US Army Corps of Engineers ®
Walla Walla District

MILL CREEK FLOOD RISK MANAGEMENT GENERAL INVESTIGATION

Draft Feasibility Study and Environmental Assessment Report

January 2020

APPENDIX F
BIOLOGICAL ASSESSMENT

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Biological Assessment
for
Threatened and Endangered Species and Critical Habitat

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

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

January 2020

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SUMMARY

The Corps of Engineers, Walla Walla District (Corps), prepared a draft Feasibility Study Report and Environmental Assessment for revisions to the Mill Creek Flood Control Project in Walla Walla, Washington. The Corps proposes to (1) rehabilitate the concrete channel in high-risk areas, (2) raise levees up to 1.5 feet in areas where the levee is too low, (3) modify the flood diversion operations, and (4) acquire flowage easements on properties at risk of flooding downstream of the MCFCP. The proposed action is discussed in this biological assessment.

The proposed action would allow the MCFCP to provide a higher level of protection to the city of Walla Walla and surrounding area. The rehabilitated channel and raised levees would continue to operate for many years into the future. The proposed changes would allow the Mill Creek channel to convey slightly higher flows than the current condition.

Endangered Species Act-listed species in the area include bull trout, steelhead, and yellow-billed cuckoo. Some aspects of the proposed action may affect, and are likely to adversely affect steelhead and bull trout and may affect their critical habitat. The action would have no effect on yellow-billed cuckoo.

The Corps requests formal consultation on the proposed action. If additional information regarding this document is required, please contact Benjamin Tice, biologist in the Environmental Compliance Section of the U.S. Army Corps of Engineers, Walla Walla District, at (509) 527-7267, or by email at ben.j.tice@usace.army.mil. Other correspondence can be mailed to:

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MILL CREEK FLOOD RISK MANAGEMENT GENERAL INVESTIGATION FEASIBILITY STUDY AND ENVIRONMENTAL ASSESSMENT REPORT – DRAFT APPENDIX F, BIOLOGICAL ASSESSMENT

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ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
BiOp	Biological Opinion
CFR	Code of Federal Regulations
cfs	cubic feet per second
Corps	Walla Walla District, U.S. Army Corps of Engineers
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
DPS	Distinct Population Segment
Ecology	Washington Department of Ecology
EFH	Essential Fish Habitat
ESA	Endangered Species Act of 1973, as amended
ESU	Evolutionarily Significant Unit
FR	Federal Register
FWCA	Fish and Wildlife Coordination Act
km	kilometer
MCFCP	Mill Creek Flood Control Project
MCR	Middle Columbia River
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NMFS	National Marine Fisheries Service
O&M	Operation and Maintenance
PBF	Physical and Biological Features
PFMC	Pacific Fishery Management Council
PIT	Passive Integrated Transponder
PL	Public Law
rkm	river kilometer
RPA	Reasonable and Prudent Alternative
SEIS	Supplemental Environmental Impact Statement
T&C	Terms and Conditions
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources

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SECTION 1 - INTRODUCTION

1.1 INTRODUCTION

The Mill Creek Flood Control Project (MCFCP) was authorized by Congress in 1938 [Public Law (PL) 75-761] (the Flood Control Act of 1938). The MCFCP was constructed to provide flood risk reduction to the city of Walla Walla and its adjacent lands. The Act authorized the construction, operation, and maintenance of the MCFCP. The upstream 1.4 miles of the MCFCP is owned by the Federal government and operated and maintained by the U.S. Army Corps of Engineers, Walla Walla District (Corps). The downstream 6 miles of the channel is owned by Walla Walla County and operated and maintained by the Mill Creek Flood Control Zone District. Both the Federal and the non-Federal portions of the MCFCP are included in this Mill Creek General Investigation Feasibility Study (Feasibility Study) consultation.

A feasibility study was conducted to identify alternatives to reduce the susceptibility of Walla Walla and surrounding areas to flood-related property damage and financial and human life losses from Mill Creek over the 50-year period of analysis. The action is needed because the performance, capacity, and reliability of the existing flood risk management system are degrading, and the operation and maintenance costs are increasing as the system ages. The action, consistent with policies, could also incorporate compatible features to improve fish habitat and passage conditions, enhance floodplain connectivity, and avoid obstructing the ability of others to make such improvements within the study area.

Middle Columbia River (MCR) steelhead and Columbia Basin bull trout, both of which are Endangered Species Act (ESA)-listed species, are present in Mill Creek. Mill Creek and one of its distributaries, Yellowhawk Creek, are currently designated critical habitat for both species. The main concerns surrounding these fish within the MCFCP include poor fish passage conditions through the MCFCP, the potential for fish to become entrained in the storage reservoir, and the minimal flow of the channel, which can reach high temperatures during summer months.

Potential effects on ESA-listed species from the proposed action are discussed in this biological assessment (BA) for the Mill Creek Feasibility Study. The Corps is currently in consultation with the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service on a supplemental environmental impact statement (SEIS) related to the operation and maintenance (O&M) of the Federal portion of the MCFCP. The only O&M action discussed in the SEIS consultation that would change as a result of the Feasibility Study consultation is the starting point, or diversion trigger, at which flood diversions to Bennington Lake begin. The diversion trigger would change from the current 1,400 cubic feet per second (cfs) diversion trigger to a diversion trigger of 1,700 cfs. All other operations and maintenance actions related to the Federal portion of the MCFCP remain unchanged.

1.2 PROJECT LOCATION

The study area for the Mill Creek Feasibility Study is the Mill Creek Watershed (Figure 1), which is situated along the border of southeastern Washington and northeastern Oregon. Most of the watershed is within Walla Walla County in Washington; it also includes parts of Columbia County, Washington, and Umatilla and Wallowa Counties in Oregon.

Mill Creek originates near the border of Washington and Oregon and flows west for 33 miles before its confluence with the Walla Walla River, which flows west for 33.5 miles before entering the Columbia River. The Mill Creek Watershed extends from Mill Creek's origin to its confluence with the Walla Walla River. Major tributaries of Mill Creek include Blue and Titus Creeks, and distributaries include Titus, Russell, Yellowhawk, and Garrison Creeks (Garrison, is actually a distributary of Yellowhawk, originating about 0.1 miles beyond Yellowhawk's origin.

The existing MCFCP, which is located entirely within Walla Walla County, Washington, begins about 2 miles east of the city of Walla Walla, and ends in the city of College Place at the Gose Street bridge (Figure 2).

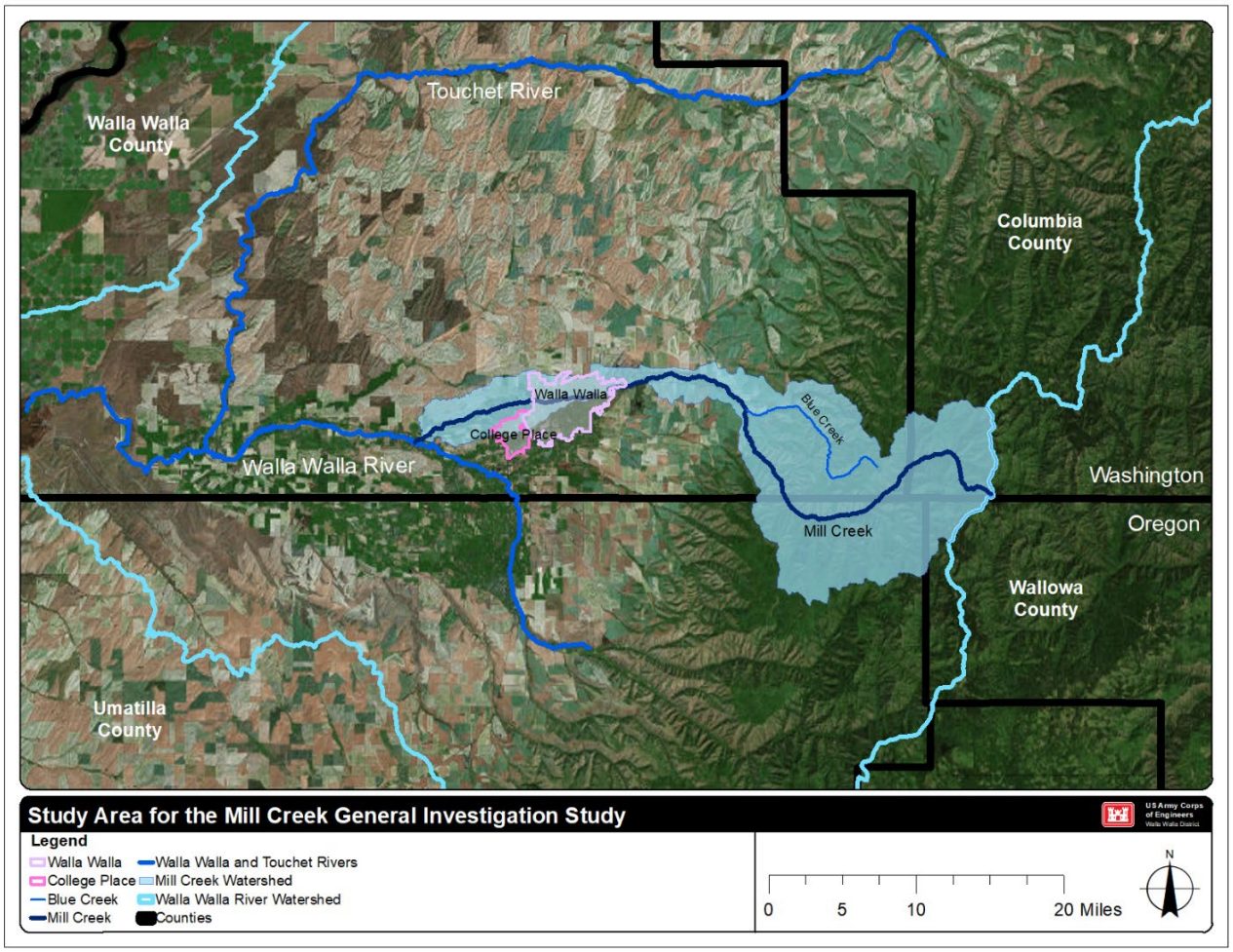

Figure 1. Mill Creek Watershed Map

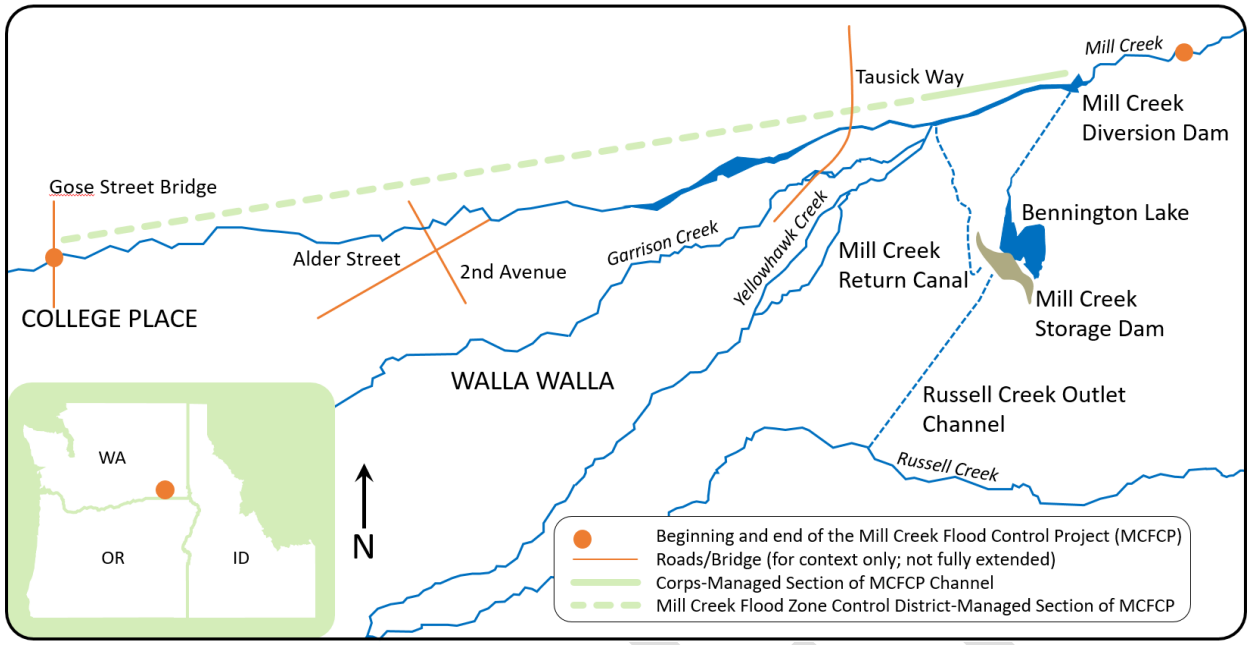

Figure 2. Project Location

1.3 PROPOSED ACTION

The proposed action in the Mill Creek General Investigation Feasibility Study includes the following:

1. Rehabilitate the concrete channel in areas that are determined to be at high-risk for failure.
2. Raise the levees up to 1.5 feet in areas where they are currently too low to safely convey 3,700 cubic feet per second (cfs).
3. Modify the flood diversion operations.
4. Acquire flowage easements on properties at risk of flooding downstream of the MCFCP.

1.3.1 Rehabilitate the Concrete Channel in High-Risk Areas

The rehabilitation of the concrete portion of the Mill Creek channel will consist of several different types of repairs along the length of the channel. The main types of repairs include the following and each type is discussed below.

1. Wall tiebacks using soil anchors (approximately 4,140 feet) (Type 1 repair)
2. General concrete resurfacing (950 feet) (Type 2 repair)
3. Wall replacement (775 feet) (Type 3 repair)
4. Center wall reinforcement (150 feet) (Type 4 repair)
5. Channel cover removal (150 feet)

<u>Type 1 repair - Wall tiebacks using soil anchors</u> (figure 3) - Total length of wall repair approximately 4,140 feet - This repair will be completed by first core drilling holes for the anchors in the wall to be tied back. The holes will be approximately 5 feet apart along the length of the wall. Anchors will be installed through the holes in the wall and approximately 20 feet into the soil beyond the wall. Base plates and nuts will be installed on each anchor. Once the anchors are installed, a 2 inch layer of concrete will be placed over the anchors to finish the installation.

This work will occur during the summer when Mill Creek flows are low and confined to the center low-flow channel.

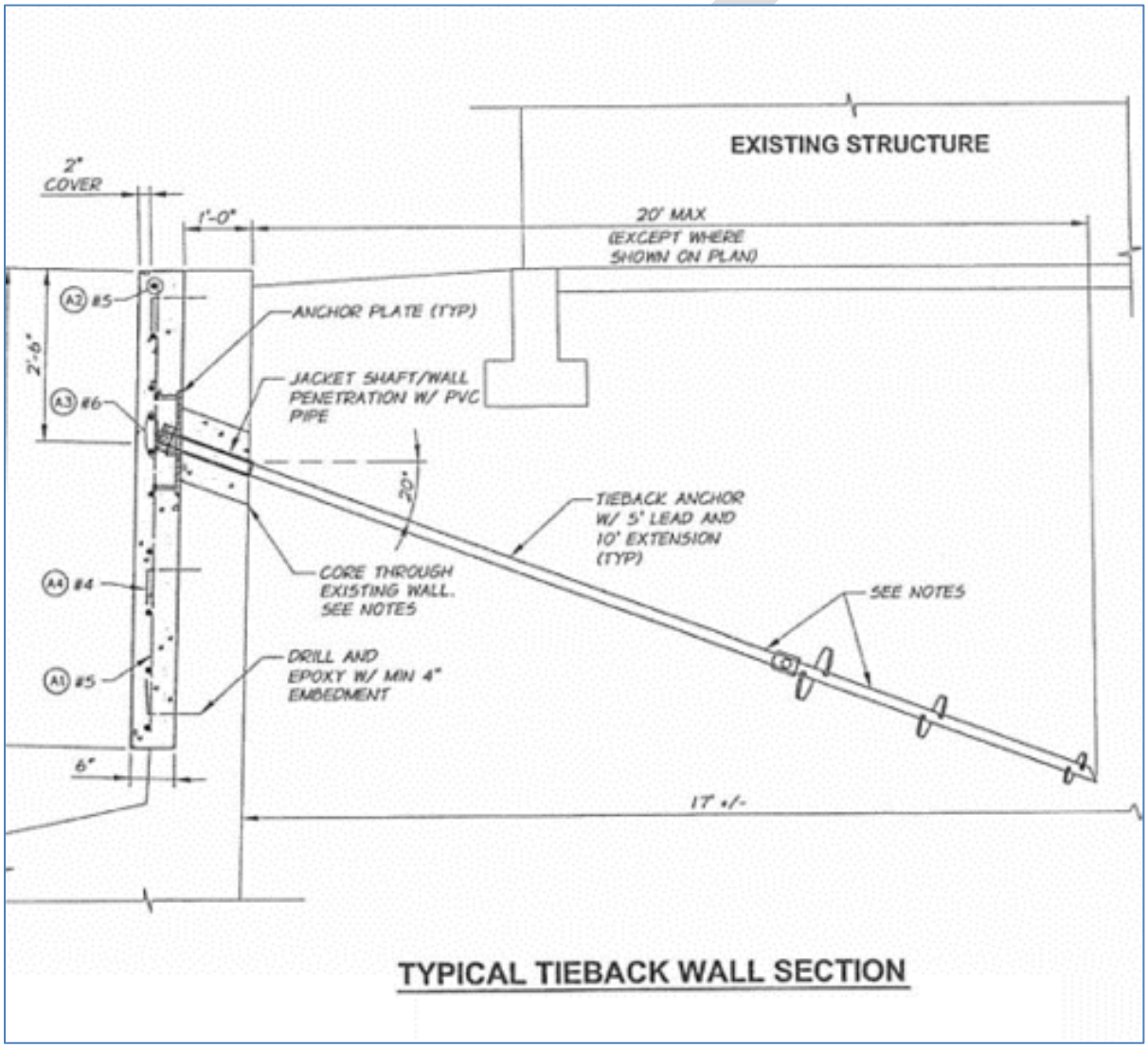

Figure 3. Type 1 Repair, Total Length of Wall Repair Approximately 4,140 Feet

Reaches for the type 1, tie back repair method are listed below.

a. Right bank downstream of 6th Avenue. Approximately 300 feet of repairs
b. Left bank between 5th and 6th Avenue. 300 feet
c. Left and right bank between 4th and 5th Avenue. 600 feet total
d. Left bank upstream of 4th Avenue. 40 feet of repairs
e. Left bank and right bank between Colville and Spokane Street. 600 feet total
f. Left bank between Palouse and Spokane Street. 200 feet total
g. Left bank upstream of Palouse Street. Approximately 200 feet
h. Right bank upstream of Palouse Street. Approximately 200 feet
i. Left bank downstream of Park Street. Approximately 150 feet
j. Right bank downstream of Merriam Street. Approximately 250 feet
k. Right and left bank downstream of Clinton Street. Approximately 400 feet. 800 feet total
l. Right bank upstream near the middle of Wildwood Park. Approximately 100 feet
m. Right bank and left bank downstream of Roosevelt Street. Approximately 100 feet on each side. 200 feet total
n. Left bank upstream of Roosevelt Street. Approximately 200 feet

<u>Type 2 Repair - General concrete resurfacing</u> (figure 4) – 950 feet - In some areas there are concerns of general deterioration of the wall surfaces in the channel. The main area of concern is in the stone masonry portion of the channel, mainly in the covered stretch of the channel going under downtown Walla Walla. This repair will consist of installing anchors in the channel wall, and installing a reinforcing mat tied to the anchors on the wall. Once the reinforcement is installed a layer of concrete 4 to 6 inches thick will be placed on the wall. Shotcrete or cast-in-place methods could be used.

