawned.

Bull trout eggs are buried in gravel. Incubation lasts approximately 220 days in water that is ideally between 35.6 and 39.2°F (2 and 4°C) (Table 2-3). Fry take approximately 65-90 days to absorb their yolk sacs. In warmer water, juvenile growth rates are significantly reduced (McPhail and Baxter 1996). After depleting their yolk sacs, the fry will spend up to three weeks developing parr marks and actively feeding on benthic and drifting aquatic insects before inflating their air bladder. Bull trout fry are very closely associated with cover and the riverbed, and they almost never feed on terrestrial insects (McPhail and Baxter 1996). The fry emerge from the stream bed at approximately 25-28 millimeters [mm (~1 inch)] total length and will continue to hold close to the bottom while foraging for benthic invertebrates during their acclimation to their new world. Rearing juveniles use a benthic microhabitat of very low velocity water in which the fry can move about while avoiding swift currents (Fish 2004). Adult migratory bull trout are a freshwater piscivore, an apex predator, and an opportunistic feeder. At all life history stages, they need access to an adequate prey base, which for adults necessitates habitats accessible through migratory corridors with suitable temperature, habitat complexity, and passage (USFWS 1998).

After 1 to 4 years in their natal stream, migratory smolt populations will travel downstream to the coast, a large river, or lake (depending on specific life history) to recruit to the adult stage. Adult individuals achieve sexual maturity at between four and seven years of age. Spawning is usually biennial, occurring only every other year or sometimes every three years, at which point the sexually mature adults fight the current back to the specific headwater in which they were produced to spawn. Several studies have shown a strong preference for spawning in small streams as opposed to larger rivers (Fish 2004).

Spawning begins when water temperatures drop below 48.2°F (9°C), typically 41-48.2°F (5-9°C) (Table 2-3). Spawning typically occurs between August and November. As with many salmonids, bull trout exhibit varying degrees of sexual dimorphism. Females do not exhibit significant changes during the spawn, but the males will develop bright red or orange sides and a kype (hooking of the lower jaw), although these distinctions vary from population to population (Fish 2004).

Table 2-3. Bull Trout Life History Events and Associated Temperatures

Bull Trout	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Temp	Length	Lethal Limits
Upstream adult migration													10-12.2°C		22°C

Downstream Adult Migration															
Overwintering															
Adult spawning													4-14°C (12, 16)		
Egg incubation													1.2-5.4°C (16)	100-220 days (13)	
Alevin													3.9-4.4°C	60-90 days	
Fry emergence															
Juvenile rearing													3.9-10°C	1-4 years	21°C
Downstream juvenile migration													<12.2°C	At night	21°C

Bull trout are brood hiders, which means that their reproductive strategy is to hide their young from potential predators in the substrate (Breder and Rosen 1966). Once spawning commences the females will focus all of their time and energy into digging redds in the loose gravel substrate into which they will deposit their eggs. Bull trout prefer small gravel, usually digging their redds in areas dominated by substrate particles less than 20mm in diameter.

Redds can range in water depth from 10 centimeters (3.9 inches) to over a meter, and range in size from less than a meter in diameter to over 2m [6.5 feet (McPhail and Baxter 1996)]. While the females are digging redds, the males are trying to court the females while at the same time driving other competing males out of the area. Once the female is satisfied with her nest and her mate, she will release her eggs (up to 5,000) into the redd, closely followed by a male who will cover the eggs with his sperm. Once the eggs are fertilized, the female will sweep pebbles into the nest to cover the eggs by undulating her tail while keeping the caudle and anal fins in contact with the substrate.

Spawning seems to cease when water temperatures drop to about 41°F (5°C) (Allen 1987). Unlike salmon species, and like steelhead, bull trout have iteroparity (the ability to spawn multiple times), so after spawning the adults will drift back downstream to their winter homes. Spawning is thought to occur biannually due to the fact that the fish survive spawning and need a year or so to recover afterwards (Fish 2004).

Factors for Decline

Bull trout are estimated to have occupied about 60 percent of the Columbia Basin and presently occur in only about 45 percent of their historic range. The decline of bull trout is primarily due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices and the introduction of non-native species. Declining salmon and steelhead populations could also negatively impact bull trout populations by reducing the number of juvenile salmon and steelhead available to bull trout for prey.

Local Population Information

The few remaining bull trout strongholds in the Columbia River Basin tend to be found in large areas of contiguous habitats in the Snake River basin of the central Idaho mountains, upper Clark Fork and Flathead Rivers in Montana, and several streams in the Blue Mountains in Washington and Oregon. Populations also exist in the Yakima and Methow River watersheds. Numbers of bull trout captured at spawning stations throughout the basin are also regularly recorded. In addition, redd counts are conducted in southeast Washington on the Tucannon River, Butte Creek, and Asotin Creek.

Recent studies have also shown Walla Walla River subbasin bull trout migration to, from, and through Lake Wallula above McNary Dam, but very little is known about how many bull trout may migrate into or through the mainstem Columbia and Snake River throughout the year. Anglin et al. (2010) reported that bull trout dispersed into the mainstem Columbia River from the Walla Walla River, and at times, this dispersal included a relatively long migration upstream to Priest Rapids Dam and downstream to John Day Dam. This data suggests that migratory bull trout from the Walla Walla River subbasin may also utilize the lower Snake River as bull trout of unknown origin are occasionally documented in the Ice Harbor south shore fishway (Barrows et al. 2015). While there is clear evidence that migratory bull trout utilize the Middle Columbia River and interact with FCRPS dams, little is known about the number of bull trout within the project area at any given time.

Ongoing Monitoring

Fish passage including bull trout is monitored at Columbia and Lower Snake River dams between March and November, and for juveniles between April and October each year. Any bull trout observations are recorded, though few, if any, are generally seen in any year at McNary Dam.

