Operation and Maintenance of City's Water Supply Intake and Fish Ladder in Mill Creek

BIOLOGICAL ASSESSMENT

Updated October 2022
By City of Walla Walla

Originally Published
January 2013, by HDR, Inc.

HDR

Fisheries Design Center

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Acronyms and Abbreviations

BA	biological assessment
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHU	Critical Habitat Unit
CWA	Clean Water Act
CWWID	City of Walla Walla Intake Dam
cy	cubic yards
DA	Discharge authorization
dB	Decibel
DPS	Distinct Population Segment
DSL	Department of State Lands
EFH	Essential fish habitat
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
ft	feet
ft^2	square feet
FR	Federal Register
HUC	Hydrologic Unit Code
LAA	Likely to Adversely Affect
MCR	Middle Columbia River
MSA	Magnuson Stevens Act
MSL	Mean Sea Level
NLAA	Not Likely to Adversely Affect
NMFS	National Marine Fisheries Service
OHWL	Ordinary High Water Line
OHWM	Ordinary High Water Mark
ODFW	Oregon Department of Fish and Wildlife
PCE	Primary constituent element
RGL	Regional Guidance Letter
Rkm	river kilometer
RM	river mile
USACE	United States Army Corps of Engineers
USFS	United States Forest Service
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
WDFW	Washington Department Fish and Wildlife
WSDOT	Washington State Department of Transportation

1.0 Introduction and Proposed Action

Since 1922, the City of Walla Walla has operated a nine (9) foot tall intake diversion dam for its municipal water supply, located 14 miles east of the City in the Mill Creek Watershed. The City has been operating the facility under OR DSL permit 52374-RF permit issued on April 7, 2015.

This request is very similar in nature to the expired permit. Mechanical removal is needed to maintain the functionality of the site, and this occurs approximately every five years or after floods. Currently, the reservoir/pond needs cleaning and gravel removal and thus the request for the dredging permit.

Silts, sand, gravels, and woody debris build up and block the water system intake and the fish ladder intake. The City conducts sluicing operations, up to 3 times per year, during high flows using the existing sluice gates (up to 10 cy per event) to keep the drinking water fish screen operating and free of blocking debris. This allows gravel to pass downstream of the dam.

In addition, over time approximately every 5 years, or after a major flood event, the 0.11-acre reservoir fills up with flood debris (silt, sand, and woody debris) and requires mechanical removal. Floods seem to be occurring more frequently and a major flood requires the mechanical removal of debris, up to 887 cubic yards to restore the 0.11-acre reservoir. It is expected dredging will need to occur in calendar year 2023. Currently, the watershed is at increasing risk of forest fire, and if a forest fire does occur in the watershed, sediment after the fire also poses a risk.

Work and operations will follow the guidelines below, as per the dredging drawings, and the construction methods described. In addition, several Biological Assessments have been performed on the site, the most recent in 2013 that was used as a guide in these documents. In addition, the site had a joint permit this summer for the construction project bringing the fish ladder entrance and exit up to current fish passage standards and was managed by the Confederated Tribe of the Umatilla Indian Reservation (CTUIR) staff. CTUIR fisheries staff recently visited the site and requested that the City dredge the intake so they could potentially use the reservoir as an acclamation pond for reintroduced chinook salmon smolt from their new hatchery on the Walla Walla River.

Currently, there are no plans for rip rap replacement. However, if there is a major flood that removes the rip rap just downstream of the dam that protects the drinking water line, this rip rap will be replaced in kind. This would be for the replacement of lost material and would not change the stream profile and would not result in the addition of fill.

In summary, the proposed action includes the following:

1. A one-time mechanical debris removal in the summer of 2023 to remove accumulated bedload (sands, fine silts, gravel) and some wood debris.
2. Additional maintenance which will include mechanical debris removal every 5 years, or after floods, as needed.
3. Replacement in kind of rip rap downstream of the dam, north shore protection of waterline after major flood, only if needed.

Section 7 of the ESA of 1973, as amended, requires federal agencies to ensure that their actions do not jeopardize the continued existence of federally listed or proposed, threatened, or endangered species, or result in the destruction or adverse modification of their designated critical habitat. Further, the governing Federal agency (in this case the U.S. Army Corps of Engineers [USACE] as the permitting agency for mechanical debris removal) must consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) on actions that may affect listed species or their critical habitat. Additionally, the Magnuson-Stevens Act (MSA) requires an assessment of effects to designated Essential Fish Habitat (EFH) for spring Chinook. This Biological Assessment (BA) is intended to fulfill both ESA and EFH requirements.