This work will occur during the summer when Mill Creek flows are low and confined to the center low-flow channel.

Reaches to be repaired include:

a. Right and left bank under 2nd Avenue and extending upstream and downstream approximately 100 feet. 400 feet total

b. Left bank under Main Street extending downstream approximately 100 feet and going upstream approximately 300 feet. 400 feet total

c. Right bank upstream of Main Street. Approximately 150 feet

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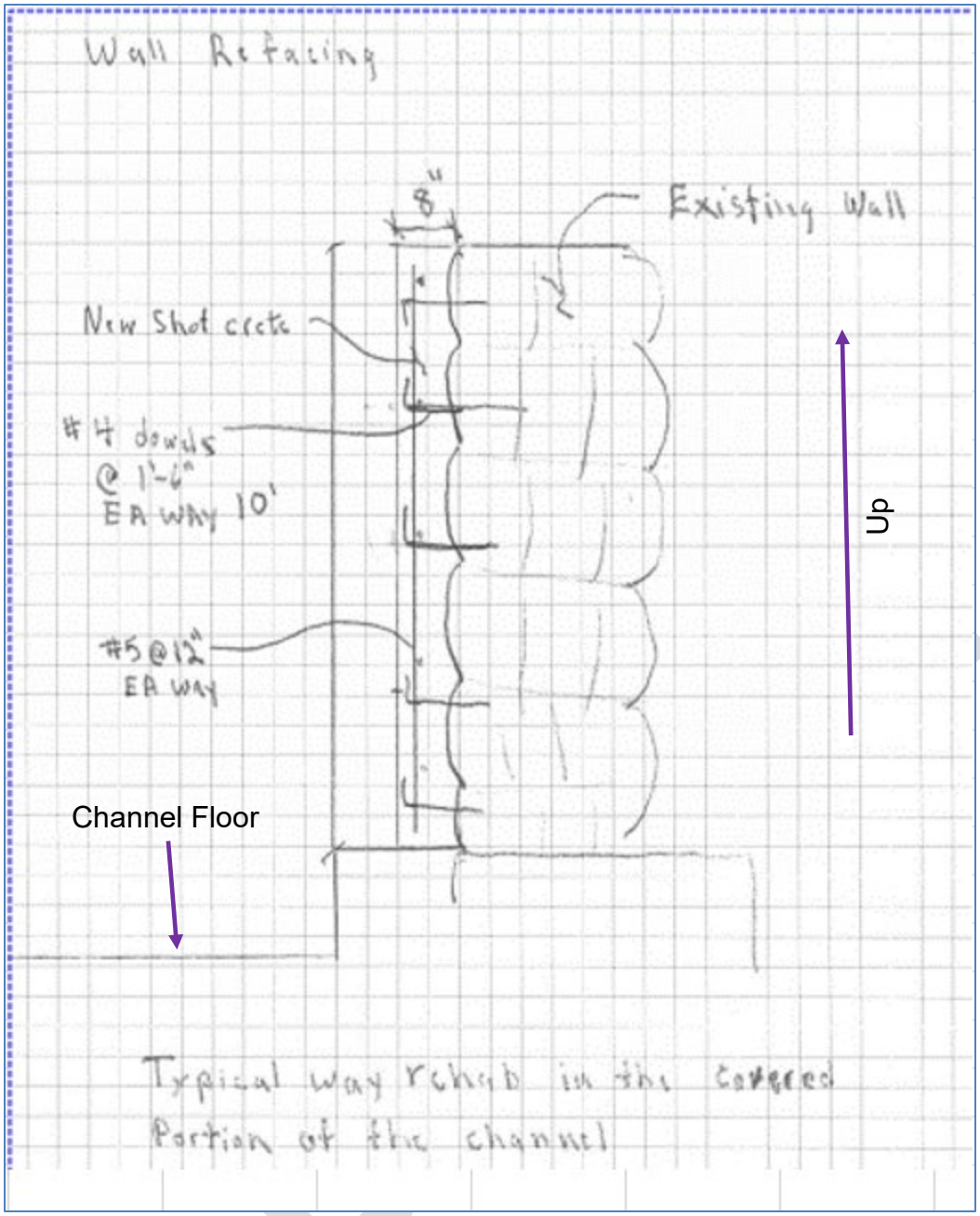

Figure 4. Type 2 Repair - Total Length of Repair 950 Feet

<u>Type 3 Repair - Wall replacement</u> (figure 5) – 775 feet - There are a few areas where the wall is in poor condition and in need of replacement. The replacement will consist of excavating behind the existing section of wall, cutting out the existing section of concrete wall, setting up concrete forms, and placing a cast-in-place, reinforced concrete footing and wall for that section. Once the new wall section has been fully cured and the forms removed, the area behind the wall will be backfilled.

Any fish in the low flow channel within the work area will be herded moved upstream or downstream with seines and block nets will be used to keep them from reentering the work area. The work will be conducted during summer when flows are low and few fish would be present.

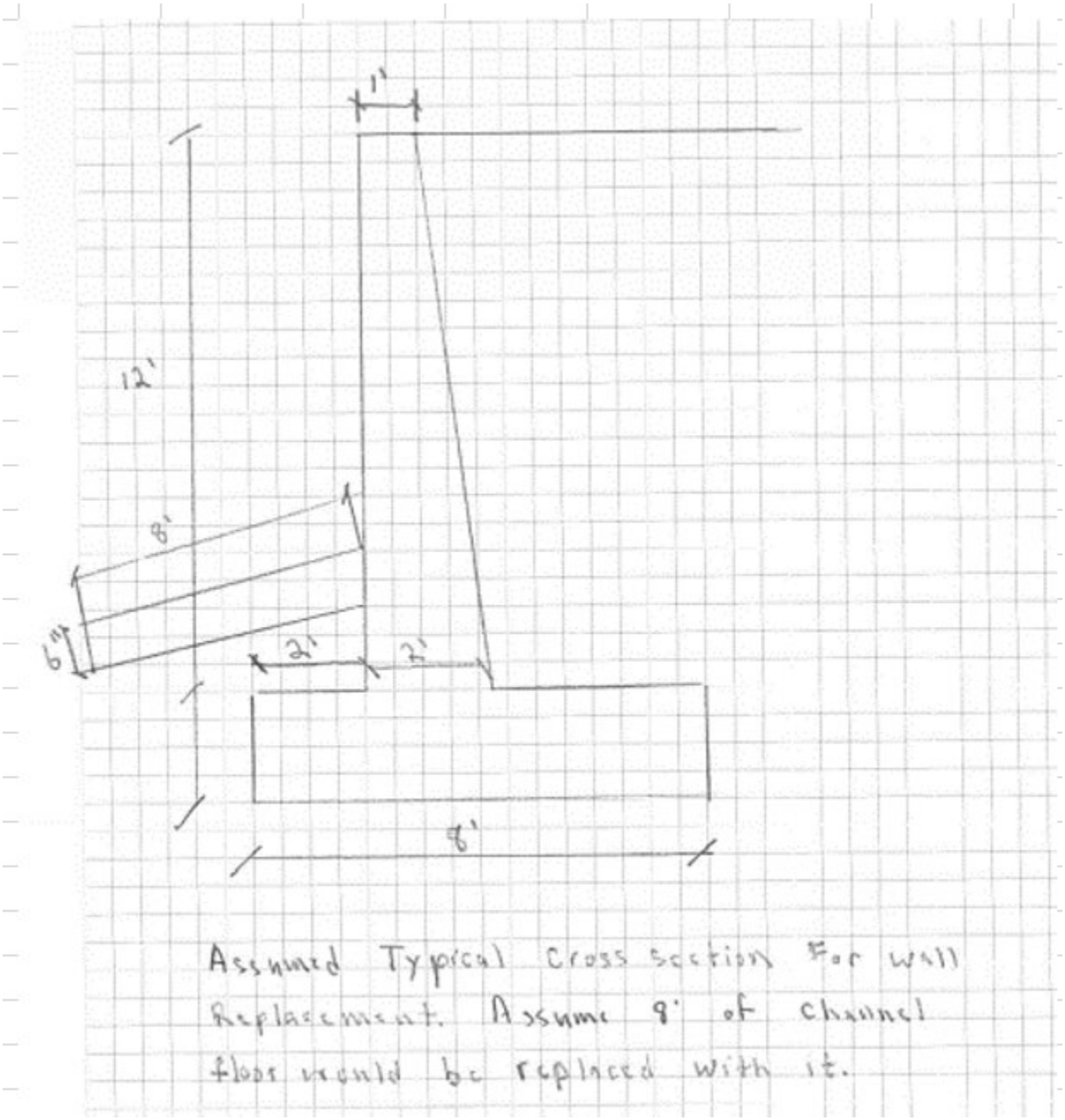

Figure 5. Type 3 Repair - 775 Feet Total

a. Right bank upstream of Spokane Street. Approximately 75 feet of wall.
b. Left bank between Otis and Merriam Street. 500 feet.
c. Several locations next to bridges - Approximately 20 feet at each bridge. 200 feet total.

Type 4 Repair - Center wall building support (figure 6) - 150 feet total - The center wall under the Die Brucke building is constructed of steel pipe columns, with a timber plank and concrete/gravel in-fill between the columns. The repair will remove the timber planks and in-fill. A cast-in-place, reinforced concrete wall will be constructed around the current steel pipe columns and anchored to the concrete footing below. The wall will be approximately 16 inches thick and approximately 150 feet long.

The water in the low flow channel adjacent to the work will be covered so that no construction material falls into the water.

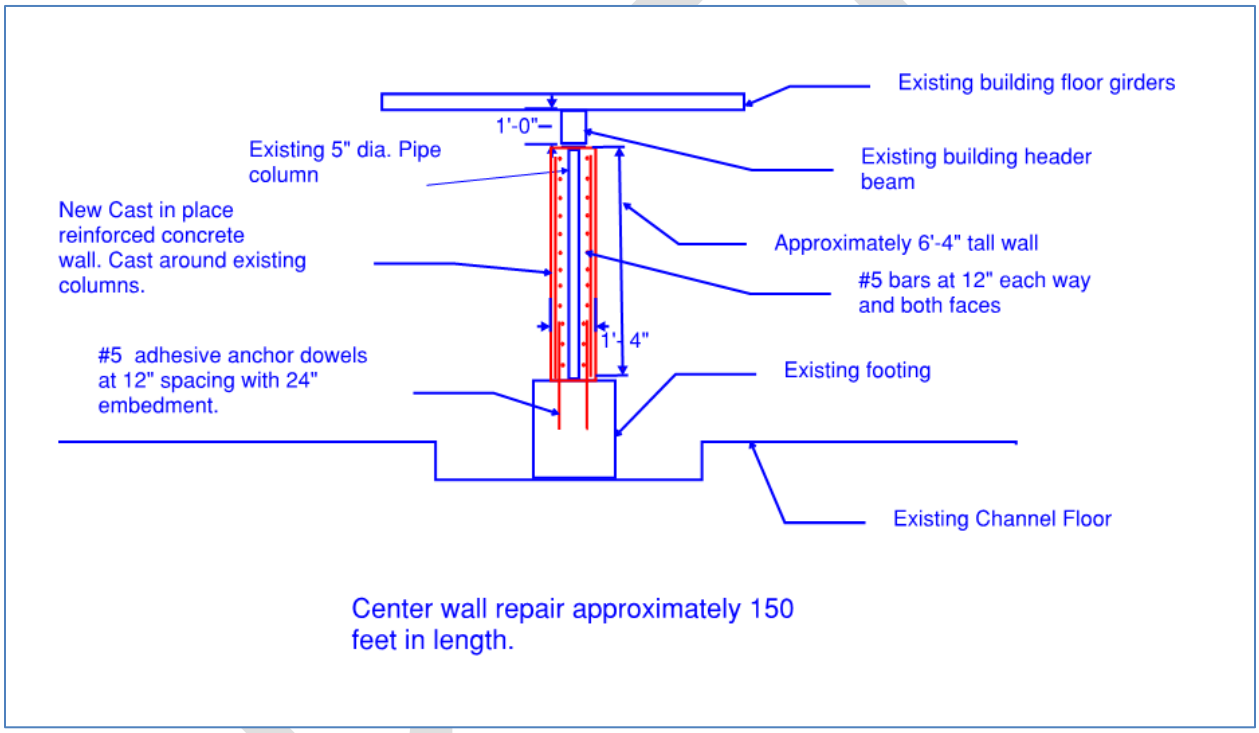

Figure 6. Type 4 Repair - 150 Feet

Channel cover removal (figures 7 and 8) - The channel cover has significant deterioration and has be listed as a "red zone" by the city in two locations. These areas are currently not being used and are in need of repairs.

a. The first location is a parking area between 2nd and 3rd Avenue. For the rehab it is recommend that this area of the channel cover be removed and guardrail be placed around the new opening. Approximately 100 feet of cover to be removed.

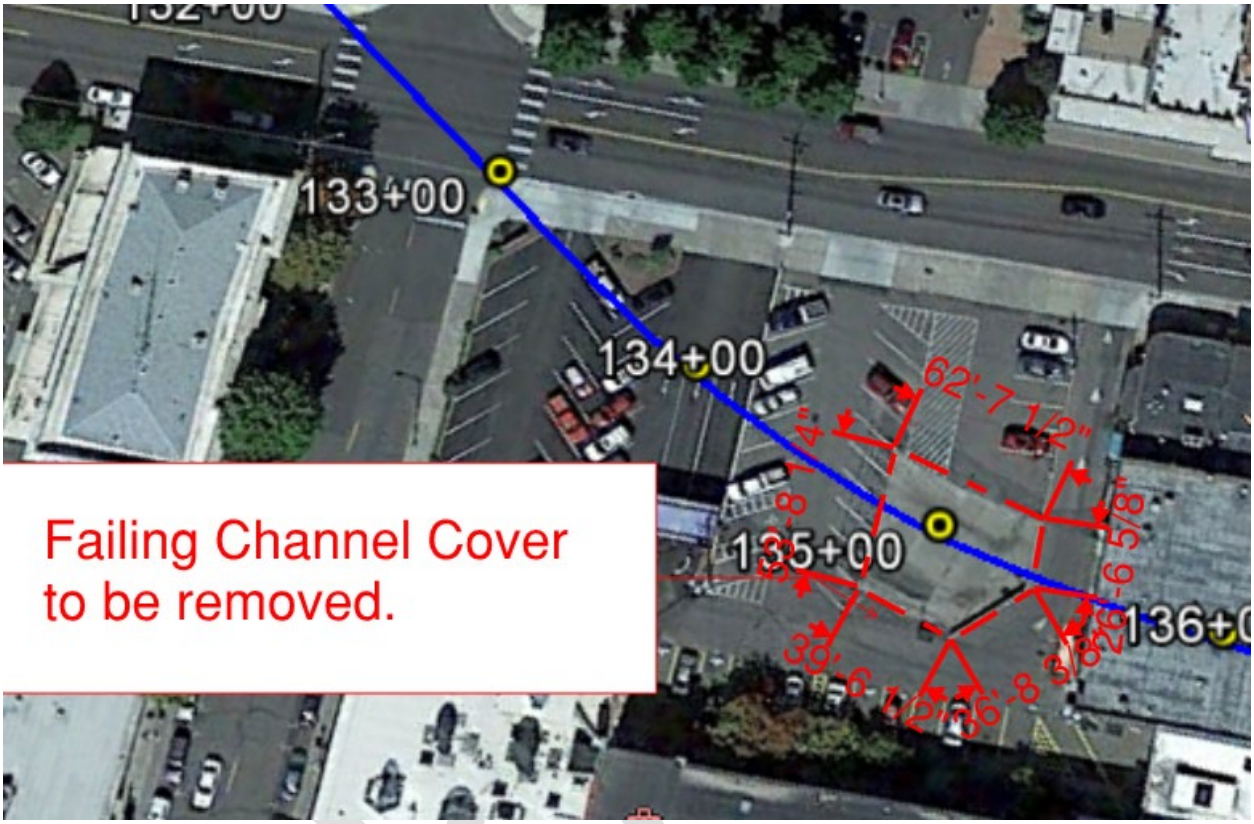

Figure 7. Channel Cover Removal Location between 2nd and 3rd Avenue near Rose Street

b. The second area for channel cover removal is a 50 feet reach upstream of 2nd Avenue. For the rehab it is recommend that this area of the channel cover be removed and a concrete guardrail be placed around the new opening. Approximately 120 feet of channel length will be uncovered.