2.3 STATUS OF CRITICAL HABITAT

2.3.1 Upper Columbia River Steelhead

NMFS designated critical habitat for UCR steelhead in the Chief Joseph, Okanogan River, Similkameen, Methow, Upper Columbia/Entiat, Wenatchee, Lower Crab, and Upper Columbia/Priest subbasins, and the Columbia River migration corridor (NMFS 2005) (Figure 2-9). Essential elements of Pacific salmon and steelhead critical habitats are found in Table 2-4.

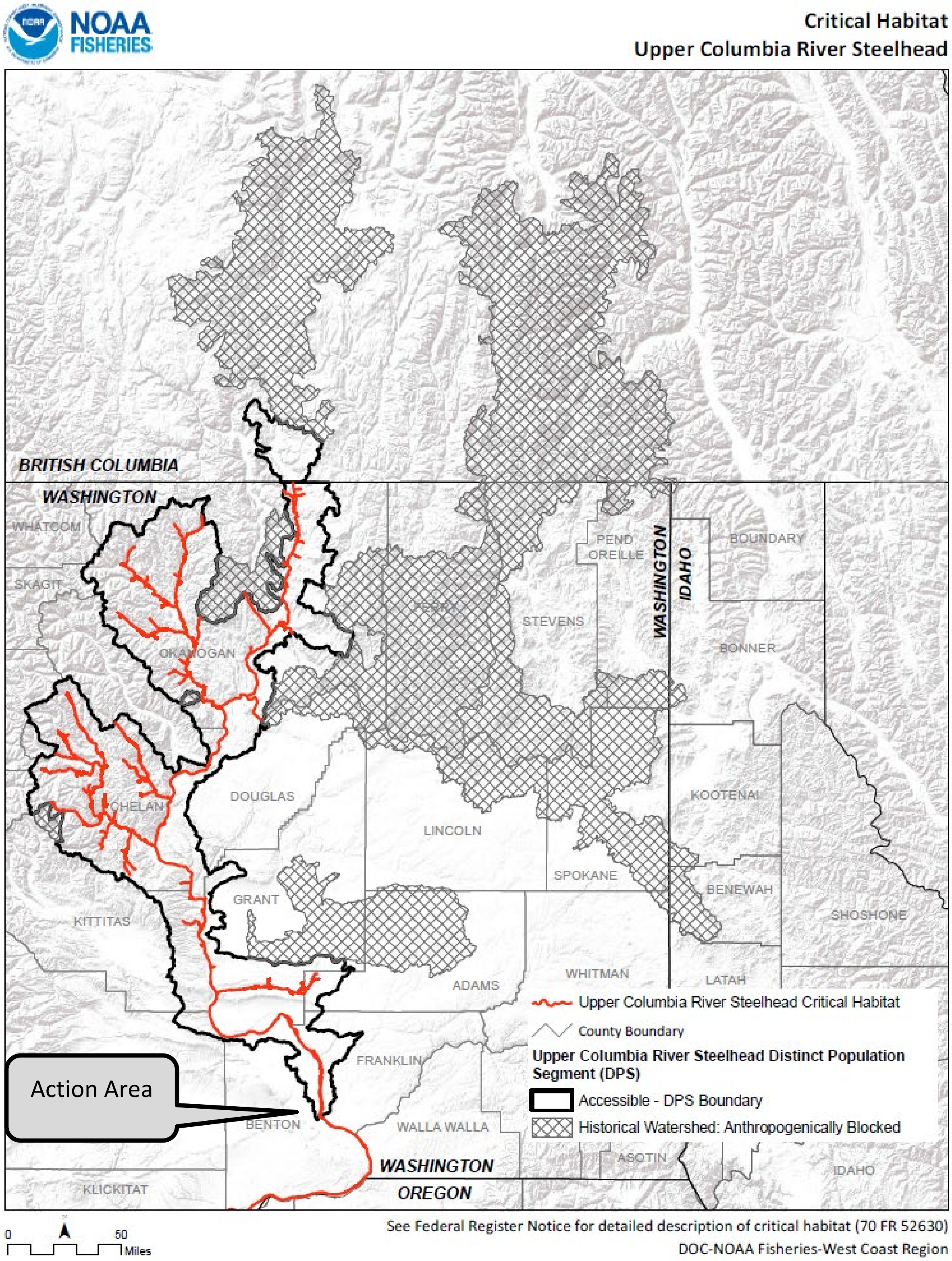


Figure 2-9. Upper Columbia River Steelhead Critical Habitat

Table 2-4. The Physical and Biological Features of Critical Habitats Designated for Pacific Salmon and Steelhead Species

Physical and Biological Features (PBF)		
PBF	**Attribute**	**Species Life History Event**
Freshwater spawning	Substrate Water quality Water quantity	Adult spawning Embryo incubation Alevin development
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	Fry emergence Fry/parr growth and development
Freshwater migration	Free of artificial obstructions Natural cover Water quality Water quantity	Adult sexual maturation Adult upstream migration, holding Kelt (steelhead) seaward migration Fry/parr seaward migration
Estuarine areas	Forage Free of obstruction Natural cover Salinity Water quality Water quantity	Adult sexual maturation Adult “reverse smoltification” Adult upstream migration, holding Kelt (steelhead) seaward migration Fry/parr seaward migration Fry/parr smoltification Smolt growth and development Smolt seaward migration
Nearshore marine areas	Forage Free of obstruction Natural cover Water quantity Water quality	Adult sexual maturation Smolt/adult transition
Offshore marine areas	Forage Water quality	Adult growth and development

Unlike earlier critical habitat designations, which relied on the U.S. Geological Survey maps of subbasins and included “all accessible river reaches within the current range of the listed species,” the 2005 designations used a much finer, more specific scale in designating critical habitat for salmon and steelhead. The 2005 designations identify stream and near-shore habitat areas where listed salmon and steelhead have actually been observed, or where biologists with local area expertise presume they occur. These habitat areas are found within more than 800 watersheds in the Pacific Northwest and California.