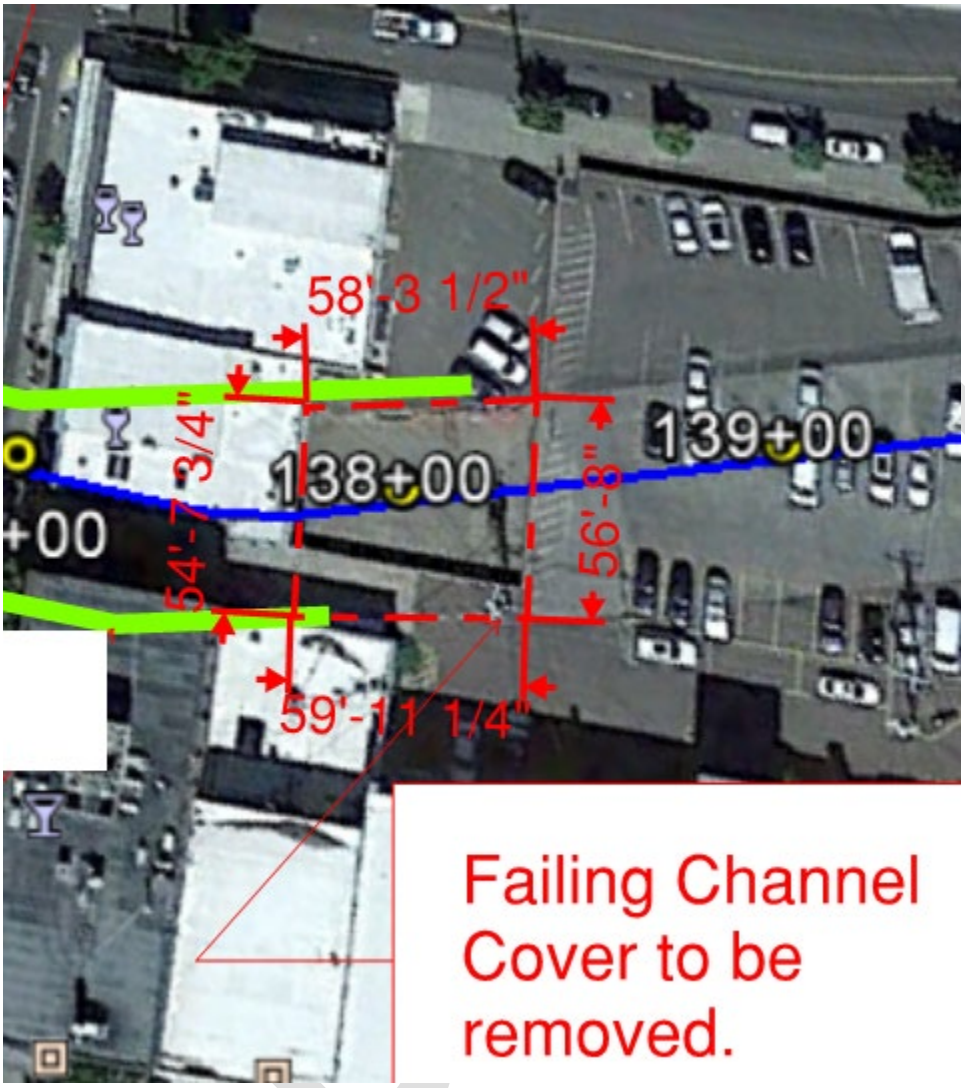

Figure 8. Channel Cover Removal Location upstream of 2nd Avenue behind Second Street Distillers

For each of the repair methods, water in the creek may need to be diverted around the construction site temporarily. Where possible, the creek water will be left in the low-flow channel and the work will be isolated from the flowing water. In other areas, the creek water may need to be diverted into a pipe routed through the construction site. Work will be done during the summer when flows are low.

Upon completion of the construction, all diversion materials and conveyance pipes will be removed and the creek will again flow in the low-flow channel.

1.3.2 Raise the Levees a Small Amount in Areas Where They Are Too Low

Some reaches of levee will need to be raised by a maximum of 1.5 feet in order to meet the 3,700 cfs, 1 percent annual chance exceedance flood criteria for the National Flood Insurance Program. This will also allow for an increase in flow conveyance capacity through the leveed areas, which improves operational flexibility. Figure 9 below shows a typical section for levee raise. Levee heights were estimated from previous LiDAR survey information, with the "worst case" height being used at each reach for the analysis. As models are updated and refined, the locations and required heights for the levee raise may change.

Very little excavation, other than clearing and grubbing is anticipated for raising the existing channel levees. For levees with smaller required raises, additional road gravel or asphalt concrete pavement will be used to meet criteria. Currently it is assumed that the existing wire bound slope revetment and gabion walls will not need to be extended or modified.

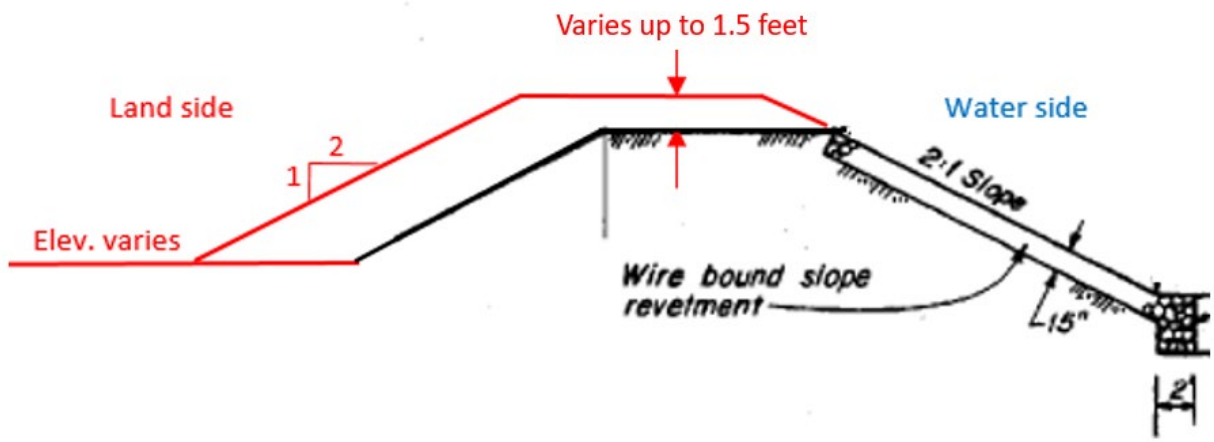

Figure 9. Typical Section of Proposed Levee Raise

A 2H on 1V slope is generally accepted as the steepest levee slope that can easily be constructed while ensuring stability of the riprap layers. To provide access for normal maintenance operations and flood fighting operations, minimum crown widths of 10 to 12 feet are commonly used. These widths are the minimum feasible for construction using modern heavy earthmoving equipment and should always be used to address safety concerns. Stability analysis of a levee section with the new width and height was performed to check that current stability criteria will be met with 2H:1V landside slopes and average height increase of 1.5 feet.

The available as-built drawings show that the existing levees meet these recommendations for 2H on 1V side slopes. Field verification will also be needed to ensure there is a 10 feet crown width, but it is likely that most of the existing levees already meet this width due to some past widening efforts. If there are areas that do not meet the minimum 10 feet width, they will be widened during the levee raise. However, consideration will be given to allow a minimum 8 feet crown width where clearances or improvements will not permit the wider section.

Local commercial sources are likely to be used to supply the material needed for the levee raise. If there are potential onsite borrow sources within the project boundaries, gradation and other index testing should be performed to confirm the material is suitable for the levee raise.

No in-water work would be required for raising the levees.

1.3.3 Modify the Flood Diversion Operations

The Corps proposes to increase the diversion trigger from the current level of 1,400 cfs to a trigger of 1,700 cfs. Flows greater than 1,700 cfs will be diverted to Bennington Lake. For large, longer-duration floods, the amount of flow remaining in Mill Creek will increase up to 3,700 cfs. When the Mill Creek channel reached 3,700 cfs, the remainder of the flow would be diverted to Bennington Lake until the lake fills.

NOTE: The diversion trigger proposed in the Mill Creek O&M SEIS consultation was a variable diversion trigger, switching between 1,400 cfs and 2,000 cfs depending on timing (December-March = 1,400 cfs; April to November = 2,000 cfs). Because ESA consultation on the variable diversion trigger has not yet been completed, the analysis in this Feasibility Study BA compares the proposed diversion trigger change to the current 1,400 cfs diversion trigger.

A diversion trigger of 1,400 cfs is exceeded every 4 years on average. A diversion trigger of 1,700 cfs would be exceeded every 5 years on average. Flooding and flood damages downstream of the MCFCP would be similar at both of these flow levels.

1.3.4 Potential Buyouts/Flowage Easement Acquisition on Properties at Risk of Flooding Downstream of the MCFCP

There are properties downstream of the MCFCP that have outbuildings that might need to be acquired and removed from the floodplain in order to minimize property damage during floods. More detailed inundation mapping would provide a much better estimate of which properties might be affected. The Corps may acquire flowage easements along the creek. Any structure within the flowage easement would be removed and no new structures would be allowed to be built within the acquired area.

1.4 PROJECT TIMELINE

The Mill Creek General Investigation Feasibility Study started in 2018 and is scheduled to be completed in 2021. If the study is approved, it will take additional time to appropriate funding and begin any proposed construction or operational changes.

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1.5 PREVIOUS CONSULTATION

In 2003, the Corps engaged in consultation with NMFS and USFWS with submission of a BA and request for formal consultation on operations and maintenance of the Federal portion of the MCFCP. On October 23, 2007, USFWS issued a Biological Opinion (BiOp) for the Project (USFWS ref # 1-9-2003-F-0239) that concluded the proposed action was not likely to jeopardize the continued existence of bull trout, and was not likely to destroy or adversely modify designated critical habitat for bull trout. The Corps has met all terms and conditions (T&Cs) of the BiOp, with the exception of 3(a), the construction of a low flow channel within the stabilized channel between Mill Creek diversion dam and the first division works by April 2012. However, in 2012 the Corps completed construction of three prototype weirs in the channel. Further, as listed under 3(d), fish ladder improvement study recommendations at Mill Creek diversion dam have not been implemented.

In 2010, the Corps formally consulted with NMFS and USFWS on a diversion dam forebay clean out, which occurred in 2011. NMFS issued their BiOp (NMFS No. 2010/01833) for the action on February 9, 2011. This BiOp covered up to four similar actions within 10 years (until 2021). USFWS issued their BiOp (USFWS ref# 13410-2010-F-0370) for the action on April 29, 2011. The Corps met the T&Cs in both the NMFS and USFWS BiOps for the clean-out.

On September 26, 2011, NMFS issued a BiOp for Project operations and maintenance (NMFS No. 2003/00309) with findings of jeopardy to MCR steelhead and adverse modification of critical habitat. The NMFS BiOp included a reasonable and prudent alternative (RPA) to avoid the likelihood of jeopardizing the continued existence of MCR steelhead, and adverse modification to MCR steelhead critical habitat. The Corps did not accept the NMFS RPA.

On April 20, 2015 the Corps requested formal consultation with USFWS and NMFS on potential effects to bull trout and steelhead from the Mill Creek Levee Vegetation Management Project. The Corps determined the proposed action may adversely affect bull trout and steelhead and that the project would be not likely to adversely affect yellow-billed cuckoo. Upon further discussion with the Services and slight modifications to the proposed action, the Corps changed its determinations for all three listed species to “not likely to adversely affect”. NMFS concurred with the Corps “not likely to adversely affect” determination for steelhead and steelhead critical habitat by letter dated July 16, 2015 (NMFS # WCR-2015-2714). USFWS concurred with the Corps determinations on July 23, 2015 (FWS ref # 01EWFW00-2015-I-0575).

On May 3, 2018, the Corps requested formal consultation with USFWS on potential effects to bull trout from another diversion dam forebay clean out (FWS ref # 01EWFW00-2018-F-1140), similar to the action consulted on in 2010. The USFWS provided their BiOp on June 28, 2018.

On June 1, 2018 the Corps requested formal consultation with USFWS and NMFS on replacement of the Yellowhawk Creek intake needle gates. The Corps at first determined the proposed action “may affect, and is likely to adversely affect.” Upon further discussion with NMFS and slight project modifications, the Corps changed the effect determination for steelhead and bull trout to “not likely to adversely affect.” NMFS concurred with the steelhead

determination on August 3, 2018 (NMFS # WCR-2018-10236). The USFWS concurred on the bull trout determination on July 17, 2018 (FWS ref # 01EWFW00-2018-I-1265.

On September 14, 2018 the Corps requested formal consultation with USFWS and NMFS on the operations and maintenance of the Mill Creek Flood Control Project. The Corps determined the proposed project "may affect, and is likely to adversely affect" middle Columbia River steelhead and bull trout, and may affect their critical habitat. This consultation is still ongoing (NMFS # WCR-2018-00274, USFWS Consultation Code 1EWFW00-2017-SLI-1139).

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SECTION 2 - LISTED SPECIES

2.1 SPECIES LISTED FOR THE PROJECT AREA

The Corps reviewed the list of threatened and endangered species that pertain to the area under the jurisdiction of NMFS and USFWS on 7 January 2020 (Table 1). The Corps determined the proposed action would have "no effect" on yellow-billed cuckoo (*Coccyzus americanus*), Canada lynx (*Lynx canadensis*), or gray wolf (*Canis lupus*). These species have not been observed at the project area during recent surveys and will not be affected by the proposed action. As a result, yellow-billed cuckoo, Canada lynx, or gray wolf will not be discussed in detail.

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

Species	Listing Status and Reference	Critical Habitat
NMFS		
Steelhead (*Oncorhynchus mykiss*)		
Middle Columbia River DPS	T:03/25/1999; 65 FR 14517	Yes: 09/2/2005; 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*)		
Northern Rocky Mountains DPS	E:03/09/1978; 43 FR 9607	No
Canada Lynx (*Lynx canadensis*)		
Contiguous U.S. DPS	T: 03/24/2000; 65 FR 16053	Yes: 11/09/2006; 71 FR 66008

Washington State Consultation Code 01EWFW00-2019-SLI-0212
Oregon Consultation Code 01EOFW00-2019-SLI-0087
*T= Threatened; E = Endangered

2.2 SPECIES STATUS

2.2.1 Middle Columbia River Steelhead

Listing History

On March 25, 1999, 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 37160). 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.

Life History/Biological Requirements

Life history characteristics for MCR steelhead are similar to those of other inland steelhead DPSs. Most fish smolt at 2 years, and spend 1 to 2 years in saltwater before re-entering freshwater. The fish may remain in freshwater streams for up to 1 year before spawning. All steelhead upstream of The Dalles Dam are summer-run (Reisenbichler et al. 1992) fish entering the Columbia River from June through August. Adult steelhead ascend mainstem rivers and tributaries throughout the winter, spawning in late winter and early spring. The Mill Creek steelhead population is most likely to spawn between February and June, with incubation typically between April and July. Fry emergence typically occurs between May and mid-July.

Steelhead exhibit a complex life history, and can be either anadromous (migratory) or freshwater residents (and under some circumstances, can yield offspring of the opposite form).

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

Table 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	Length	Lethal Limits
Upstream adult migration			P	P									0-17.5°C	After 1-4 years in ocean	0/23.9°C
Adult spawning													3.9-9.4°C		
Egg incubation													8.5-14°C	50-150 days	3-15°C >17.5 C
Alevin													8.5-14°C		>17.5°C
Fry emergence													8.5-14°C		
Juvenile rearing													7.3-14.6°C	1-3 Avg 2 years	16-20.5°C
Downstream Kelts															
Downstream juvenile migration				P									<14.4°C		13°C

P=Primary

Distribution

Distribution of steelhead in the Walla Walla subbasin (Hydrologic Unit Code 17070102) can be seen in Figure 10 (NMFS 2005), and distribution in the action area can be seen in Figure 11 (StreamNet 2010). Migration and rearing are known to occur in the action area. Spawning

occurs in areas upstream of the diversion dam and possibly in Yellowhawk Creek, downstream of the second division works. Spawning may also occur from Gose Street to the mouth of Mill Creek. The Garrison Creek fish screen now prevents fish from entering the creek, which has been deemed unsuitable for salmonids by fish management agencies. Thus, data showing "migration" in Garrison Creek has been eliminated from the Figure 10. Figure 11 represents available geospatial data from Washington Department of Ecology, Washington Department of Natural Resources, and the State of Washington, all of which was obtained from StreamNet (2010).

The spawning range of the MCR steelhead Distinct Population Segment (DPS) extends over an area of approximately 35,000 square miles in the Columbia plateau of eastern Washington and eastern Oregon. (The Mill Creek watershed drains an area of 165 square miles, or 0.47 percent of the DPS). The MCR steelhead DPS includes all naturally-spawning populations of steelhead in streams within the Columbia River Basin. Their range extends from above Wind River in Washington and Hood River in Oregon (exclusive) upstream to, and including, the Yakima River in Washington, but excluding steelhead from the Snake River Basin (64 FR 14517, March 25, 1999).

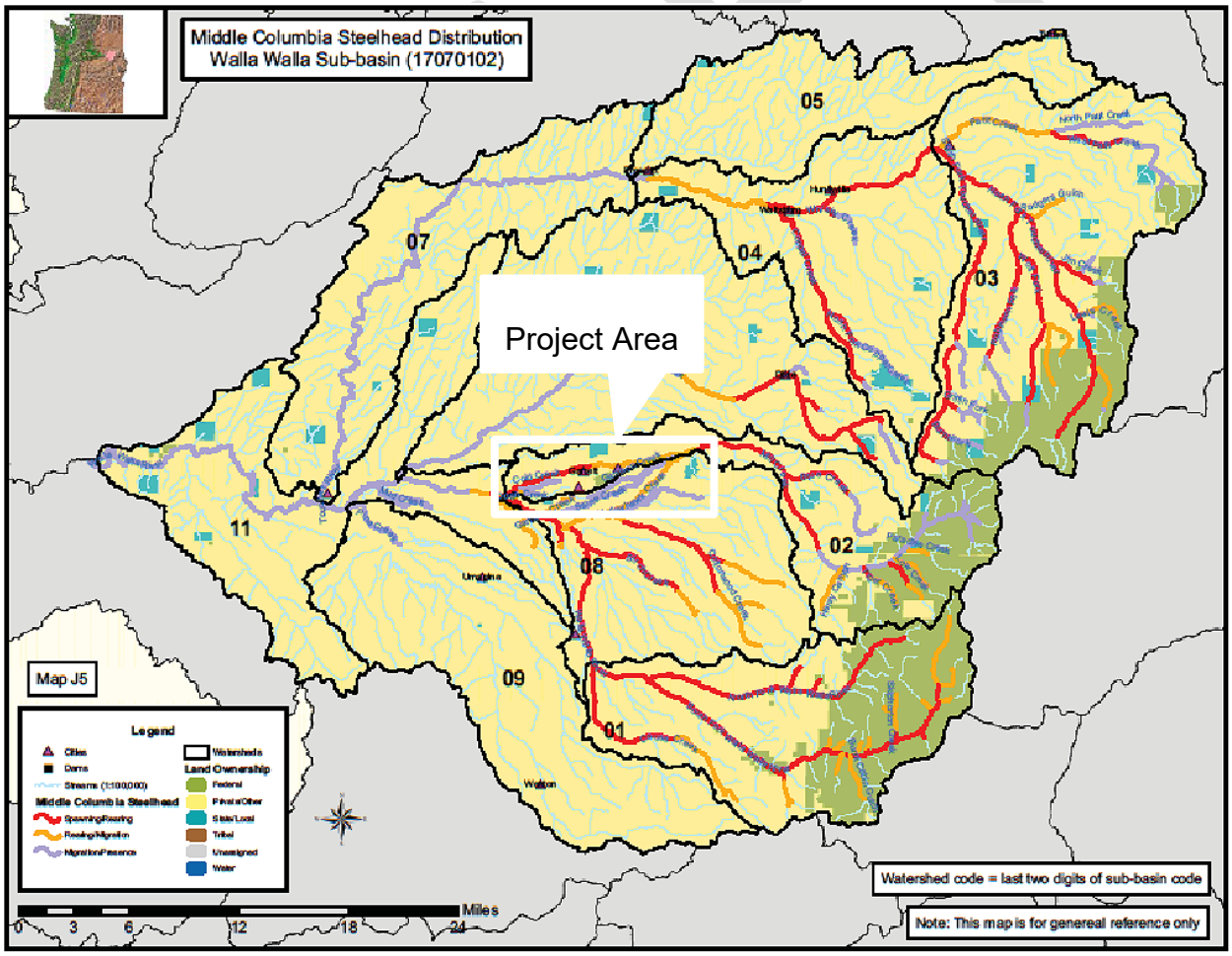

Figure 10. Distribution of MCR Steelhead in the Walla Walla Subbasin
Source: NMFS 2005