2.3.2 Middle Columbia River Steelhead

NMFS designated critical habitat for Middle Columbia River steelhead in the Upper Yakima, Naches, Lower Yakima, Middle Columbia/Lake Wallula, Walla Walla, Umatilla, Middle Columbia/Hood, Klickitat, Upper John Day, North Fork John Day, Middle Fork John Day, Lower John Day, Lower Deschutes, and Trout subbasins, and the Columbia River migration corridor (NMFS 2005) (Figure 2-10). Essential elements of Pacific salmon and steelhead critical habitat are found in Table 2-4.

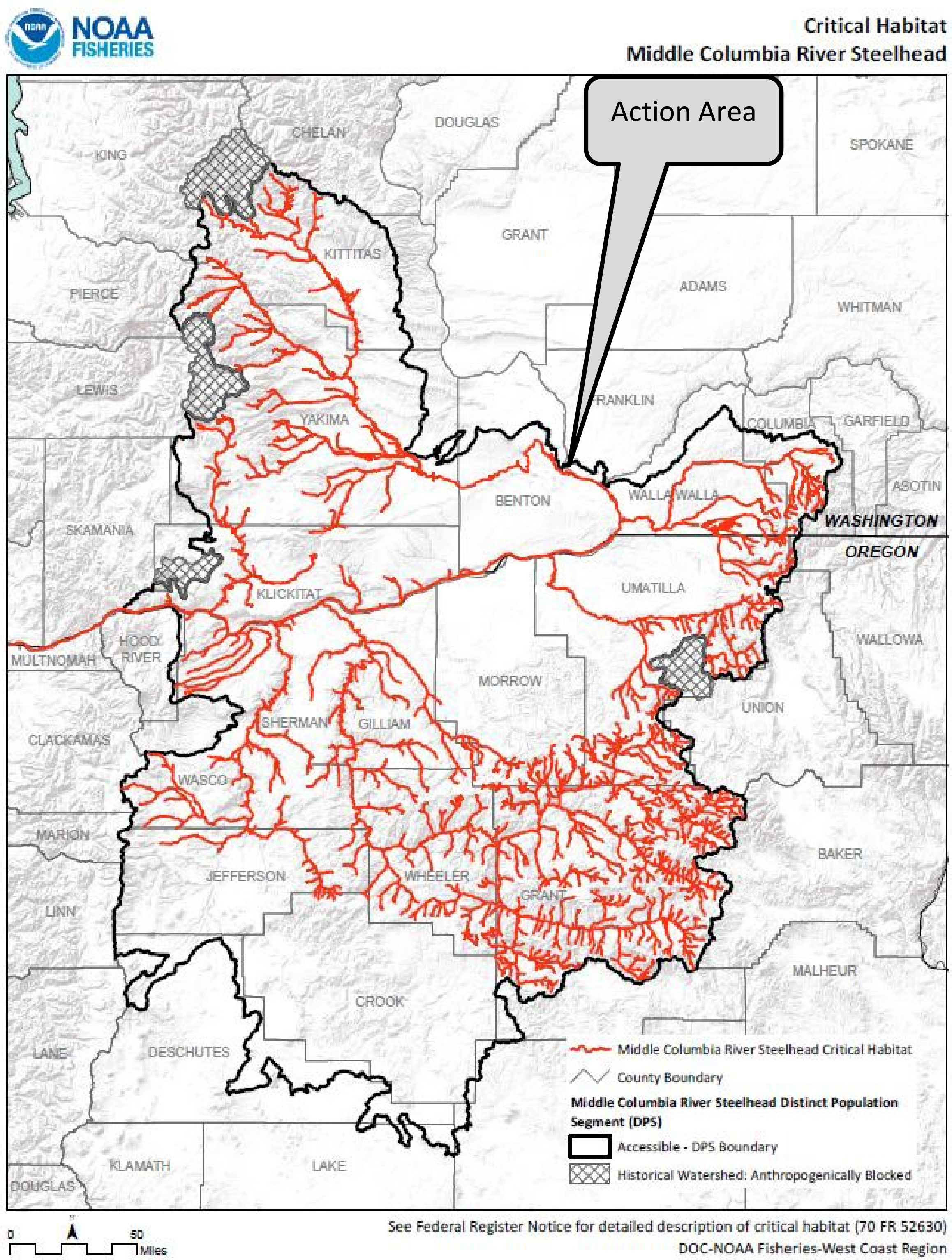


Figure 2-10. Critical Habitat for Mid-Columbia River Steelhead

2.3.3 Upper Columbia River Spring Chinook

NMFS designated critical habitat for Upper Columbia River Chinook salmon in the Chief Joseph, Methow, Upper Columbia/Entiat, and Wenatchee subbasins, and the Columbia River migration corridor (NMFS 2005) (Figure 2-11). Essential elements of Pacific salmon and steelhead critical habitat are found in Table 2-4.