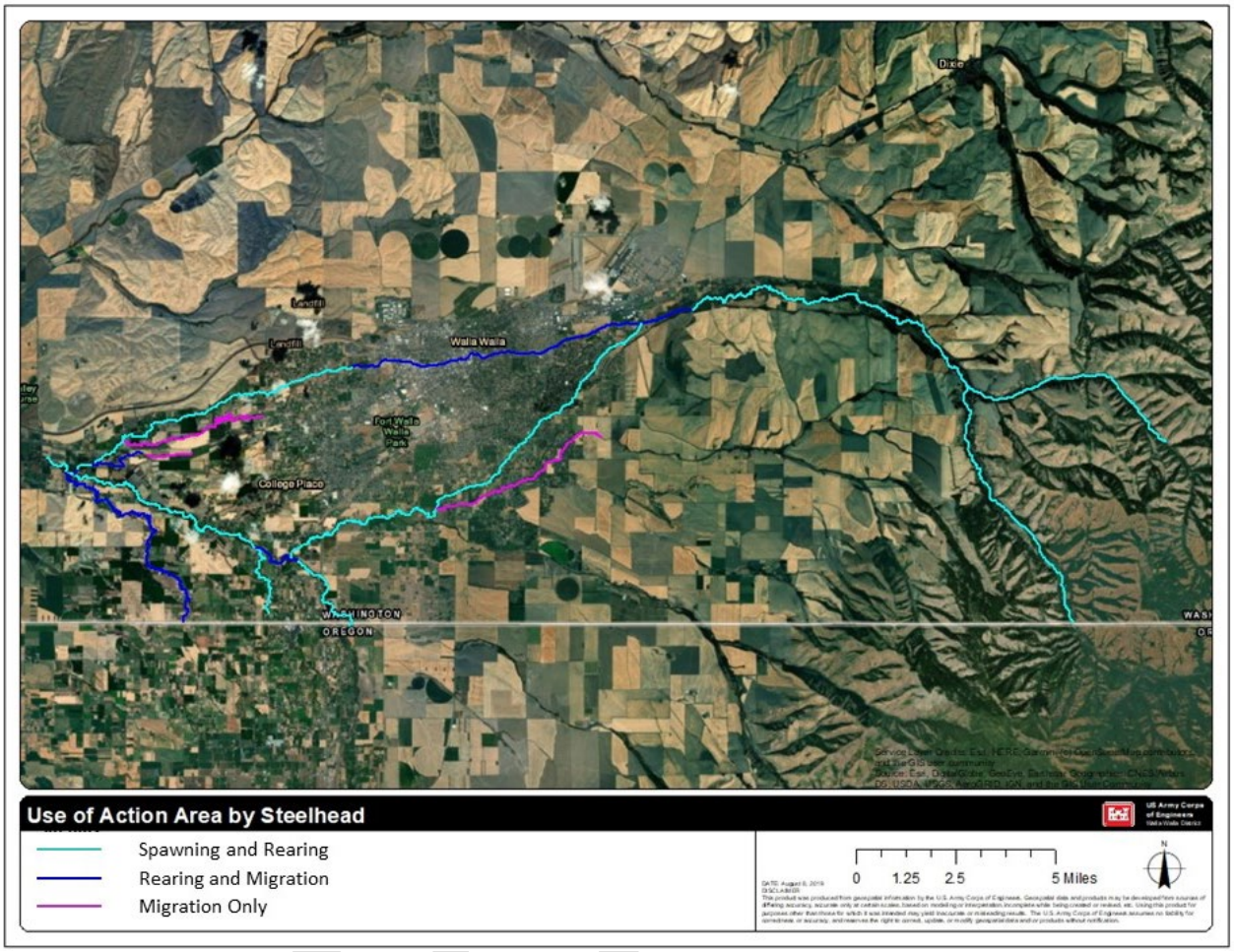

Figure 11. Use of Action Area by Steelhead
Source: StreamNet 2010

Historical Pressures on the Species

Historic fishing pressure began the decline of salmon and steelhead populations over 100 years ago. The construction of dams, roads, railroads, levees/shoreline protection, and irrigation withdrawals has altered the rearing habitat of juvenile salmonids and the migratory habitat of both juveniles and adults. Increased predation on juvenile salmonids caused by these habitat changes is also a contributor in the declining salmonid populations.

Prior to the construction of McNary Dam, a large percentage of the Columbia River shoreline consisted of shallow water with 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 Columbia Basin salmonid populations.

In Mill Creek, the diversion dam was constructed in 1942 with no provisions for upstream fish passage until 1982. Some fish may have been able to pass the structure through a series of temporary blocks, but passage was likely poor. The current fish ladder at this location provides

upstream fish passage at normal flows, but as flows increase above about 200 cfs, passage becomes difficult. At flows above 400 cfs, passage is blocked entirely.

The MCFCP channel through Walla Walla has also presented a partial passage barrier since the 1940s. Some fish are able to pass at a narrow range of flows, but passage is likely very poor. Yellowhawk Creek serves as a second passage route, but it joins the Walla Walla River a few miles upstream from Mill Creek so fish have to bypass Mill Creek to reach Yellowhawk Creek.

Current Pressures on the Species

Factors that led to the ESA listing of MCR steelhead continue to exert substantial influence on anadromous fish production. These factors include declines in the abundance of naturally produced fish, heavy harvest pressures, significant habitat loss, losses associated with mainstem Columbia River hydropower projects, grazing, irrigation diversions, and pervasive hatchery impacts that affect the viability of steelhead populations.

The Mill Creek diversion dam continues to be a partial barrier which delays upstream fish passage at flows above 400 cfs when the forebay fills and passage is blocked. Even if the ladder remained in operation (exit gate left fully open), it would likely be impassable to fish due to the high water level differences (spillway crest at elevation 1,261 feet and the ladder's normal operating range of elevation 1,253 to 1,256 feet) and the high water velocity through the ladder exit.

From 2000 to 2016, flow exceeded 400 cfs from 1 to 26 days per year (Table 3). Higher than average flows were observed in 2017, 2018, and 2019. February 2017 had 12 days above 400 cfs and March 2017 had 23 days above 400 cfs; there were a total of 43 days with flows above 400 cfs for the year. April 2018 had 13 days above 400 cfs; there were a total of 30 days total above 400 cfs that year. 2019 also had 30 days above 400 cfs. For comparison, in 1996, a major flood year, there were 18 days above 400 cfs in February and a total of 28 days during the year over 400 cfs.

In an effort to protect steelhead, the Washington Department of Fish and Wildlife (WDFW) has closed sections of Mill Creek below the Mill Creek diversion dam to fishing and there are seasonal restrictions in upstream areas.

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Table 3. Days Exceeding 400 cfs, by Month, 2000 through 2019

	Jan	Feb	Mar	Apr	May	Jun	Jul-Oct	Nov	Dec	Total
1996		18		4				1	5	28
2000		1			1					2
2001										0
2002	1	3	3	3						10
2003	2	3	9							14
2004	3	2			2					7
2005			1						1	2
2006	4		1	7				2	3	17
2007	2									2
2008				1	1	2				4
2009	7		3	16						26
2010						3			3	6
2011	6		3	7						16
2012	1	2	6	3						12
2013			2	3						5
2014			9						1	10
2015		3								3
2016		1	3							4
2017		12	23	4	1				3	43
2018	7	7	3	13						30
2019	5		8	17						30
Ave	1.81	2.48	3.52	3.71	0.24	0.24	0	0.14	0.76	12.9

Note: Measurements were taken at the Mill Creek at Walla Walla gauging station near the Corps Project office.
Source: USGS 2019

Local Population Information

Redd surveys of reference sites conducted by WDFW on Mill Creek are presented in Table 4. Redd data can vary greatly due to conditions that affect visibility into the water.

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Table 4. Steelhead Spawning Survey Summary, Redd Count (Number of Times Surveyed), for Mill Creek, 2001-2018

	Reach Surveyed														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
	rkm 37.8-36.1	rkm 36.1-34.8	rkm 34.8-33.5	rkm 33.5-30.1	rkm 30.1-29.5	rkm 29.5-29.0	rkm 29.0-25.6	rkm 25.6-22.2	rkm 22.2-20.8	rkm 20.8-20.0	rkm 7.9-7.6	rkm 7.6-4.8	rkm 4.8-3.2	rkm 3.2-0.0	
Year															Total Redds
2001	4 (3)			3 (3)		9 (3)		3 (2)	2 (2)			0 (1)	0 (1)	1 (1)	22
2002	0 (2)			1 (2)		0 (2)		0 (2)	0 (2)		0 (2)			0 (2)	1
2003			0 (2)	5 (2)		2 (2)		2 (2)	0 (2)						9
2004			4 (5)	10 (5)			5 (5)	9 (5)	8 (5)						36
2005	10 (3)		33 (3)					26 (3)	10 (3)	1 (3)					80
2006	9 (4)			6 (4)			20 (4)	4 (4)	4 (4)						43
2007[b]															0
2008	3(2)			4(2)			4(2)	3(2)	1(2)						15
2009[b]															0
2010	33(4)			27(4)		24(4)		17(4)	25(4)						126
2011[b]															0
2012[b]															0
2013				25(4)		21(4)		25(4)	12(4)						83
2014				8(2)		5(2)		8(2)	5(2)						26
2015				24(5)		25(5)		32(5)	16(5)						97
2016[b]															0
2017		0(3)		6(3)		1(3)		1(3)	6(3)						14
2018[b]															N/A

[a] A: Stateline to 2.6 km above Wickersham bridge, B: 2.6 km above Wickersham bridge to 1.3 km above Wickersham bridge, C: 1.3 km above Wickersham bridge to Wickersham bridge, D: Wickersham bridge to 0.6 km above Blue Creek mouth, E: 0.6 km above Blue Creek mouth to Blue Creek mouth, F: Blue Creek mouth to 0.5 km below Blue Creek mouth, G: 0.5 km below Blue Creek mouth to Seven Mile Rd., H: Seven Mile Rd. to Five Mile Rd., I: Five Mile Rd. to 1.0 km above Bennington Dam, J: 1.0 km above Bennington Dam to 0.2 km above Bennington Dam, K: Hussey St. to Campbell Rd.,
L: Campbell Rd. to Wallula Rd., M: Wallula Rd. to Last Chance Rd., N: Last Chance Rd. to Mouth.
[b] No surveys conducted.

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Ongoing Monitoring

The Corps conducts video monitoring at both Mill Creek Project fish ladders, and at the entrance to Yellowhawk Creek at the first division works. The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) conducts Passive Integrated Transponder (PIT) tag monitoring at both fish ladders, Mill Creek diversion dam low-flow outlet, and on Yellowhawk Creek. There have also been antennae on the sill just below the division dam. Figure 12 shows the timing of PIT tag detections (see also attached Annex). Steelhead numbers are very low during the July 15 to September 15 in-water work window.

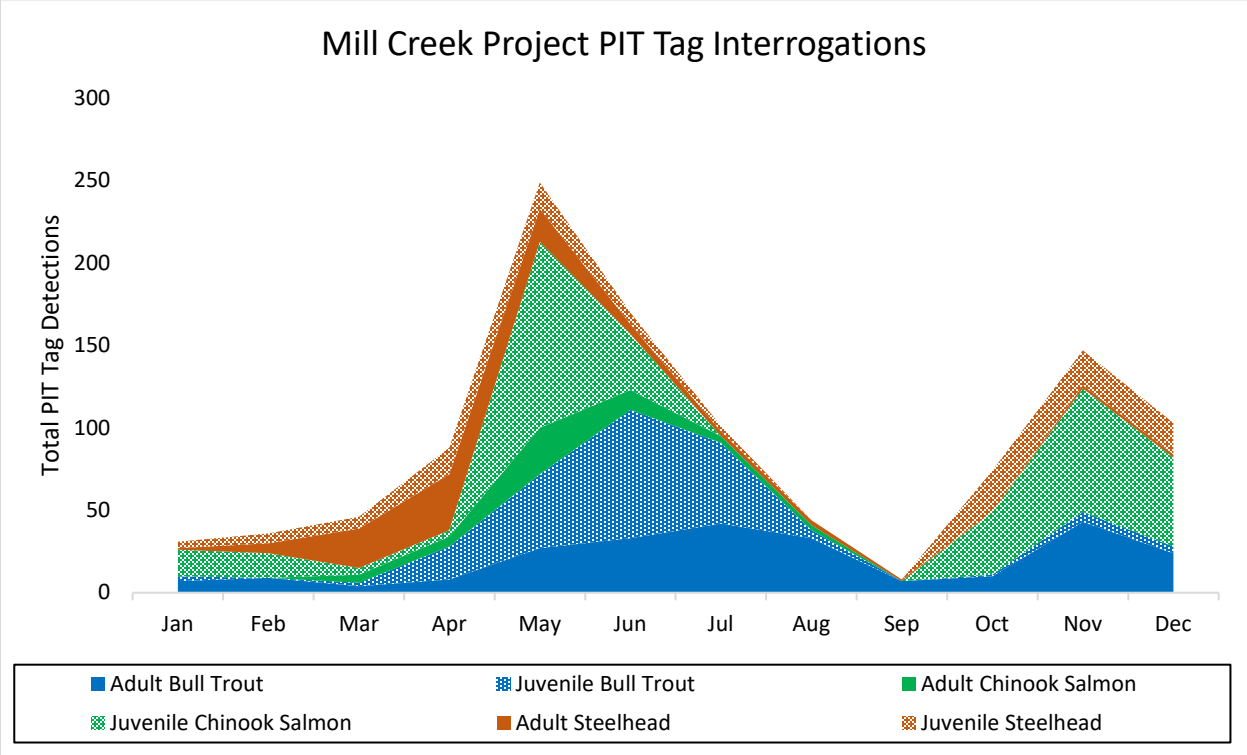

Figure 12. Mill Creek/Yellowhawk Creek PIT Tag Detections

2.2.2 Bull Trout

Listing History

USFWS listed bull trout as a threatened species on June 10, 1998. Bull trout are currently listed as threatened throughout their range in the United States. In the Columbia River Basin, bull trout historically were found in about 60 percent of the basin, but now occur in less than half of their historic range. Populations remain in portions of Oregon, Washington, Idaho, Montana, and Nevada.

Life History/Biological Requirements

Individual bull trout may exhibit resident or migratory life history strategies. Habitat components influencing bull trout distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrates, and migratory corridors (with resting habitat). All life history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and deep pools.

The Walla Walla Basin is comprised of five local bull trout populations within two core areas (Figure 13). Two local populations are located in the Walla Walla River Subbasin (Walla Walla River Core Area). Each local population in the Walla Walla Basin has a resident and migratory (fluvial) component (Anglin et al. 2012). Fluvial populations migrate to larger streams after a few years in their natal stream.

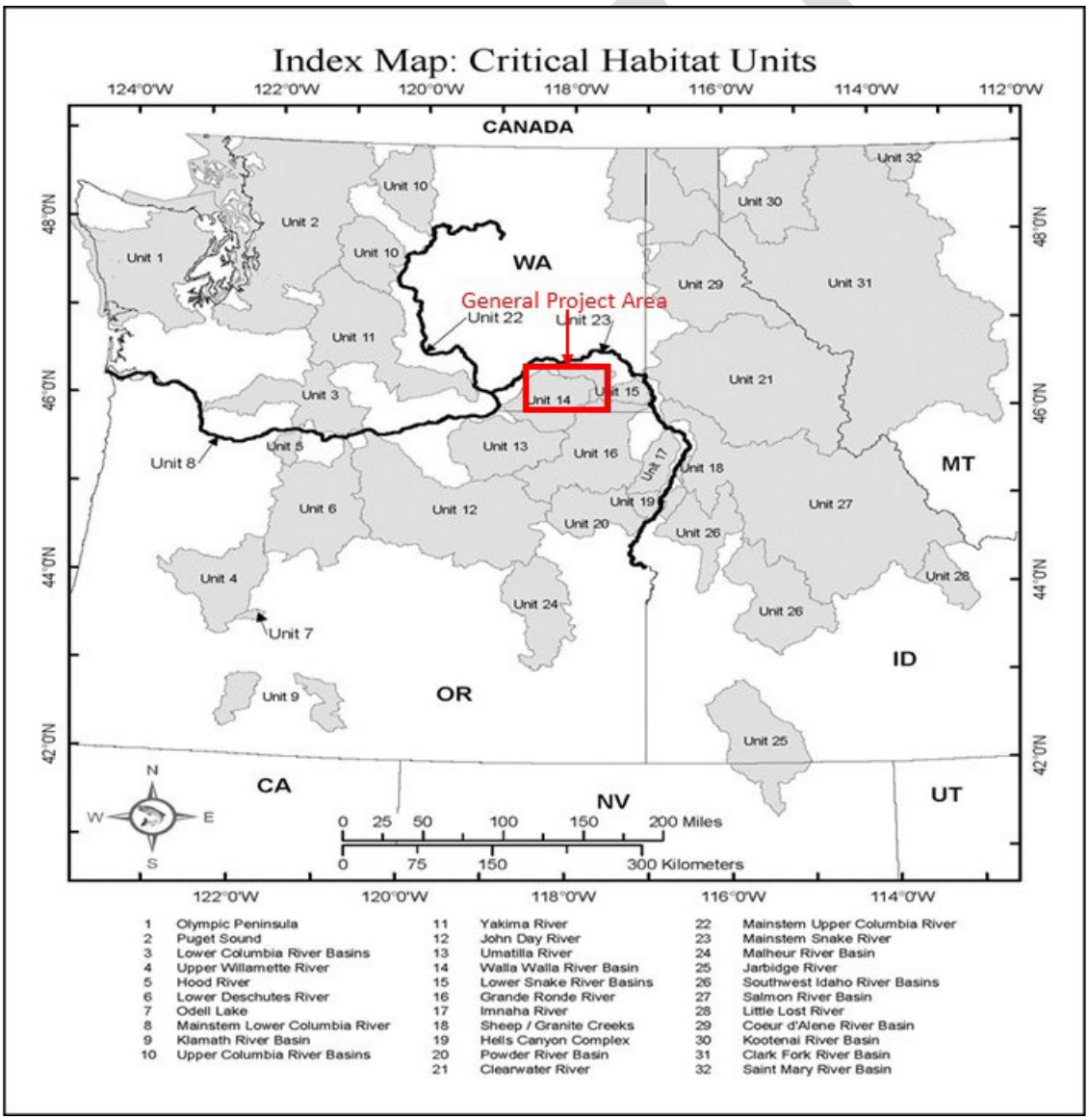

Figure 13. Approximate Distribution of Bull Trout in the Columbia Basin (75 FR 63875)

Resident bull trout complete their entire life cycle in the headwater streams where they spawn and rear. Migratory bull trout spawn in headwater streams along with resident bull trout. Bull trout juveniles rear from 1 to 4 years before migrating downstream to mainstem river habitats as subadults. Migratory adult bull trout return to headwater spawning areas between August and November, and most individuals migrate downstream to overwintering areas from October through December after spawning. Resident and migratory forms may be found together, and either form may give rise to offspring exhibiting either resident or migratory behavior. Both subadult and adult bull trout use the lower Walla Walla River and Mill Creek during the fall, winter, and spring for rearing and overwintering (Anglin et al. 2012).