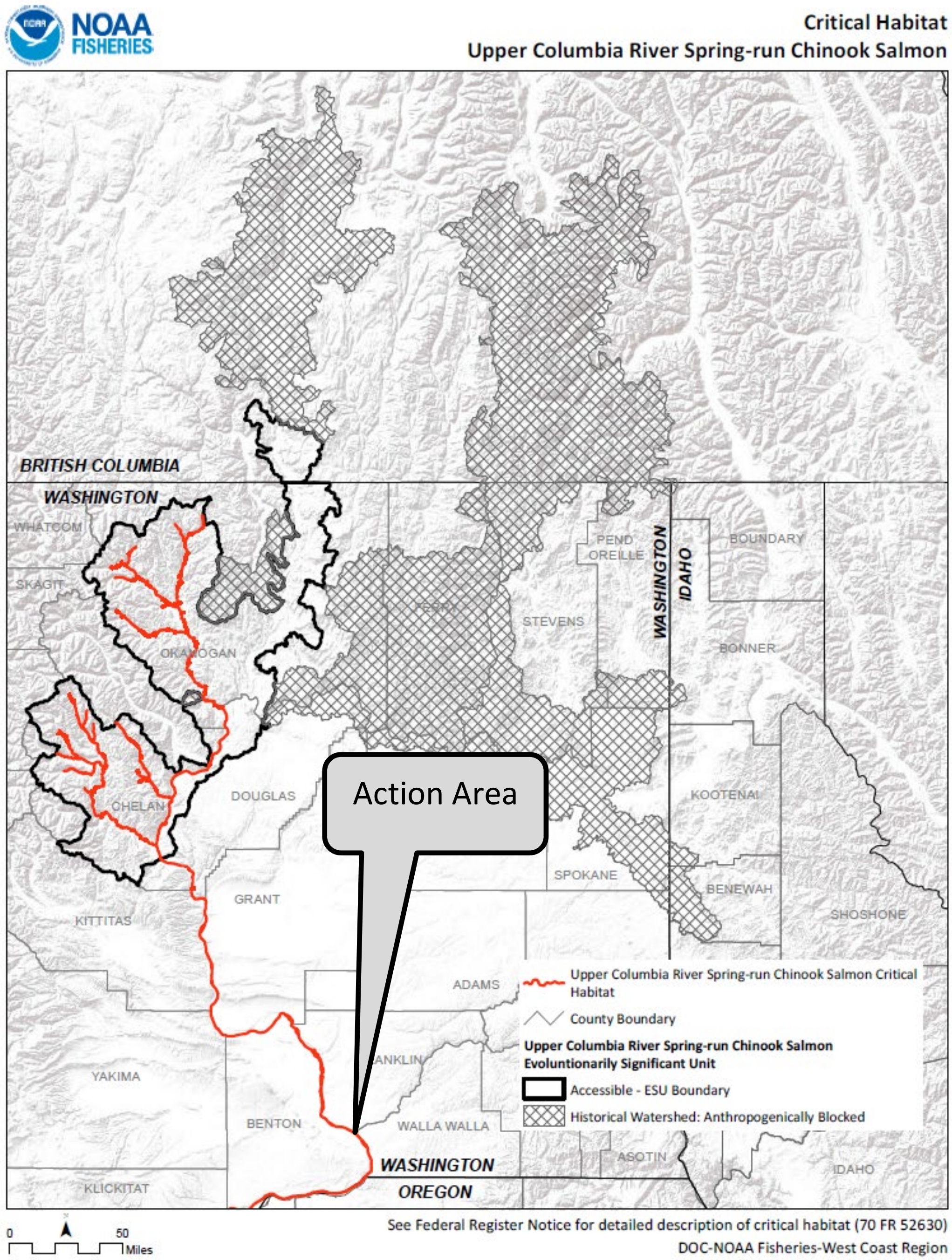


Figure 2-11. Upper Columbia River Spring Chinook Salmon Critical Habitat

2.3.4 Bull Trout

Bull trout critical habitat was designated in 2005. The USFWS revised the designation in 2010. A final rule was published on October 18, 2010, and took effect on November 17, 2010. A total of 19,729 miles of stream and 488,251 acres of reservoirs and lakes are designated as bull trout critical habitat. The Snake, Columbia, Yakima, and Walla Walla Rivers, which encompass the project area, are designated as bull trout critical habitat (Figure 2-12). PBFs for bull trout critical habitat are listed in Table 2-5.