Bull trout normally reach maturity in 4 to 7 years and may live 12 years or more. They generally spawn from August to November during periods of decreasing water temperatures. Migratory bull trout may travel over 100 miles to their spawning grounds. Egg incubation is normally 100 to 145 days and fry remain in the substrate for several months.

Bull trout are opportunistic feeders. Their diet requirements vary depending on their size and life history strategy. Resident and juvenile bull trout prey on insects, zooplankton, and small fish. Adult migratory bull trout mainly eat other fish. Bull trout timing in Mill Creek is shown in Table 5. Adult spawning, egg incubation, alevin, and fry emergence life histories and timing do not apply to the action area, as spawning occurs many miles upstream in areas suited for bull trout spawning. Wydoski and Whitney (2013) indicate that all four bull trout life history types (anadromous, adfluvial, fluvial, and resident) require water temperatures below 15°C (59°F).

Table 5. Walla Walla River Bull Trout Life History Timing and Thermal Requirements

Bull Trout - Walla Walla Basin	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													3.9-10°C		
Egg incubation													1.2-5.4°C	100-145 days	
Alevin													1.1-6.1°C	60-90 days	
Fry emergence													1.1-6.1°C		
Juvenile rearing													3.9-10°C /Peak growth at 13.2°C	1-4 years	21°C
Downstream juvenile migration													<12.2°C	At night	21°C

Distribution

Figure 14 shows use of the action area by bull trout (StreamNet 2010). The StreamNet data indicates anadromous or resident bull trout use the action area for migration only. These data show no spawning or rearing use by bull trout in the action area, which is consistent with USFWS information. The USFWS show bull trout use the action area for feeding, migrating, and overwintering (Figure 15).

Bull trout are known to outmigrate from natal streams in limited numbers to the Walla Walla River and into the Columbia River (Anglin et al. 2010). Presumably, some of those individuals originate from areas upstream of the action area and emigrate through Mill Creek, which is reflective of the USFWS data.

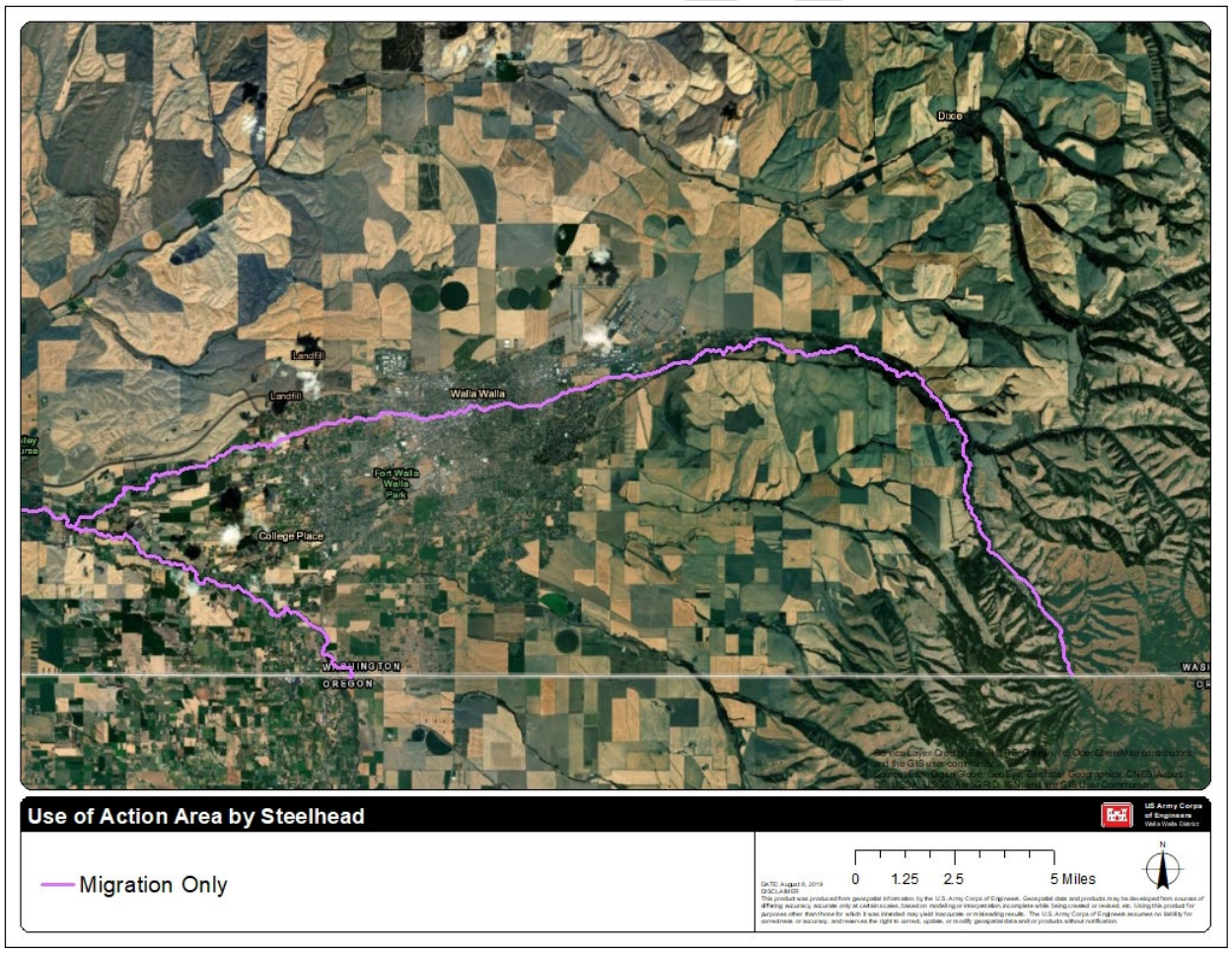

Figure 14. Bull Trout Distribution in the Action Area

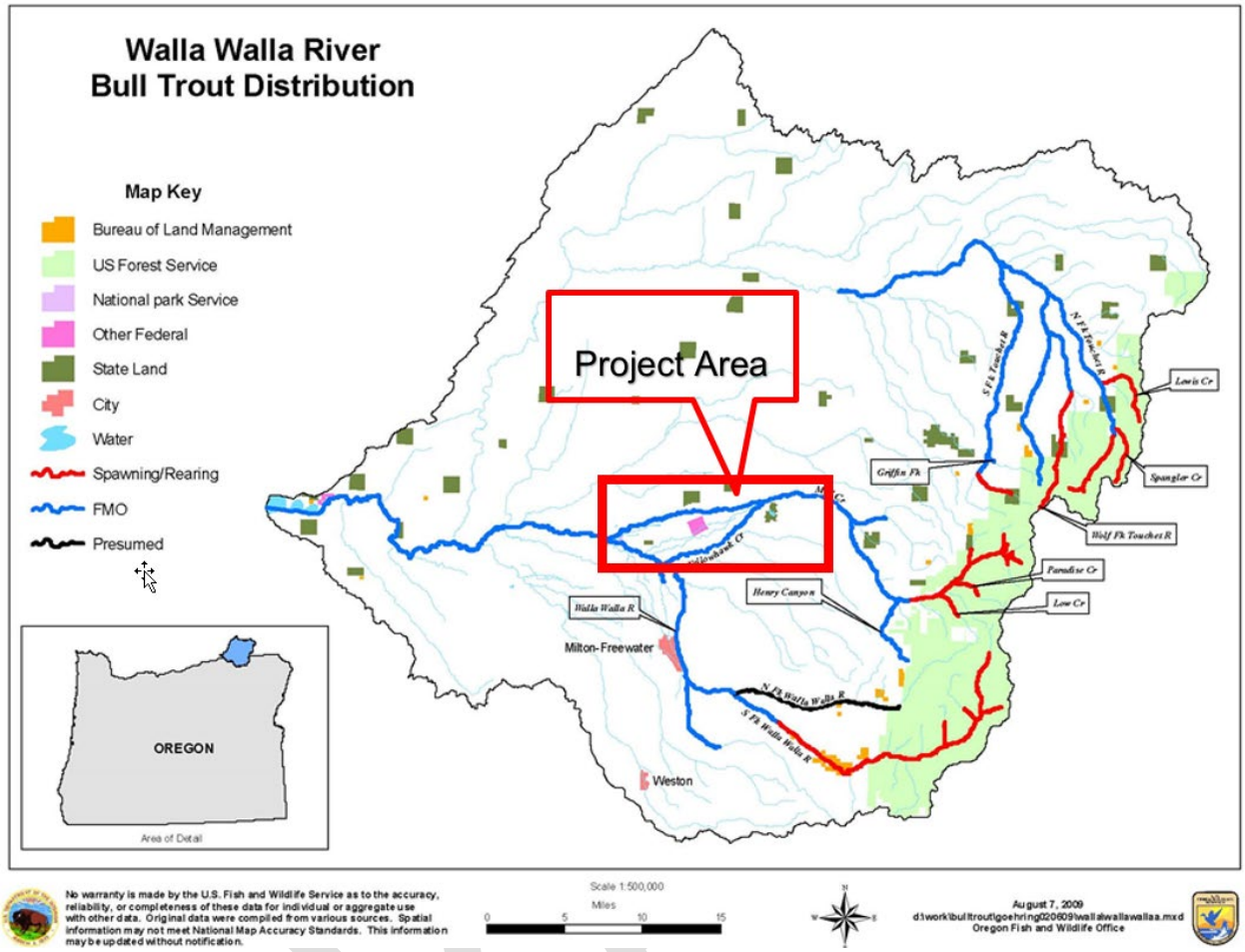

Figure 15. Walla Walla River Bull Trout Distribution from USFWS
Note: Action area shown in red box.

Based on the Anglin et al. studies, and the Faler et al. (2008) studies, it is clear that some individual bull trout migrate out of their natal streams and into the mainstem Columbia and Snake Rivers. Anglin et al. (2010) estimated a total of 192 bull trout emigrated from the Walla Walla Basin to the Columbia River from November 2007 through December 2009. They estimated 36 PIT tagged bull trout entered the Columbia River from the Walla Walla River in 2009. However, only one bull trout was detected returning to the Walla Walla River from the Columbia River in June. Anglin et al. (2010) also indicate that bull trout dispersed into the mainstem Columbia River from the Walla Walla Basin and at times, this dispersal included a relatively long migration (Anglin et al. 2010).

The timing of migratory bull trout movement from the Walla Walla River to the Columbia River varies from year to year, but generally occurs between October and May, peaking between December and February (Anglin et al. 2010).

Historical Pressures on the Species

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 that bull trout might prey on.

Current Pressures on the Species

Bull trout habitat is sensitive to stream channel changes. Altered flow regimes, sedimentation rates, bank erosion, and reduced channel complexity all reduce the quality of bull trout habitat.

Limiting Factors for Recovery

Barriers between isolated populations are a limiting factor for most of the bull trout subpopulations in the Columbia Basin.

Current Local Population Information

An estimated bull trout population size could not be located for Mill Creek and data for Mill Creek is lacking (Mahoney et al. 2015). However, hundreds of bull trout have been captured and tagged in Mill Creek over the last decade. Bull trout redd data for Mill Creek is presented in Table 6.

Ongoing Monitoring

The Corps conducts video monitoring at both fish ladders on Mill Creek, as well as at the entrance to Yellowhawk Creek at the first division works. The CTUIR conducts PIT tag monitoring at both fish ladders, the low-flow outlet, and on Yellowhawk Creek.

Figure 12 shows the timing of PIT tag detections. Bull trout numbers are low during the July 15 to September 15 in-water work window, but some are present.

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Table 6. Bull Trout Spawning Survey Summary, Redd Count (Number of Times Surveyed), for Mill Creek, 1990-2017

Year	Reach Surveyed									Total Redds
	A	B	C	D	E	F	G	H	I	
1990[b]		48 (3)	15 (3)	1 (3)						64
1991[b]	10 (4)	14 (4)	17 (4)	11 (5)						52
1992[b]	6 (4)	9 (4)	51 (4)							66
1993[c]										N/A
1994[d]	15 (1)	28 (2)	91 (5)	26 (1)		2 (2)	0 (1)	1 (1)	0 (1)	163
1995[d]	28 (2)	16 (2)	68 (3)	13 (2)	1 (2)	3 (1)	0 (1)	0 (1)	0 (1)	129
1996[d]	3 (2)	8 (2)	48 (2)	14 (2)	4 (2)	0 (1)	0 (1)	1 (1)	0 (1)	78
1997[d]	16 (4)	15 (4)	36 (4)	14 (4)		5 (4)	0 (4)	0 (4)		86
1998[d]	17 (4)	14 (4)	45 (4)	15 (4)		3 (4)	1 (4)	0 (4)		95
1999[d]	14 (4)	13 (4)	58 (5)	38 (4)		4 (4)	0 (4)	0 (4)	3 (1)	130
2000[d]	15 (4)	10 (4)	70 (4)	13 (4)		2 (4)	0 (4)	0 (1)	1 (4)	111
2001[d]	18 (3)	27 (4)	83 (4)	32 (4)		0 (2)	3 (3)	0 (2)	2 (1)	165
2002[d]	15 (3)	24 (3)	80 (3)	40 (3)		2 (2)	0 (2)	0 (2)		161
2003[d]	9 (3)	12 (3)	53 (3)	18 (3)		6 (3)	0 (2)	0 (2)	4 (2)	102
2004[d]	12 (3)	17 (3)	45 (3)	18 (3)		1 (3)	0 (3)	0 (3)		93
2005[d]	6 (3)	10 (3)	33 (3)	34 (3)		3 (3)	0 (3)	0 (3)	1 (3)	87
2006[d]	7 (3)	7 (3)	29 (3)	8 (3)		0 (3)	0 (3)	0 (3)	2 (3)	53
2007[d]	3(3)	15(3)	35(3)	3(3)		1(3)	0(3)	0(3)	2(3)	59
2008[c]										NA
2009[c]										NA
2010[c]										NA
2011	17(3)	20(3)	59(3)							96
2012[c]										NA
2013[c]										NA
2014	4(3)	11(3)	26(3)							41
2015	9(3)	8(3)	36(3)							53
2016	3(3)	8(3)	51(3)							62
2017[e]	3(1)	5(1)	67(1)							75

[a] A: Forks to Bull Ck., B: Bull Ck. to Deadman Ck., C: Deadman Ck. to North Fork Mill Ck, D: North Fork Mill Ck. to ½ way to Paradise Ck., E: ½ way to Paradise Ck. to Paradise Ck., F: Paradise Ck. to Broken Ck., G: Broken Ck. to Low Ck., H: Low Ck. to Intake dam, I: Intake dam to Forestry Boundary.
[b] Surveys conducted by masters degree students (Martin et al. 1992 and Underwood et al. 1995)
[c] No survey.
[d] ODFW, USFWS, and USFS data.
[e] Only one survey due to heavy snowfall

Source: (Email from M. Gembala, WDFW 6/12/2018)

2.3 STATUS OF CRITICAL HABITAT

2.3.1 MCR Steelhead

In 2005, NMFS published final critical habitat designations for 12 evolutionarily significant units (ESUs) of west coast salmon and steelhead, including MCR steelhead. They focused on specific "physical and biological features" (PBFs) essential to support one or more life stages of salmon

and steelhead (Table 7). The 2005 designations also analyzed areas with the greatest biological benefits for listed salmon, and balanced economic and other costs for areas considered for designation. Table 8 lists PBFs for critical habitats designated for Pacific salmon and steelhead except Snake River populations. Mill, Yellowhawk, and Russell Creeks are designated critical habitat for MCR steelhead in the action area (Figure 16).

Table 7. The Physical and Biological Features of Critical Habitats Designated for Pacific Salmon and Steelhead Species.

Physical and Biological Features		
Site Type	**Site 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 USGS 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.