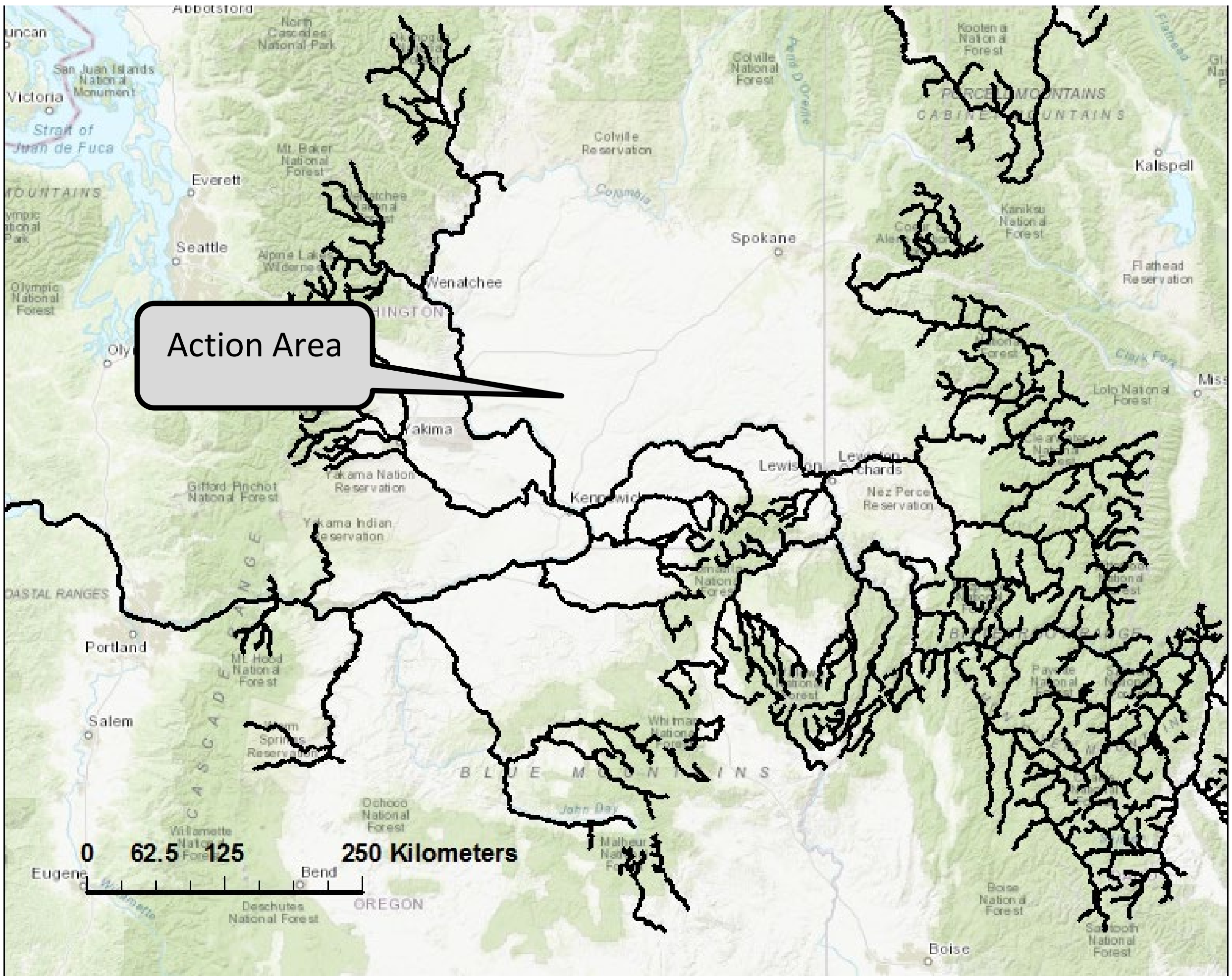


Figure 2-12. Columbia Basin Bull Trout Critical Habitat

Table 2-5. Physical and Biological Features of Bull Trout Critical Habitat

PBFs		
1	Water Quality	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporehic flows) to contribute to water quality and quantity and provide thermal refugia.
2	Migration Habitat	Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats, including but not limited to permanent, partial, intermittent, or seasonal barriers.
3	Food Availability	An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.
4	Instream Habitat	Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these environments, with features such as large wood, side channels, pools, undercut banks and clean substrates, to provide a variety of depths, gradients, velocities, and structure.
5	Water Temperature	Water temperatures ranging from 2 to 15 °C (36 to 59 °F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range will depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading, such as that provided by riparian habitat; streamflow; and local groundwater influence.
6	Substrate Characteristics	In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount (e.g., less than 12 percent) of fine substrate less than 0.85 mm (0.03 in.) in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions.
7	Stream Flow	A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.
8	Water Quantity	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.
9	Nonnative Species	Sufficiently low levels of occurrence of nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.

SECTION 3 - ENVIRONMENTAL BASELINE

The ESA regulations were revised in late 2019 and included clarification on baseline. The baseline discussion in this section focuses primarily on habitat conditions for the ESA-listed MCR steelhead and bull trout. However, baseline conditions for other salmonids would be similar.

Environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

In an ongoing Federal action, generating effects on the environment that predate the relevant listing(s) and designation(s), the environmental baseline is comprised of two components.

- The first environmental baseline component consists of environmental effects resulting from past resource commitments. This component of the environmental baseline is comprised of collective effects of past and ongoing human activities "leading to the current status of the species, [the] habitat (including designated critical habitat), and ecosystem, within the action area." This is the "snapshot" of species' health, exclusive of the effects of the proposed action (USFWS and NMFS 1998).
- The second component of the environmental baseline is comprised of unavoidable effects of the existence of the Bateman Island Causeway on the species, their habitat, and the ecosystem. These effects are considered throughout the period of analysis during which the effects of the proposed agency action are being evaluated.

For the purpose of this analysis, past unalterable resource commitments include construction of the Bateman Island Causeway itself. The structures are part of the environmental baseline. The presence of the Bateman Island Causeway constitutes an "existing human activity" that, over the course of time, has generated effects on listed species and designated critical habitat. By its very presence, this structure will continue to cause impacts. The present and historical existence of the causeway is, therefore, being analyzed as part of the environmental baseline.

The environmental baseline encompasses the collective effects of all operations and maintenance activities conducted prior to this BA. It includes diminished and degraded riparian habitat, along Bateman Island and on shorelines in the backwater. Numerous water diversions and public and private uses, existing flows, existing water temperatures, etc., are also included. More detailed descriptions of the environmental baseline are provided in the following paragraphs.

The second component of the environmental baseline extends to effects inherent in the passive existence of the Bateman Island Causeway, distinct from the effects of any operations and maintenance. By its very existence, the causeway alters the habitat conditions of the Yakima River Delta. This modification carries with it a variety of effects (positive, negative, and neutral), which are all part of the baseline.

Because the environmental baseline of a continuing agency action consists of more than a mere “snapshot” and must have a prospective component, it is critical to identify the line that distinguishes future effects encompassed within the environmental baseline from the future effects of the proposed action. It is widely accepted that baseline conditions at the Yakima River Delta are degraded. The existence of structures in the action area, including the causeway, are part of the “baseline” condition.

3.1 GENERAL

The Columbia River Basin has been impacted by dams constructed for irrigation, flood control, hydropower, and navigation purposes. The normal riffle-run-pool sequences and associated habitats of free-flowing rivers have been lost to large pools. Other anthropogenic impacts include shoreline development with overwater structures and natural vegetation removal, and the introduction of non-native predator fishes which benefit from overwater structures and other shoreline developments.

Yakima River Delta is in the middle reach of the Columbia River, an area estimated to have lost more than 80 percent of aquatic and riparian habitat available prior to the construction of McNary Lock and Dam, impoundment of Lake Wallula, and construction of the Tri-Cities Levees. The causeway itself prevents flow mixing, inhibits natural sediment transport, and contributes to thermal barrier development which inhibits fish passage into the Yakima River.

Following the construction of structures in the area, the intensity and volume of flows entering the Delta were decreased. The Yakima River's capacity to create and sustain shallow side channels has significantly decreased as a result of flow obstruction. Due to this, an abundance of extra sediment collects in pool regions, covering the gravels that young salmonids utilize for feeding and camouflaging. It also alters water temperature, creating difficulties for fish passage, increased predation, and unsuitable conditions for adult salmonids as well.

3.2 LIMITING FACTORS

The Upper Columbia River Spring Chinook Salmon and Steelhead Recovery Plan (UCRSRB 2007) identified the following major limiting factors for these populations, which are also applicable to Middle Columbia River and Snake River salmon and steelhead, and bull trout within the vicinity of the action area.