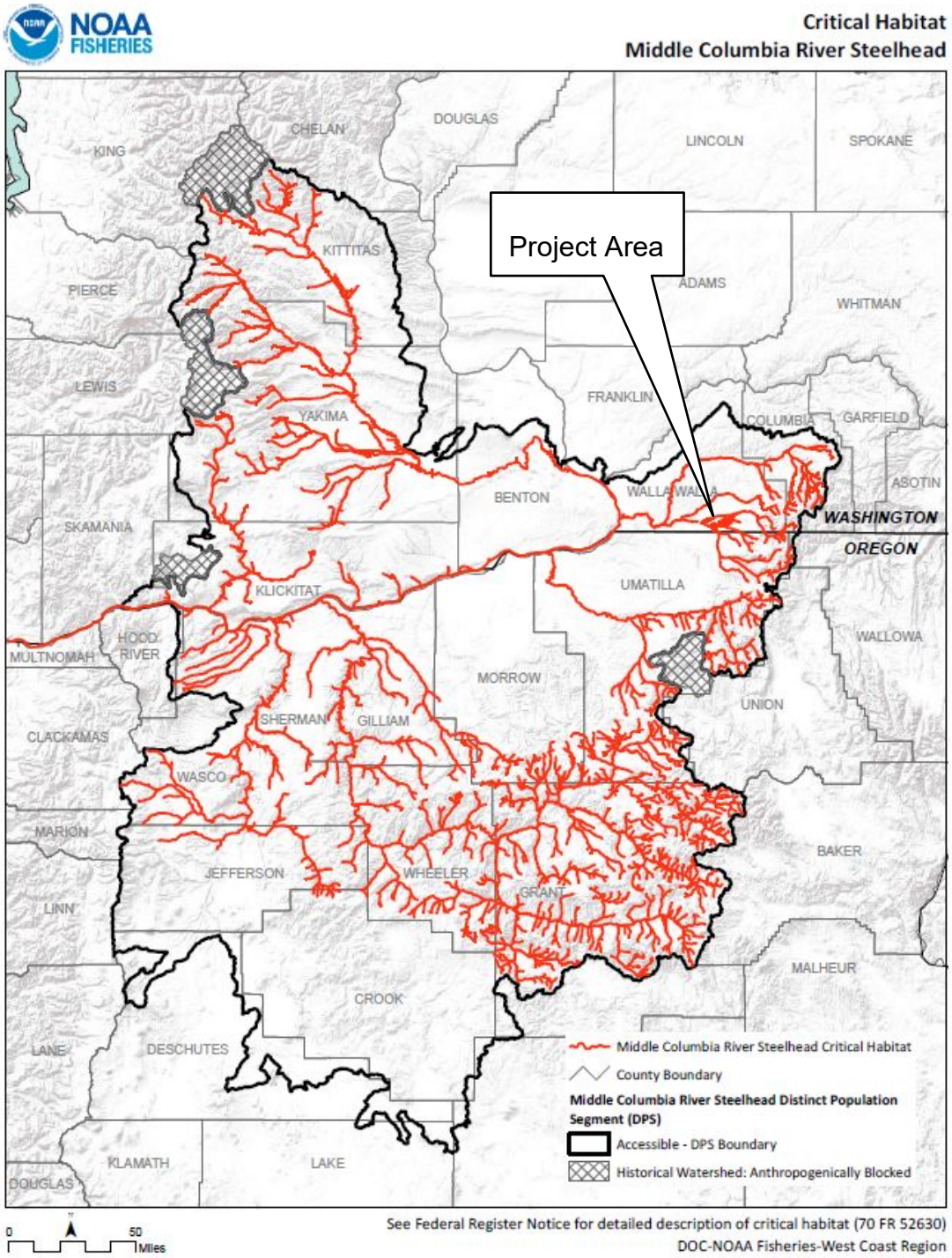

Figure 16. Critical Habitat for Mid-Columbia River Steelhead
Source: NMFS 2005

2.3.2 Bull Trout

Bull trout critical habitat was designated by USFWS in 2005, and revised in 2010. A final rule was published October 18, 2010, and took effect November 17, 2010. Mill and Yellowhawk Creeks are designated critical habitat for bull trout in the action area.

Based on needs identified in 50 Code of Federal Regulations (CFR) 17 (75 FR 63898); and current knowledge of the life-history, biology, and ecology of the species; and characteristics of the habitat necessary to sustain essential life history functions of the species, USFWS has identified PBFs for bull trout critical habitat (presented later in this BA).

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SECTION 3 - ENVIRONMENTAL BASELINE

The environmental baseline represents the set of environmental conditions, as of the consultation date, to which the direct and indirect effects of the proposed action would be added. It includes the past and present impacts of all Federal, State, or private 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 (50 CFR 402.02). The baseline discussion in this section focuses primarily on habitat conditions for the ESA-listed MCR steelhead and bull trout.

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 MCFCP 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 MCFCP itself and its associated infrastructure (e.g., Mill Creek diversion dam, first division works, stabilized channel, concrete channel, etc.). The structures are part of the environmental baseline. The presence of the MCFCP constitutes an "existing human activity" that, over the course of time, has generated effects on listed species and designated critical habitat. By their very presence, these structures will continue to cause impacts. The present and historical existence of MCFCP structures are, therefore, being analyzed as part of the environmental baseline.

The "existence" of the MCFCP must also encompass the basic level of physical maintenance required to keep that structure intact and functional. If a structure cannot be maintained in an intact state, the concept of a baseline "existence" of a structure that pre-dates listing loses all relevant meaning. General/routine maintenance actions are not expected, individually or collectively, to result in significant alteration, replacement, or repair of existing MCFCP structures; however, failure to adequately maintain the MCFCP over time risk failure of the project or flooding during certain periods of increased flows. Not only would such an event present a risk to human life and property interests downstream, it would also fail to meet the key element of the initial congressional authorization. The timing and consequences of such a

failure are impossible to predict. Therefore, the baseline includes the effects of current and future, nondiscretionary actions undertaken to maintain the structures.

For example, the passive existence of the MCFCP alone does not provide substantial flood risk reduction. It must be operated and maintained to meet the Congressional authorization. Some level of operations and maintenance is therefore nondiscretionary. Those nondiscretionary actions are included as part of the baseline, along with physical/constructed elements of the Project. For example, the Corps lacks discretion to not operate the Mill Creek Project (including the diversion works) to achieve flood risk management benefits.

Changes in operation can be discretionary, to a certain point. Changes in operations and maintenance are discretionary as long as the purposes of the MCFCP are met. Changes must be implementable in a manner consistent with the intended purpose of the action, consistent with the scope of the action agency's legal authority and jurisdiction, and are economically and technologically feasible, etc. However, project purposes are not discretionary. Any changes in operations and maintenance must still allow the Corps to meet authorized purposes of the MCFCP.

The environmental baseline encompasses the collective effects of all operations and maintenance activities conducted prior to this BA. It includes diminished and degraded creek and habitat, along with the stabilized portion of Mill Creek. Numerous water diversions throughout the basin, 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 MCFCP and its structures, distinct from the effects of any operations and maintenance. By its very existence, both the Mill Creek Channel downstream (non-Corps) and the Federal portion of the Project alter the habitat conditions of Mill Creek. 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. The Corps has identified the dividing line for the MCFCP as the existing conditions and structures, as well as the current operations and maintenance regime. It is widely accepted that baseline conditions at the MCFCP are degraded. The existence of structures in the action area, including the stabilized Mill Creek Channel and its geometry, are part of the “baseline” condition. How those structures are operated and maintained, within the limits of the structures and purposes of the Project, is generally at the discretion of the Corps and the Washington Department of Ecology (for low flows).

3.1 GENERAL

Mill Creek originates in Washington, dips into Oregon, and returns to Washington, where it passes through the City of Walla Walla and joins the Walla Walla River. Mill Creek is approximately 37 miles in length. This creek system includes the mainstem Mill Creek, Blue Creek, Yellowhawk Creek, Cottonwood Creek, Garrison Creek, and others.

Fair to excellent steelhead habitat can be found in Mill Creek upstream from Mill Creek diversion dam throughout the Washington portion, into Oregon, and up to the City of Walla Walla water intake. An old water diversion dam presents a minor barrier near the Oregon/Washington border at Kooskooskie when flows are low. The City's current water intake dam is above Kooskooskie (River Mile 26.9), and water is piped overland to the City's water plant. Most diversions occur in winter and spring, and are stored in the Walla Walla aquifer for recovery during summer when flows are low. The amount of water the City can withdraw is controlled by the Federal Energy Regulatory Commission license (as some electricity is produced at the water facility). Minimum flows are set at the Kooskooskie water gage currently maintained by the USGS near Kooskooskie Dam. The Walla Walla watershed upstream of the intake is a protected area that has limited access and is in near-pristine condition.

Flows are annually depressed because of natural variability and human water use throughout the subbasin. Water diversions reduce flows in some reaches of Mill Creek and its principle tributaries. Historically, portions of lower Mill Creek are dewatered for periods each year. Slightly higher flows have been maintained in Mill Creek in recent years.

The stabilized channel is wide and shallow with almost no shade. Mill Creek is oriented from east to west, so it receives almost the maximum amount of solar heat input possible. Levees line both sides of the channel. To maintain levee stability, Corps guidelines for levees do not allow trees on the levees or within 15 feet of the landward toe.

The diversion dam disrupts a portion of the sediment transport in Mill Creek by slowing the water during flows above 400 cfs. A portion of the bedload and fine sediment deposits in the forebay. Accumulated silt is removed from the forebay every 5 to 10 years. Not all of the sediment is stopped at the diversion dam. Some of the sediment is transported to the wide area on Mill Creek upstream of Wilbur Avenue, which functions as a sediment trap. This area is periodically cleaned by the Mill Creek Flood Control Zone District. The sediment trap is intended to keep bedload out of the concrete channel through Walla Walla. However, the combination of a constricted channel and lack of bedload has created downcutting downstream of the MCFCP.

Consideration was not given to fish passage when the MCFCP was built. Fish ladder additions have improved passage through the Federal portion of the Project over original design conditions. These ladders were added to the Mill Creek diversion dam (by modifying one of the two low-flow outlets) and the first division works in 1982.

Yellowhawk Creek originates at Mill Creek by way of the first division works, via Ecology-directed diversions for irrigation and to benefit fish. Yellowhawk Creek flows about 8.5 miles through urban and semi-rural areas until it joins the Walla Walla River almost 5 miles upstream of the mouth of Mill Creek. Yellowhawk Creek has largely been confined and is missing riparian structure. Flows are controlled and do not fluctuate like a natural stream. This causes fine sediment to accumulate on the creek bed. Fish do pass through Yellowhawk Creek, but the success of this passage is poorly understood.

Water temperatures in Yellowhawk are marginal to acceptable for rearing juvenile steelhead, as the input of relatively cool water from several spring-fed tributaries modifies temperature in the downstream portion. It is possible that some steelhead spawning does occur in Yellowhawk, but the amount and success is unknown. Given existing conditions, Yellowhawk Creek provides the best habitat downstream of the Mill Creek diversion dam. Cottonwood, Russell, and Caldwell Creeks all have confirmed steelhead rearing and presumed limited spawning, but are largely channelized with poor riparian conditions. The upstream portion of Cottonwood is the only section of these tributaries with good to marginal conditions.

Titus Creek is a distributary of Mill Creek, and originates about 2.5 miles above the Mill Creek diversion dam. Titus Creek runs parallel to Mill Creek for 4.6 miles before joining it downstream of the first division works. The inlet to Titus Creek from Mill Creek is maintained in the spring and summer to provide water for water rights drawn from Titus Creek. Several springs contribute to, and at times maintain, the flow. Titus Creek flows through semi-rural areas with both good and poor riparian areas, along with an area on the Walla Walla Community College campus that recently underwent restoration activities.

3.2 LIMITING FACTORS

General limiting factors for Mill Creek were described in NPCC (2004) as limiting habitat attributes. "In the Mill Creek reach from Gose St. to the Mill Creek diversion dam the primary limiting factors included obstructions, sediment load, habitat diversity, flow, temperature, and key habitat quantity. Secondary limiting factors included channel stability and food. Numerous obstructions associated with the flood channel and diversion dams were modeled, with a cumulative affect that seems to all but eliminate the possibility of successful adult passage. It should be pointed out that actual passage to the upstream sections of Mill Creek from either the flood channel portion of Mill Creek or Yellowhawk Creek is poorly understood. Sediment load and habitat diversity had high to extreme impacts to most life stages. Warm summer temperatures were limiting to egg incubation, fry colonization, and 0-age active rearing. Increased peak flows were a moderate to high impact to colonizing fry, and low summer flows had small to moderate effects on age-1 and age-2 active rearing. Food had a small to moderate effect on most juvenile life history stages (NPCC 2004)."

The Gose Street to the Mill Creek diversion dam reach of Mill Creek was among the two highest ranking geographic areas for restoration according to the Ecosystem Diagnostic and Treatment model output used by the Northwest Power Conservation Council. The recommended section of Mill Creek (Gose Street to the diversion dam) was the only portion of the Mill

Creek/Yellowhawk complex to have a restoration potential of 0.5 percent or greater (NPCC 2004).

3.2.1 Limiting Factors for MCR Steelhead

The Mid-Columbia Steelhead DPS Recovery Plan (NMFS 2009) identified the following major limiting factors for the Umatilla/Walla Walla steelhead Major Population Group:

- *Mainstem passage*. The Walla Walla and Touchet populations must pass four major dams; while the Umatilla population must pass three. 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.
- *Tributary habitat*. For all three populations, degraded water quality (temperature), altered sediment routing, blocked and impaired fish passage, degraded floodplain and channel structure, and hydrologic alterations are limiting factors.
- *Hatchery-related effects*. The hatchery program on the Umatilla River uses endemic (native) stock and is not currently considered a threat to wild steelhead. However, strays from outside the DPS pose a risk to spawner composition. Non-endemic hatchery fish are considered a potential threat to the Walla Walla wild steelhead population. Currently, data are insufficient to determine whether hatchery effects are a problem for the Touchet River population. An endemic stock program is under development for the Walla Walla and Touchet River populations.
- *Predation/competition/disease*. Predation, competition, and disease issues in the mainstem rivers and the estuary affect all MCR steelhead populations.

3.2.2 Limiting Factors for Bull Trout

Historical land uses affecting bull trout habitat in the Walla Walla Basin include forest management, livestock grazing, irrigated agriculture, urbanization, and flood risk management. Past harvest regulations and fish stocking programs have also been implicated in the decline of bull trout. Existing land management facilities and activities contributing to fish habitat problems include riparian road and railroad construction, and use; riparian grazing; riparian (and to a lesser extent, upland) timber harvest; recreational and municipal water developments and withdrawals; recreational use of riparian areas, livestock water developments, channel modification for flood control, agricultural development, and competition with stocked hatchery rainbow trout (USFWS 2002).

Mill Creek downstream of the City of Walla Walla watershed has been impacted by roads, residential development, and agricultural and forest management practices. Urbanization and flood control structures are concentrated in and around Walla Walla and College Place, Washington (USFWS 2002).

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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 Corps anticipates that project-related effects would be similar for both ESA-listed fish in the project area. Therefore, these species will be analyzed collectively. There would be less impact on bull trout for work in the concrete channel due to the lower number of bull trout that inhabit the lower section of Mill Creek.

4.1.1 Effects on ESA-Listed Fish

The main actions directly associated with the Feasibility Study are:

1. Rehabilitate the concrete channel in areas that are determined to be at high-risk of failure.
2. Raise the levees up to 1.5 feet in areas where they are currently too low to safely convey 3,700 cfs.
3. Modify the flood diversion operations.
4. Acquire flowage easements on properties at risk of flooding downstream of the MCFCP.

The effects of these actions are discussed below. Other effects of the Federal portion of the MCFCP were discussed in the ESA-consultation for the O&M of the Project.

<u>Rehabilitate the concrete channel in areas that are determined to be at high-risk of failure</u>

During construction work in most areas of the concrete channel, the creek will be isolated from the work and construction materials or debris will not enter the creek. In areas that the creek could not be isolated from the work, fish will be moved out of the work area with seines and kept out of the construction area with block nets or other barrier material. Work will be conducted during the summer (July 15 to September 15) when flows are low and relatively few fish would be present in the concrete channel.

Effects on fish from construction of this type of work would be similar in nature to recent fish passage improvement work in the concrete channel performed by Tri-State Steelheaders. Effects from operation and maintenance of the channel after construction would be the same as the existing baseline.

Raise the levees a by up to 1.5 feet in areas where they are currently too low to safely convey 3,700 cubic feet per second (cfs)

There will be no in-water work to raise the levees. The Corps does not anticipate any effects to steelhead or bull trout from the levee raises during construction, maintenance, or operation due to the timing of the work and the low likelihood that any of these fish would be present during construction.

Modify the Flood Diversion Operations

Entrainment to Bennington Lake

No ESA-listed fish have been found to be entrained in the diversion channel or Bennington Lake, but it is possible fish could be entrained during flood diversions.

Based on many years of data, the overwhelming majority of flood diversions occur in December, January, and February (see attached Annex). Since construction of the MCFCP in 1942, there have been 28 flood diversions to the lake. Twenty-five of the diversions took place in these 3 months, with only three of these diversions occurring in other months; one in November, and one in March, and one in April. The large, pre-Project flood in 1931 occurred in early April. On average, a flow of 1,700 cfs or more is expected to occur in Mill Creek once every 5 years. In addition, most diversions last about one day.

Based on PIT tag data (https://www.ptagis.org) and video counting data (USACE unpublished data), the majority of bull trout and steelhead pass through the Project during the months of April, May, June, July, and November (Figure 12). Most of the flood diversions occur at a different time than when the majority of the ESA-listed fish are present within the Project. Therefore, while possible, the potential for entraining ESA-listed fish in to the diversion channel is low, and the likelihood of diverting a substantial percentage of a year's migrating population to the lake is de minimis.

To illustrate the minimal risk to protected fish populations (based on data outlined above), for a time period of 100 years, approximately 23.3 diversions would be expected. Assuming there are likely less than 250 adult steelhead a year in Mill Creek based upon video data, redd counts, and comparison to Nursery Bridge counts in the Walla Walla River, in 100 years, there would be an accumulated population total of 25,000 steelhead.

If 90 percent (conservatively) of the diversions occur in December through February when only 20 percent (also conservatively) of the year's adult steelhead may pass through the Project area and all of these fish were entrained (which is virtually impossible), 1,450 (5.8 percent) of 25,000 adult steelhead could be diverted to the diversion channel/lake within the 100-year period. On average, that would be 14.5 adult steelhead per year. That would be the absolute worst case scenario and would require that all of the fish during those 3 months be present during that 1 day of diversion, and that all of those fish present be entrained (an unreasonable assumption).

In a second scenario, building on the one above, if each day during the 3 winter months (~90 days) is accounted for, and all the ESA-listed fish arriving within a conservative assumption of 7 days of a diversion, diversions that could entrain ESA-listed fish would occur 7.8 percent of the time. Multiplying the 14.5 adult steelhead by 7.8 percent results in a very conservative estimate of 1.1 adult steelhead that could be diverted per year on average. Over the 100-year accumulated population period, approximately 110 adult steelhead might be entrained to the lake out of a total accumulated population of 25,000 adult steelhead, which is 0.44 percent of that population, meaning the effects of diversion on adult steelhead are discountable.

The same entrainment effects model equations can be applied to adult bull trout and juveniles of both species. If there were 50 adult bull trout annually near the Federal section of the MCFCP, less than one (0.23) would be diverted per year on average, meaning the effects of diversion on adult bull trout are discountable. If there were 500 juvenile bull trout migrating downstream, about three (0.23) would be diverted per year on average. If there were 10,000 juvenile steelhead in Mill Creek in a year, approximately 45 (0.45 percent) of them could be diverted per year, on average, meaning the effects of diversion on juvenile bull trout and steelhead are discountable.

These calculations are based on several average values. Each of the assumptions used in the calculations is purposely conservative, and the actual numbers of diverted fish would likely be lower due to the following factors:

- Only a fraction of the flows (and presumably fish) are diverted.
- Fewer fish would be diverted during small floods (which are frequent) than large floods (which are infrequent).
- Upstream passage is blocked at the diversion dam during diversions.

Diversions are generally 1 day or less.

<u>Acquire Flowage Easements on Properties at Risk of Flooding Downstream of the MCFCP</u>

There would be no direct effects of acquiring flood-risk properties downstream of the MCFCP and removing them from the floodplain. Acquiring property and removing structures from the floodplain would allow the diversion trigger to be raised. There could be an indirect benefit to bull trout and steelhead if the diversion trigger were raised. The risk of diverting fish to Bennington Lake would decrease as the diversion trigger increased.