- *Mainstem passage*. Salmon and steelhead populations bound for the Walla Walla River Basin, Snake River Basin, and Upper Columbia River must pass four major Columbia River dams to reach the action area. Limiting factors therefore include direct mortality of pre-smolts and smolts at McNary, John Day, The Dalles, and Bonneville Dams; delayed upstream migration of returning adults; false attraction of returning adults over McNary Dam; and cumulative impact of the hydropower system on mainstem and estuary habitat.
- *Ecosystem Function*. For all populations, degraded water quality (temperature), altered sediment routing, blocked and impaired fish passage, degraded floodplain and channel structure, and hydrologic alterations are limiting factors within the mainstem and tributaries. Predation, competition, and disease issues in the mainstem rivers and the estuary affect all Middle and Upper Columbia and Snake River populations.
- *Flow*. While the mainstem Columbia Dams downstream of Chief Joseph Dam are run-of-river and pass the river volume (i.e. do not store very much water), the varied flows of a natural river do not exist. No natural cooling, warming or oxygenation occurs as it would with a natural riffle-run-pool sequence. Migration time is affected for both upstream and downstream migrants.
- *Water Quality*. For all populations, degraded water quality (temperature) is a limiting factor. Columbia River summer water temperature within the action area can reach a maximum summer temperature of approximately 72°F, averages approximately 65°F at the mouth of the Yakima River Delta and Bateman Island, and temperature in the Yakima River Delta averaged between 75-78°F (USACE 2021).

SECTION 4 - EFFECTS OF THE ACTION

This section includes an analysis of general project-related effects of the proposed action, as well as specific effects on the species and PBFs of critical habitat. Effects from other interrelated and interdependent activities are also discussed.

4.1 EFFECTS TO LISTED SPECIES

The proposed actions for full removal of the causeway includes activities such as vegetation removal, excavation, and fill placement to armor the disturbed shoreline. These actions are likely to adversely affect ESA-Listed species. Potential effects are described in detail in the following sections. Due to the nature and timing of the proposed actions, effects to all fishes will be evaluated together.

4.1.1 Direct Effects

Specific actions associated with the project include:

8. Placement of approximately 1,200 linear feet (lf) of turbidity curtain on both the upstream and downstream sides of the causeway.
9. Removal of causeway vegetation and preparation of the existing surface along the south shore of the island to facilitate contractor access to the work site and the placement of fill within the area following excavation
10. Hauling approximately 139 cubic yards (cy) rock and soil materials across the causeway to Bateman Island to a stockpile for later use to stabilize the exposed post-removal shoreline
11. Removal of the entire 560-foot-long causeway using a long reach arm excavator to cut 39, 870 cy of material over an 800-foot-long alignment.
12. Additional excavation to create a toe at the base of the shoreline stabilization materials (four feet below the bottom and three feet out from the Bateman Island and mainland shorelines)
13. Placement of 70 cy of riprap and gravel at the mainland shoreline and 139 cy of rock and soil materials along the Bateman Island shorelines to provide shoreline stabilization

Direct effects from specific project activities include:

> *Removal of vegetation and preparation of the existing surface along the south shore of the island to facilitate contractor access to the work site and the placement of fill within the area following excavation*

All woody vegetation will be removed from the causeway using vegetation cutting equipment (i.e., chainsaws) and/or an excavator, used for grubbing. This action is likely to have a minor adverse effect on anadromous fish species, specifically steelhead, as their habitat productiveness is dependent on complexity in the form of these woody structures. Steelhead need cover provided by overhanging vegetation as protection from disturbance and predation during spawning, but considering spawning is not known to occur in the action area, the impact is likely to be minor and temporary on the anadromous fish populations. Due to the large size of the Columbia River, loss of the vegetation is not expected to have any effect on water temperature.

Hauling riprap/rock and soil materials across the causeway to Bateman Island to a stockpile for later use

Approximately 62 CY of rock and soil would be hauled to the island by trucks, via the causeway. The material would be stockpiled on the island to be placed along the island and mainland shoreline to minimize shoreline erosion. This action will likely have little to no direct effect, as the temporary placement area for the stockpile of material will be located on Bateman Island and not within or near the water during this construction step.

Removal of the entire 560-foot-long causeway using a long reach arm excavator to cut 37,000 (cy) of material over an 800-foot-long alignment.

Excavation of the causeway will result in a temporary decline in water quality during the construction, as sediment will be mobilized and create a turbidity plume. The abundance of excess sediments is likely to settle and temporarily cover the gravels used by juvenile salmonids for camouflage and feeding and create temporary thermal barriers that impedes fish passage. However, the long-term effect from the action will be a significant benefit in water quality within the Yakima Delta by providing cooler water during the summer months and thereby improving fish habitat conditions for ESA-listed species.

Additional excavation to create a toe at the base of the riprap (four feet below the bottom and three feet out from the Bateman Island and mainland shorelines)

Creation of a toe, designed to stabilize the base of the stabilized shoreline, will result in temporary adverse effects on water quality. Similar to the excavation during the causeway removal, excavation to create a toe is likely to stir up sediment that could impact rearing juvenile fish. the action is not anticipated to generate notable cumulative impacts and would provide long-term benefits for these fish species during future migration periods.

Placement of rock and soil materials along the Bateman Island shoreline and riprap along the mainland shoreline to provide stabilization

Stabilization of the Bateman Island shoreline by excavation of 41 cy to create a toe four feet below the river bottom and three feet out for the placement of 62 cy of shoreline stabilization materials. Stabilization of the mainland shoreline by excavation of 51 cy to create a toe four feet below the river bottom and three feet out for the placement of 77 cy of shoreline stabilization materials.

Not unlike the construction steps requiring excavation of materials, placement of rock and fill will increase turbidity temporarily, resulting in similar short-term adverse effects. It's important to note that no excavation is being proposed at the intact sections of the island or shoreline, resulting in a 'not likely to adverse effect' determination for substrate characteristics, a determining factor for fish egg, embryo, and juvenile survival. This action will be done to minimize shoreline erosion potential, which had an overall, long-term benefit on the Yakima River Delta Ecosystem.

4.2 EFFECTS ON CRITICAL HABITAT

Due to the nature and timing of in-water work, effects to all critical habitat will be evaluated together.

4.2.1 **Direct Effects**

Direct effects to critical habitat include the following:

- Water Quality
- Riparian vegetation
- Shoreline Stability

Water Quality

Water quality would temporarily decline during construction and for approximately 2-3 years post breach of the causeway during freshets. Sediment would be mobilized and create a turbidity plume. The sediment would settle within the confluence of the Yakima River and in the downstream reaches of the Columbia River through the McNary pool and dissipate on the river bottom normally.

The long-term effect from the proposed action will be a significant benefit in water quality within the Yakima Delta by providing cooler water during the summer months and thereby improving fish habitat conditions for ESA-listed species.

Riparian vegetation

Under the proposed action, there will be minimal change to riparian vegetation as the amount of vegetation removed will be limited, resulting in the habitat remaining consistent with the existing condition. Riparian vegetation would continue to grow in Federal and state managed lands, and riparian areas along Bateman Island would remain sparce. Aquatic vegetation would continue to dominate the biome. Furthermore, terrestrial vegetation would be largely un-impacted by the proposed action. Overall, the impact to critical habitat would be less than significant.

Shoreline Stability

Soils consist of loamy fine sands, silt sands, and sandy loams along the Yakima River from the Ice Ages to present day. The delta of the Yakima River accumulates deposited sediments from upstream erosion that are characterized as basalt gravels and cobbles to fine silt. Sediment accretion occurs within the backwater environment created behind the causeway and Bateman Island. Sediments accumulated in the delta behind the causeway, a portion of these sediments will mobilize during the breach of the causeway and for approximately two - three years following the action during freshet.

Sediment sampling and a sediment transport model was conducted after public review to address this concern. The sediment transport modeling of three flow scenarios resulted in the following (NHC, 2024):

- The Low Flow for both Rivers scenario, representative of typical minimum annual flows, results in relatively low sediment mobility and low overall dispersion of particles through the domain. A less conservative settling assumption only results in approximately 6% of all particles released being transported through the entire domain and exiting the downstream boundary. With a more conservative settling assumption, none of the particles leave the Delta area under the Low Flow MS scenario.
- A High Columbia River, Low Yakima River scenario, approximately 2-year return period, results in a significant flux of particles from the Delta and between 60% and 73% of particles released being transported through the entire domain and exiting the downstream boundary.
- A High Columbia River, High Yakima River(High Flow 2) scenario, approximately 25-year return period, results in a significant flux of particles from the Delta and between 64% and 70% of particles released being transported through the entire domain and exiting the downstream boundary.

All the three scenarios indicate that almost all the particles will remain on the river right (south side of the channel) with some gradual spreading into the middle of the channel near the downstream end of the model domain. Due to the particles being outside the thalweg the tendency for settlement of the particles is higher on the far right. Particle numbers generally decrease progressively in the downstream direction due to particle deposition along the transport path for all flow scenarios.

Sediment sampling was conducted in May 2024 with laboratory analysis completed in June 2024. All sediment constituents were found to be meet state criteria. The USACE has included additional water quality monitoring (refer to Appendix G, Monitoring and Adaptive Management Plan) and will continue coordination with State of WA, Department of Ecology and EPA during design prior to construction.

Stabilization from riprap or other materials will prevent shoreline erosion at the points of causeway connectivity to Bateman Island and the mainland. In the long-term, erosion will decrease, and new areas would accrete within the Delta.

The Yakima Delta geologic features are anticipated to remain constant and disturbance of the existing subsurface materials within the boundaries of the shoreline will be minimized, if not eliminated, during design and construction by providing requirements and constraints in the construction specifications that require the contractor to protect the existing subsurface materials. Some options available to the designer include requiring the contractor to operate on additional fill or temporary matting placed in the construction area(s) to operate heavy equipment from during construction. The practicability of such options will be assessed during the design phases and implemented as appropriate.

As design progresses, adjustments to the corridor surface will be made to minimize or eliminate surface cuts (excavation) and refine the corridor presented, ensuring subsurface materials are protected as required.

Effects to Physical and Biological Features of Critical Habitat

Effects to the PBFs of anadromous fish critical habitat is presented in Table 4-1, and the equivalent for bull trout is presented in Table 4-2.

4.2.2 Anadromous Fish

Table 4-1. Effects of the Proposed Action to PBFs of Critical Habitat for Anadromous Fishes and Their Corresponding Species Life History Events

Physical and Biological Features – Anadromous Fishes		
PBF	**Attribute**	**Effect Determination**
Freshwater spawning	Substrate Water quality Water quantity	No effect - Spawning is not known to occur in the action area.
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	LAA/Beneficial
Freshwater migration	Free of artificial obstructions Natural cover Water quality Water quantity	LAA/Beneficial

Estuarine areas	Forage Free of obstruction Natural cover Salinity Water quality Water quantity	No Effect
Nearshore marine areas	Forage Free of obstruction Natural cover Water quantity Water quality	No Effect - Spatially separated from the proposed action.
Offshore marine areas	Forage Water quality	No Effect - Spatially separated from the proposed action.

4.2.3 Bull Trout

Table 4-2. Effects determinations for the proposed action to the PBFs for bull trout.