<u>Operation and Maintenance of the MCFCP</u>

The following effects pathways were included in the Mill Creek O&M ESA consultation. They apply to this consultation on the Mill Creek General Investigation Feasibility Study as well.

Migration Barriers at Ladders

The fish ladders at the diversion dam and the division dam do not meet current fish passage criteria. At the diversion dam, adult steelhead migration is known to be delayed at some flows (above around 200 cfs), and totally blocked at flows above 400 cfs. On average, flows are above 400 cfs for about 10 days a year. However, 2017 was an extreme year with flows above 400 cfs for 43 days. 2018 and 2019 also had flows which were higher than average, with many days of blocked fish passage during the steelhead spawning season.

The division dam may cause some delay at some flows, but the problems are not well understood. The ladder does not provide reliable attraction flow during some flows. During flows above 400 cfs, the center gates of the division dam are opened which should provide passage. At flows above 1,000 cfs, all the dam gates are opened. This removes the physical barrier, but high water velocity over the concrete apron could be a problem for passage.

The diversion dam ladder is also a fish passage barrier when the forebay is lowered below 1,252 feet elevation. The forebay is lowered and the ladder is taken out of service seasonally for short periods for maintenance work. Longer ladder outages are also needed infrequently for forebay clean out and maintenance of the low flow outlet gate.

Delay at the diversion dam is the largest contributor to harm (delay and physical injury) of adult steelhead on the Federal portion of the MCFCP. Improving passage at this dam is one of the highest priorities for recovery of the Walla Walla and Umatilla major population group of steelhead (NMFS 2016). The Corps plans on replacing the ladders with new ladders that provide better fish passage at a wider range of flows. Construction of the division dam ladder is scheduled for 2020. Construction of the diversion dam ladder has been delayed and the construction schedule is currently not known.

Migration Barriers Due to Low Flows and High Temperatures

The stabilized channel and concrete channel are also a partial barrier to fish passage, especially at low flows. Water depth over the existing weirs can be less than an inch at low flows and the horizontal distance a fish must jump is approximately 3 to 6 feet.

The Corps plans on constructing a low-flow channel in the stabilized channel within the Federal portion of the MCFCP. The low-flow channel would increase water depth, lower jump heights, and decrease jump distances for fish passage and may keep water temperature slightly lower. However, the channel between the low-flow weirs would still be wide and shallow with no shade. The schedule for construction of the low-flow channel is currently unknown.

Disturbance from Construction Activity

Actions that include in-water work could cause direct disturbance to fish. Disturbance could affect feeding behavior and migration. When possible fish will be removed from and kept from reentering work areas as discussed in the effects from fish salvage below.

The major in-water work actions include construction of the new ladders, and the low-flow channel, and diversion dam forebay clean out. Construction actions that could affect fish include work in the concrete channel discussed earlier in this section.

Increased Turbidity

During some of the in-water construction activities and diversion dam forebay drawdowns, turbidity levels in the creek would increase. The turbidity level is generally expected to return to the background level within 500 feet downstream. This is not expected to result in lethal take, but could disrupt fish's normal migrating, feeding, and sheltering behaviors for a short time.

Stranding Due to Low Flows

There is potential for fish to become stranded downstream of the division dam as flows recede and a majority of the available water is diverted to Yellowhawk Creek.

Fish Salvage

Fish salvage will typically consist of herding fish out of the areas to be dewatered and netting any fish that do not leave on their own to facilitate in-water construction actions. Any captured fish will be released back to the creek immediately. This is not expected to result in lethal take, but could disrupt their normal feeding and sheltering behaviors for a short time.

The Corps does not propose to salvage fish that become stranded downstream of the division dam when flows recede in the early summer during normal operations.

4.2 EFFECTS ON CRITICAL HABITAT

4.2.1 MCR Steelhead

Effects to physical and biological features (PBFs) for MCR steelhead are shown in Table 8. The proposed action is expected to affect freshwater rearing and freshwater migration; therefore, only those PBFs will be discussed further.

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Table 8. Effects of the Proposed Action to PBFs of Critical Habitat for MCR Steelhead and Their Corresponding Species Life History Events

Physical and Biological Features		
Site Type	**Site Attribute**	**Effects of the Proposed Action**
Freshwater spawning	Substrate Water quality Water quantity	No effect - Spawning is not known to occur in Mill Creek within the MCFCP area
Freshwater rearing	Floodplain connectivity Forage Natural cover Water quality Water quantity	May affect each of the attributes except forage
Freshwater migration	Free of artificial obstructions Natural cover Water quality Water quantity	May affect each of the attributes
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
Offshore marine areas	Forage Water quality	No Effect

Freshwater Rearing

- Floodplain connectivity through Walla Walla has been eliminated since construction of the MCFCP. This is part of the baseline condition. These effects will continue into the future.
- The modifications to the MCFCP would not affect steelhead forage.
- Natural cover is affected by MCFCP. Large woody debris is trapped by the debris barrier in the diversion dam forebay and at trash racks in other areas. This potential habitat is removed from the creek or cut into smaller pieces that will be carried downstream without plugging openings or bridges.

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- Water quality is affected by both the existence of the MCFCP and operations and maintenance. Water temperature within the MCFCP is high during summer due to the unshaded channel that is wide and shallow, with a limited amount of flow. There would be minimal in-water work associated with rehabilitating the concrete channel. Water quality effects would be minimal due to the lack of fine sediment on the bottom of the channel.
- Water quantity can be affected during periods of flooding as well as during water right diversions to Bennington Lake. Mill Creek flows downstream of the division dam are also affected during summer due to Ecology-directed diversions to Yellowhawk Creek.

Freshwater Migration

- The MCFCP is not free of artificial obstructions. There is a partial barrier on Yellowhawk Creek from debris accumulation at the downstream end of the Federal portion of the MCFCP. This is a debris jam that provides habitat, but is not affected by high "flushing flows" like it would be in a natural stream system. Debris continues to accumulate with little being carried downstream.
- Migration for steelhead and bull trout through the stabilized channel and through the concrete channel sections can be difficult at some flows.
- The Mill Creek division dam creates a partial or a complete barrier at some flows. A new ladder is proposed to be constructed in the future. The Mill Creek diversion dam is the largest barrier within the MCFCP. The dam is a partial barrier at some flows and a complete barrier at flows above 400 cfs, which can occur multiple days during spring when adult steelhead are migrating upstream.
- Natural cover in the stabilized channel is poor for downstream migrants as the creek is wide and shallow, especially over the existing weirs where predation occurs.
- Water quality and quantity – see discussion under freshwater rearing.

4.2.2 Bull Trout

Effects to PBFs for bull trout are shown in Table 9. The proposed action is expected to affect water quality, migration habitat, instream habitat, water temperature, substrate characteristics, stream flow, and water quantity; therefore only those PBFs will be discussed further.

Table 9. Effects determinations for the proposed action to the PBFs for 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.	May affect – Poor water quality conditions (mainly temperature) during summer
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.	May affect – Partial to complete passage barriers at some flows
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, pools, undercut banks and unembedded substrates, to provide a variety of depths, gradients, velocities, and structure.	May affect – Poor habitat conditions within the stabilized channel and concrete channel
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.	May affect – Temperatures are above the acceptable range during summer
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.	May affect – Substrate has been altered throughout the MCFCP and now provides minimal habitat value
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.	May affect – Hydrograph has been altered, especially within Yellowhawk Creek. No "flushing flows" occur. Peak flows on Mill Creek are sometimes diverted to the lake
Water Quantity	Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited.	May affect – Decreased flow available during summer, especially in Mill Creek below the division dam
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

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Water Quality

Water quality is affected by both the existence of the MCFCP and operations. Water temperature through the MCFCP is high during summer due to the unshaded channel that is wide and shallow and has very little flow.

Migration Habitat

Migration habitat is affected at the diversion dam, which is a partial barrier at some flows and a complete barrier at flows above 400 cfs. However, most adult bull trout migrate when flows are lower during April through August and in November and December (Figure 12). The division dam may also be a partial barrier to some bull trout.

Instream Habitat

Instream habitat within the MCFCP lacks the complexity typically utilized by bull trout. Some habitat is provided by depth and large pieces of riprap below weirs in the stabilized channel, but there is no large woody debris or undercut banks.

Water Temperature

Water temperature through the MCFCP is high during summer due to the unshaded channel that is wide and shallow. Temperature of the inflow is above bull trout thresholds, but water temperature increases even more within the stabilized channel.

Substrate Characteristics

Substrate characteristics have been altered throughout the MCFCP. In the diversion dam forebay, fine sediment and some bedload deposit upstream of the dam, needing recurring removal. The stabilized channel has some natural substrate characteristics, but there is also unnatural concrete and riprap. There is virtually no substrate within the concrete channel. Yellowhawk Creek is severely embedded with silt due to the lack of peak flows.

Stream Flow

The natural hydrograph on Mill Creek is altered within the MCFCP and downstream at flows above 1,400 cfs when flood flows are diverted to Bennington Lake. Low flows can also be affected during water right diversions to the lake. However, a minimum of 40 cfs is retained in Mill Creek during these diversions. The water right diversions are also curtailed before June 15 when the water right diversion period ends.

Below the division dam, base flow is altered by Ecology-directed flows to Yellowhawk Creek. Very little water remains in Mill Creek below this point during summer.

The hydrograph of Yellowhawk Creek has been affected most dramatically. Flood flows as large as 900 cfs were historically diverted into this Creek. Since the 1960s, the creek receives a

maximum peak of about 70 cfs. This has caused fine sediment to build up in the channel, with no "flushing flows" to keep the sediment moving through the system. Garrison Creek is also affected in this way, but has been screened from passing fish, so is not relevant to this discussion on bull trout. Residential development along these creeks currently limits the maximum flow that can safely pass downstream.

Water Quantity

Water quantity can be affected during periods of flooding as well as during water right diversions to Bennington Lake. Mill Creek flows downstream of the division dam are also affected during summer due to Ecology-directed diversions to Yellowhawk Creek. A small amount of water flows into Mill Creek downstream of the division dam.

4.2.3 Cumulative Effects

Cumulative effects for ESA consultation purposes are those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation.

Cumulative effects on ESA-listed fish would be derived from water supply use and recharge, future flood damage reduction actions, and habitat improvements.

The supply of water within the Mill Creek watershed, especially during summer, would continue to be limited, but is predicted to meet municipal needs. Withdrawal of water from Mill Creek for Walla Walla's municipal needs would continue into the foreseeable future. If the city's ability to withdraw water from the creek was diminished (e.g., due to sedimentation from a fire in the watershed), the deep basalt aquifer has sufficient supply to meet the city's demand for 10 years or longer when supplemented by the City's Aquifer Storage and Recovery Program. The storage and recovery program stores water in the aquifer with treated Mill Creek water that meets Federal and State drinking water quality standards. Other permitted water withdrawals from Mill Creek, Yellowhawk Creek, and Garrison Creek for irrigation would also likely continue in the future. Long term water supply demands could likely be met by the conversion of agricultural supplies to municipal and industrial use as development and populations expand.

Several groups are also working on shallow aquifer recharge projects to divert spring runoff to areas with permeable soil to allow water to infiltrate into the shallow aquifer. Since the shallow aquifer and nearby streams are connected, increased ground water flow can improve water quality and fish habitat.

Upstream of the diversion dam, Mill Creek is classified as a priority restoration reach because the Snake River Regional Technical Team envisions that passage through lower Mill Creek will be restored (CTUIR 2017). Fish passage improvements led by the CTUIR, the Tri-State Steelheaders, the Washington Department of Fish and Wildlife, the Walla Walla County Conservation District, and others would continue as funding allows. The overall shared goal is

to create a channel where steelhead and bull trout (and Chinook salmon) can successfully pass at a wide range of flows while maintaining appropriate flood capacity.

These potential future actions would have a positive effect on threatened and endangered fish by improving migration passage and rearing habitat in Mill Creek. Upstream from the diversion dam, the steelhead habitat is fair to excellent, so removing passage barriers and improving aquatic habitat has high potential to benefit ESA-listed species, as well as other species.

4.3 IMPACT MINIMIZATION MEASURES

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

1. Isolate channel rehab work from the creek.
2. Conduct fish salvage when necessary for in-water work. A qualified biologist will oversee fish salvage.
3. Follow the in-water work window for in-water construction actions.
4. Raise the diversion trigger from 1,400 cfs to 1,700 cfs.
5. Operate fish screens for water right diversions to Bennington Lake.
6. Construct new diversion dam fish ladder with better fish passage at a wider range of flows.
7. Construct a new division dam fish ladder with better fish passage.
8. Construct a low-flow channel for better fish passage during low flows.

4.4 EFFECTS DETERMINATIONS AND SUMMARY

Some of the actions proposed for the Mill Creek General Investigation Feasibility Study may affect, and are likely to adversely affect steelhead and bull trout, but would have no effect on yellow-billed cuckoo (Table 10). In addition the proposed actions may affect steelhead and bull trout critical habitat. Formal consultation with NMFS and USFWS is required.

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Table 10. Effect Determination for Threatened and Endangered Species That May Occur in the Project Area

Species	Species Determination	Critical Habitat Determination
NMFS		
Steelhead (*Oncorhynchus mykiss*)		
Middle Columbia River DPS	May affect, likely to adversely affect	May affect
USFWS		
Bull Trout (*Salvelinus confluentus*)		
Conterminous U.S.	May affect, likely to adversely affect	May affect
Western Yellow-Billed Cuckoo (*Coccyzus americanus)*		
Western U.S. DPS	No effect	n/a, CH not in project area
Gray wolf (Canis lupus)		
Northern Rocky Mountains DPS	No effect	n/a, CH not in project area
Canada Lynx (Lynx canadensis)		
Contiguous U.S. DPS	No effect	No effect

4.4.1 Listed Species

Some proposed actions at the Project may affect and are likely to adversely affect steelhead and bull trout as discussed in Section 4.1.1.

4.4.2 Critical Habitat

Critical habitat for steelhead and bull trout may be affected as discussed in Section 4.2.

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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.

Some Chinook now return to the Walla Walla River watershed and Mill Creek; however, these fish are a reintroduced population and are not covered under this Act (79 FR 75449). The MSA does not cover any species present in Mill Creek; therefore, the MSA is not applicable to the Project.

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MILL CREEK FLOOD RISK MANAGEMENT GENERAL INVESTIGATION

Draft Feasibility Study and Environmental Assessment Report

APPENDIX F, BIOLOGICAL ASSESSMENT
ANNEX A, FISH PRESENCE TIMING

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Purpose and Intent

The U.S. Army Corps of Engineers' (Corps) Mill Creek Project is located approximately 2 miles east of Walla Walla, Washington, and serves to protect the city and surrounding areas from flooding. The Project consists of a diversion dam, a storage reservoir (Bennington Lake), a storage dam, and approximately 1 mile of a 7-mile-long channel. The Mill Creek Flood Control Zone District is responsible for maintaining the rest of the channel. During high water events, the Corps diverts water to Bennington Lake to prevent flooding of Walla Walla.

Mill Creek is used by several species of fish of concern in the Pacific Northwest, including Columbia basin bull trout (*Salvelinus confluentus*), mid-Columbia River steelhead (*Oncorhynchus mykiss*), and spring Chinook salmon (*O. tshawytscha*). Any fish present in Mill Creek near the diversion dam are at risk of becoming entrained in Bennington Lake during a diversion event. As there is no passage from the diversion channel back into Mill Creek, any occurrence of fish diverted from Mill Creek's mainstream into Bennington Lake is considered take.

This report summarizes fish camera detections of bull trout, steelhead, and Chinook salmon in Mill Creek to outline seasonal trends in abundance. The intent is to inform decisions regarding diversion timing and minimize take of bull trout, steelhead, and Chinook salmon.

Methods

PIT tag interrogations from the Mill Creek Intake Dam and Mill Creek Diversion Project PIT antenna arrays were downloaded from the PTAGIS database for the years 2005 to 2016. These interrogations are primarily of juvenile and adult fish tagged in Mill Creek as part of local monitoring efforts conducted by state and tribal agencies, but also include some fish tagged in the Walla Walla and Columbia rivers. 1097 unique detections were recorded over this period.

Cameras were placed at the Mill Creek Diversion Dam Ladder, Mill Creek Division Dam, and Yellowhawk intake between 2004 and 2014. Cameras were recording in all three locations February through July with the following exceptions. Data was collected only at the diversion dam in 2004. Data was collected February through April at the Yellowhawk intake in 2005. Data was collected in May and June at the Division Dam in 2006. There is no Diversion Dam data from 2008. Data was only collected for February and March at the Diversion Dam and Yellowhawk intake and February through April at the Division Dam in 2013. There is no Diversion Dam or Yellowhawk intake data from 2014 and data was collected only in February and March and the Division Dam for that year.

Diversion events were compiled from the Water Control Manual for Mill Creek Flood Control Project (2006) and standardized to diversion days. Diversion days are calculated as the duration of flows requiring a regulation action (greater than 1400 cfs) in hours divided by 24.

Results

Over the last 72 years the majority of the diversion events occurred during the winter months January, February, and December (Table 1). January had nearly double the amount of diversion days as February or December. Natural peak flow did exceed 1,400 cubic feet per second (cfs) in March 2009, but there was no diversion event. A policy change was in effect during that time and water was not diverted until flow exceeded 2500 cfs.

Table 1. Flood Events Requiring Regulation 1945-2017

Month	Sum of Average of Natural Peak Flow (cfs)	Sum of Average of Regulated Peak Flow (cfs)	Sum of Total Duration over 1,400 cfs (hours)
Jan	21806	16430	317
Feb	20051	14849	162
Mar	1400	0	5
Apr	0	0	0
May	0	0	0
Jun	0	0	0
Jul	0	0	0
Aug	0	0	0
Sep	0	0	0
Oct	0	0	0
Nov	1822	1750	3
Dec	13751	10920	131

PIT Interrogations

PIT interrogations were aggregated by month of detection for the 12 year period (Fig. 1). Detections peak during the month of May, with a total of 249 unique PIT tag detections during May from 2005 to 2016. Other months with frequent detections were June, November, December, and July with 170, 147, 103, and 101 detections, respectively.

Bull trout were the most commonly detected species with a total of 460 detections, 247 adults and 213 juveniles. Bull trout were the most steadily detected species with adults detected in Mill Creek during all months of the year. Juvenile bull trout were detected in all months except February and September, but were most common May through July. Numbers for adult bull trout peaked in June with 78 detections; juvenile numbers peaked in November with 43 detections.

Spring chinook salmon were detected nearly as frequently as bull trout, with 411 total detections. 58 adult Chinook salmon and 353 juveniles were interrogated in Mill Creek from 2005 to 2016. Numbers for both age groups peaked in the month of May with 28 total adult

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detections and 113 juvenile detections. Juvenile spring Chinook salmon were detected in Mill Creek in all months of the year except July, August, and September.