Physical and Biological Features – Bull Trout		
PBFs	**Attributes**	**Effect Determination**
Water Quality	Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia.	LAA
Migration Habitat	Migration habitats with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and freshwater and marine foraging habitats including, but not limited to permanent, partial, intermittent, or seasonal barriers.	LAA
Food Availability	An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	No Effect
Instream Habitat	Complex river, stream, lake, reservoir, and marine shoreline aquatic environments, and processes that establish and maintain these aquatic environments, with features such as large wood, side channels,	No Effect

	pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	
Water Temperature	Water temperatures ranging from 2°C to 15°C (36°F to 59°F), with adequate thermal refugia available for temperatures that exceed the upper end of this range. Specific temperatures within this range depend on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shading (provided by riparian habitat); streamflow; and local groundwater influence.	No Effect
Substrate Characteristics	In spawning and rearing areas, substrate of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine sediment, generally ranging in size from silt to coarse sand, embedded in larger substrates, is characteristic of these conditions. The size and amounts of fine sediment suitable to bull trout will likely vary from system to system.	NLAA
Stream Flow	A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, minimal flow departure from a natural hydrograph.	NLAA
Water Quantity	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	NLAA
Nonnative Species	Sufficiently low levels of occurrence of non-native predatory (e.g., lake trout, walleye, northern pike, smallmouth bass); interbreeding (e.g., brook trout); or competing (e.g., brown trout) species that, if present, are adequately temporally and spatially isolated from bull trout.	No Effect

4.3 CUMULATIVE EFFECTS

Cumulative effects are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area and are not subject to ESA consultation (50 CFR 402.02).

The Yakima River Delta is expected to be fully functional in the future as a result of breach of the causeway and is not expected to be impacted by onsite actions or other actions associated with Tri-Cities or the rest of the Yakima River Watershed. USACE is not aware of any proposed non-federal projects in the action area that could contribute to cumulative effects on listed species beyond the daily stressors. However, should water temperatures continue to rise as a result of climate change, migration delays and the potential for in-system fish mortality will increase. The proposed action significantly improves conditions to alleviate these pressures.

The Yakima River Delta Ecosystem Restoration Project would provide an opportunity for higher success of salmonid migration through the Delta which means an increase in ESA-listed fish reaching constructed fish habitat restoration sites located in the headwaters of the Yakima Rivers. This allows for a higher success in ESA fish spawning and returns, thereby increasing the potential of recovery success for these species. Without these improvements to migration, these restoration efforts that have been completed or will be completed in the near future would not reach their full potential and fish migration would continue to be impaired.

4.4 IMPACT MINIMIZATION MEASURES

The USACE is planning several actions to avoid or minimize impacts on ESA species and the environment. These impact minimization measures follow.

1. Silt curtains will be deployed prior to construction above and below the causeway to minimize turbidity from construction activities.
2. Begin removal of the causeway in the winter when few, if any, juvenile salmonids would be present. This will occur during the in-water work window from December 1 through February 28.
3. During in-water work, turbidity monitoring shall occur. If state water quality standards are exceeded, work shall be modified or ceased until turbidity levels returned to acceptable limits. An extended mixing zone will be employed. Related monitoring would examine sediment mobilization during freshet events.
4. Construction best management practices will be followed to minimize impacts from potential petroleum spills.
5. Construction materials will not be released into the water, except for clean fill or riprap installed to protect the shorelines from erosion.
6. Silt curtains would be used to minimize turbidity from any excavated or stockpiled materials.
7. Interstitial spaces of fill material will be filled with gravel or soil as appropriate to prevent the creation of predator habitat.
8. Use of nature-based designs will be maximized in the development of shoreline stabilization elements.
9. Disturbance of the existing subsurface materials within the boundaries of the disturbed shoreline will be minimized as much as practicable during design and construction by providing requirements and constraints in the construction specifications that require the contractor to protect the existing subsurface materials.
10. During design phase adjustments to the excavated surface will be identified to minimize or eliminate excavation and refine the disturbed footprint, ensuring subsurface materials are protected as much as feasible.

4.5 EFFECTS DETERMINATIONS AND SUMMARY

Based on the timing and effects of the proposed action, fish life history and migration timing, and the impact minimization measures proposed, the proposed action may affect, and is likely to adversely affect Upper and Middle Columbia River steelhead, Upper Columbia River Spring Chinook salmon, and bull trout and would have no effect on yellow-billed cuckoo and gray wolf. The critical habitats for all fish species may be, but is not likely to be adversely affected, and the critical habitats for the two other list species (yellow-billed cuckoo and gray wolf) will have no effects from the proposed action. A summary of effects determinations can be found in Table 4-3. Informal consultation with NMFS and USFWS is required.

Table 4-3. Effect Determination for Threatened and Endangered Species That May Occur in the Project Area

Species	Species Determination	Critical Habitat Determination
	NMFS	
Steelhead (*Oncorhynchus mykiss*)		
Upper Columbia River DPS	LAA	May Affect
Middle Columbia River DPS	LAA	May Affect
Chinook Salmon (*Oncorhynchus tshawytscha*)		
Upper Columbia spring run ESU	LAA	May Affect
	USFWS**	
Bull Trout (*Salvelinus confluentus*)		
Conterminous U.S.	LAA	May Affect
Western Yellow-billed Cuckoo (*Coccyzus americanus)*		
Western U.S. DPS	No Effect	No Effect
Gray Wolf *(Canis lupus)*		
Conterminous U.S.	No Effect	No Effect

SECTION 5 - MAGNUSON-STEVENS ACT – ESSENTIAL FISH HABITAT

The consultation requirement of section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) directs Federal agencies to consult with NMFS on all actions, or proposed actions that may adversely affect Essential Fish Habitat (EFH). Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

The Pacific Fishery Management Council (PFMC) is one of eight regional fishery management councils established by this Act. The PFMC has designated EFH for ground fish; coastal pelagic species; and Chinook salmon, Coho salmon, and Puget Sound pink salmon. Steelhead are not protected by this Act.

The action area is designated Chinook and Coho salmon EFH. Although the restoration would be beneficial, during excavation, turbidity and disturbance to macroinvertebrate communities would temporarily modify EFH. The action would cause adverse modification to EFH, although affects would be no more than minimal and temporary. Ultimately, the project would result in restored EFH, but due to the immediate effects from construction, EFH consultation is required.

SECTION 6 - REFERENCES

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