A total of 226 steelhead were detected in Mill Creek from 2005 to 2016, 102 adults and 124 juveniles. Steelhead detections peaked for both age groups in the month of April where there were 34 adult detections and 16 juvenile detections. Adult steelhead were detected in all months of the year except October, juvenile steelhead were detected in all months except August and September.

Camera Observations

Camera detections were compiled by month of observation for the 10 year period. Detections peak during the month of May, with a total of 302 bull trout, steelhead, and Chinook salmon observed. Other months with frequent detections were March, April, and June with 188, 280, and 171 observations, respectively (Fig. 2).

Total number of fish observed varied by location. 443 fish were observed at the Diversion Dam, 355 fish were observed at the Division Dam, and 232 fish were observed at the Yellowhawk intake over this period.

Steelhead were the most commonly detected species with a total of 569 observations. Steelhead were also the most steadily detected species in Mill Creek during all months sampled. Steelhead observations peaked at all three locations between March and April with a total of 422 steelhead observed for those months combined.

Kelt abundance peaked in May with 48 fish observed. The highest number of kelt were observed at the Yellowhawk intake with a total of 36 kelts recorded (Fig. 3). The fewest number of kelt were observed at the Diversion Dam with a total of 6 fish recorded (Fig. 4). Steelhead observed swimming downstream were recorded as kelt. Steelhead smolt were observed only one time during the 10 year study at the Division Dam in April 2009 (Fig. 5).

Chinook salmon were the next most frequently observed fish, with 267 observations. Chinook salmon observations peaked in May and June with 132 and 111 observations respectively. A total of 117 bull trout were observed in Mill Creek from 2004 to 2014. Bull trout observations peaked in June with 52 recorded.

The highest number of Chinook, steelhead, and bull trout were observed at the Diversion Dam with 150, 217, and 70 observations, respectively. Chinook observations peaked at different times between the three locations. Chinook observations peaked at the Diversion and Division Dams in May with 66 and 65 fish, respectively; while Chinook observations peaked at the Yellowhawk intake in June with 22 salmon observed.

Combined Results

Steelhead PIT interrogations peaked in April with 50 fish detections. Steelhead camera observations also peaked in April with 242 fish recorded (Figs. 1 and 2).

Chinook salmon PIT interrogations peaked in May with 141 detections. Chinook camera observations also peaked in May with 132 fish recorded.

Bull trout PIT interrogations peaked in June with 111 detections. Bull trout Camera observations also peaked in June with 52 fish recorded.

Discussion

Both methods indicate bull trout, steelhead, and Chinook salmon abundance is highest in Mill Creek March through June. PIT Interrogations indicate a second peak in abundance, consisting mostly of juveniles, October through November. Over the last 72 years the majority of the diversion events occurred during the winter months January, February, and December.

PIT Interrogations were collected year round for a 12 year period while Camera observations were recorded only during the months of February through July (with noted exceptions) for a 10 year period. PIT interrogations and camera observations follow similar trends. Steelhead abundance peaks first between March and May. Chinook salmon abundance peaks between May and June and bull trout abundance peaks in June.

Bull trout were the most commonly detected fish using PIT interrogations. Bull trout were also the most steadily detected species in Mill Creek during all months of the year; however, steelhead were the most frequently observed species on camera. Chinook salmon were the second most detected species by both PIT interrogations and Camera observations.

Steelhead abundance peaked in April while kelt abundance peaked in May suggesting steelhead may spawn in Mill Creek between those months.

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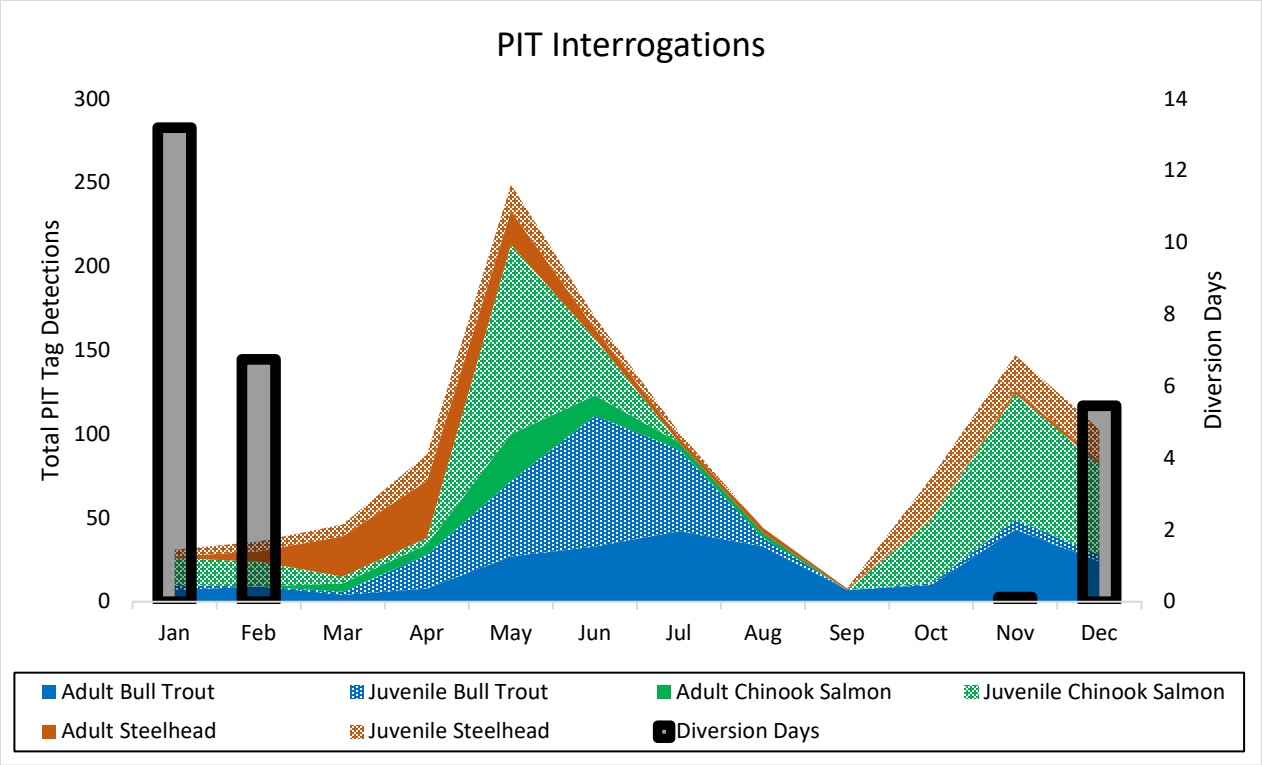

Figure 1. Number of Diversion Days by *M*onth between 1945 - 2017 *Overlaying Spring Chinook Salmon, Summer Steelhead, and Bull Trout Abundance*

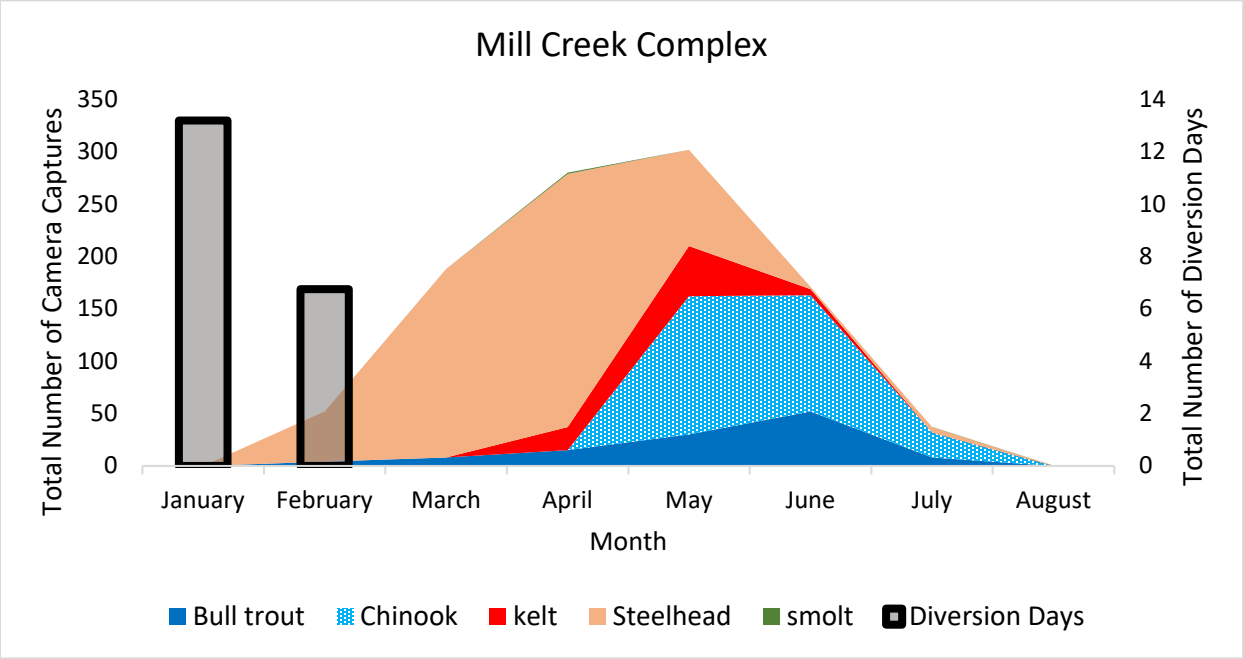

Figure 2. Number of Diversion Days by month between 1945 - 2017 Overlaying Bull Trout, Steelhead, Kelt, Steelhead Smolt, and Chinook Salmon Abundance for the Diversion Dam, Division Dam, and Yellowhawk Intake Combined

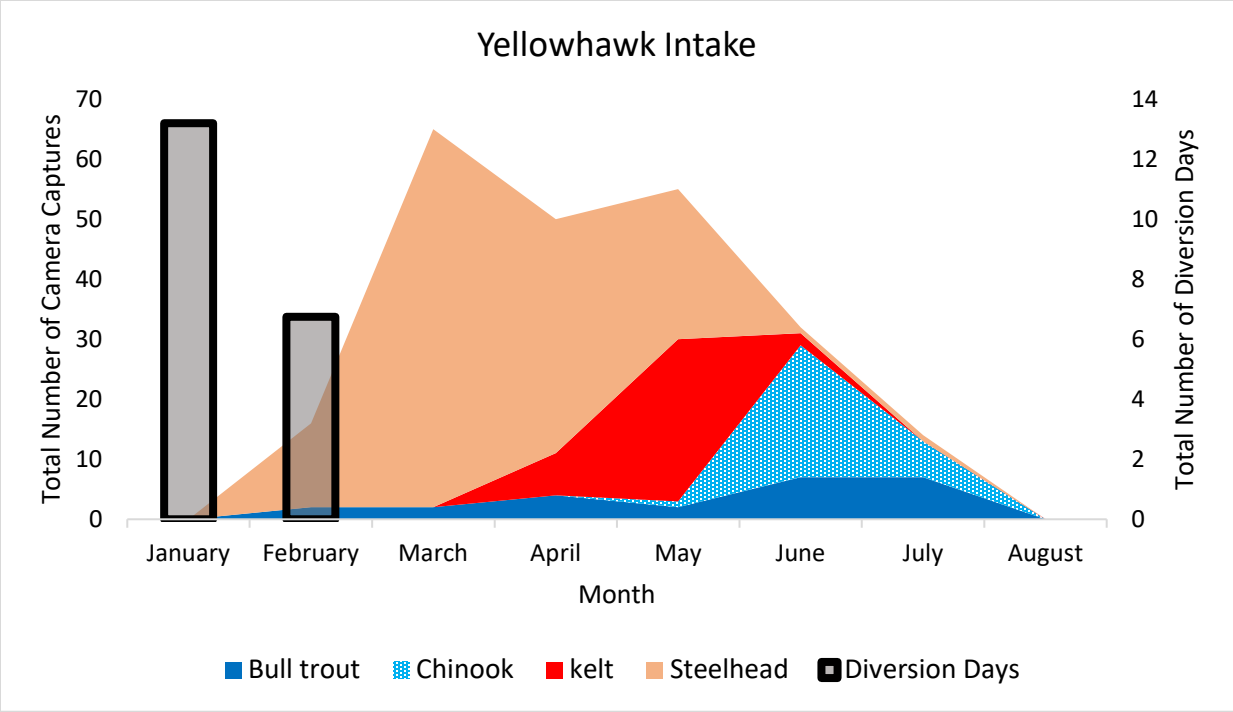

Figure 3. Number of Diversion Days by Month between 1945 - 2017 Overlaying Bull Trout, Steelhead, Kelt, and Chinook Salmon Abundance for the Yellowhawk Intake

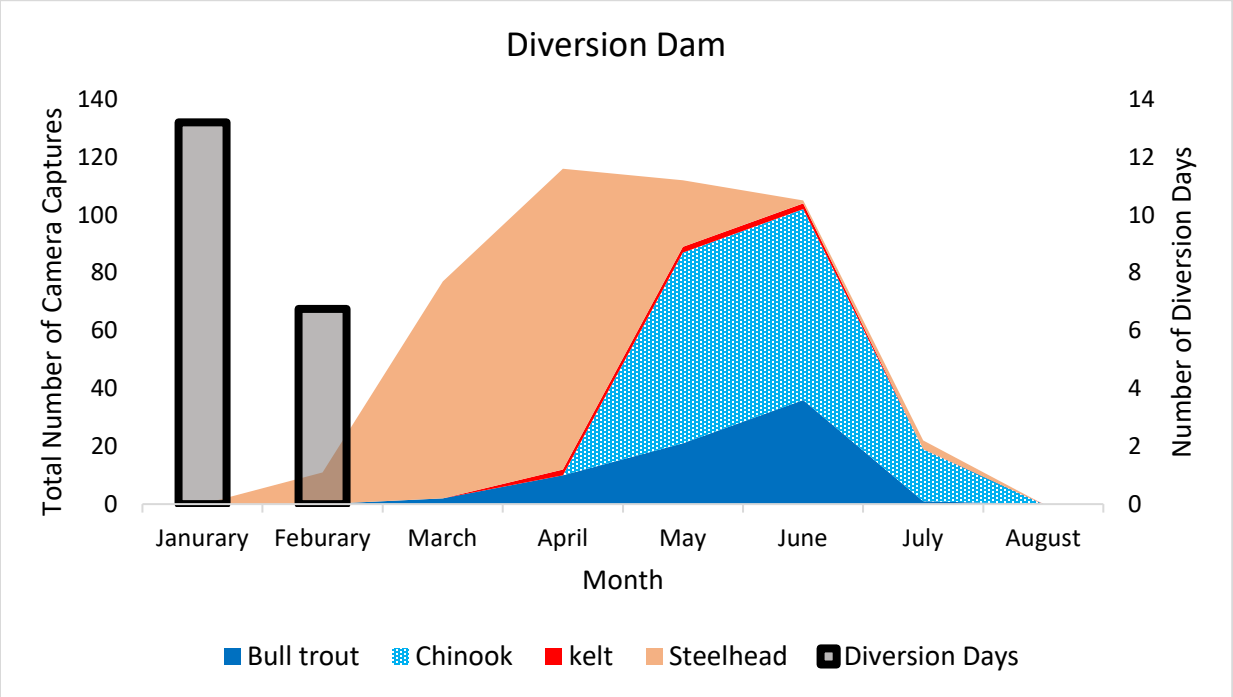

Figure 4. Number of Diversion Days by Month between 1945 - 2017 Overlaying Bull Trout, Steelhead, Kelt, and Chinook Salmon Abundance for the Diversion Dam

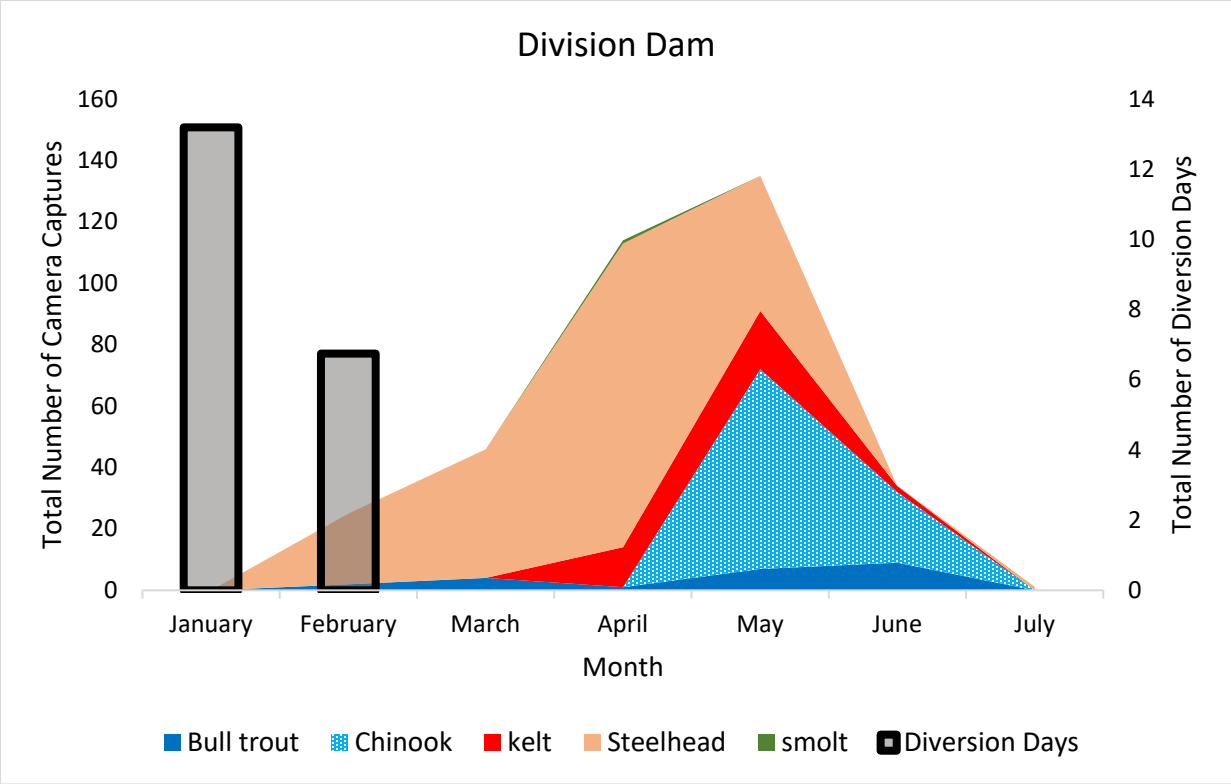

Figure 5. Number of Diversion Days by Month between 1945 - 2017 Overlaying Bull Trout, Steelhead, Kelt, Steelhead Smolt, and Chinook Salmon Abundance at the Division Dam

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