2.0 Project Vicinity

2.1 Project Location and Site Description

The CWWID is located on river mile (RM) 25.4 of Mill Creek in Oregon, approximately 14 miles upstream of the City of Walla Walla Washington, near the town of Kooskooskie, Washington. The dam is about ¼ mile down the east end of Mill Creek Road in the Blue Mountains of Oregon (Figure 1). The site is in the NE ¼ of the NW ¼ of Section 22, Township 6 North, Range 38 East, Willamette Meridian, Umatilla County, Oregon (Latitude 45.9901° North, Longitude 118.0483° West).

Since the early 1900s, the City has obtained roughly 85 percent of its water supply from the Mill Creek intake near the Oregon-Washington border (City of Walla Walla undated). Surface water was originally diverted from Mill Creek at a dam built in 1907 at Kooskooskie 4 miles downstream from the current dam. Since 1922, water has been obtained under an agreement between the City and the USFS under an existing water right from the State of Oregon.

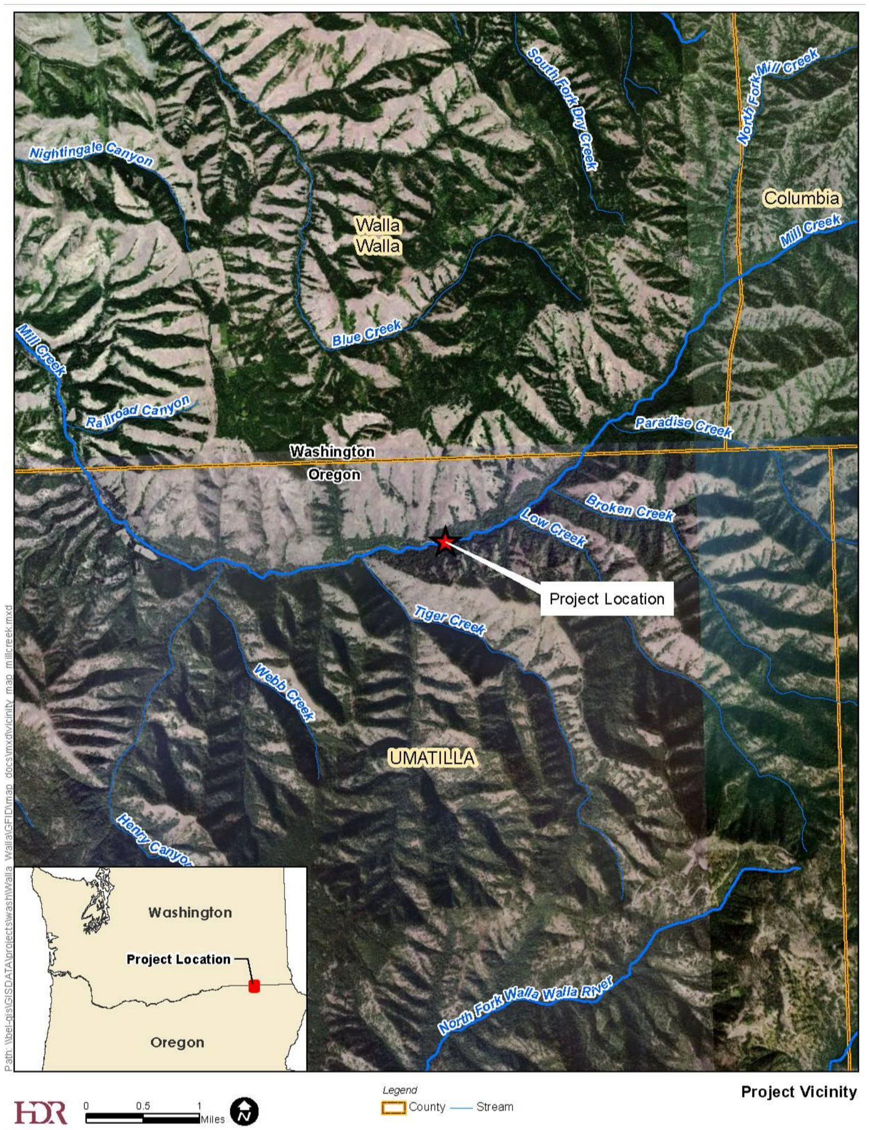

Figure 1. Project Vicinity Map.

The CCWID was constructed in 1928 and pools an upstream reservoir approximately 120 feet long by 50 feet wide to create head on a 30-inch pipeline that extends 14.5 miles to Mill Creek Treatment Plant in Walla Walla. The dam is equipped with two 30 by 48-inch sluice gates for draining the reservoir for maintenance, as well as two additional "bypass" gates in the water intake building. Just upstream of the CWWID, Mill Creek has a large gravel bar that has accumulated in the forebay (

Figure 2). This gravel bar would be removed during mechanical debris removal in the forebay.

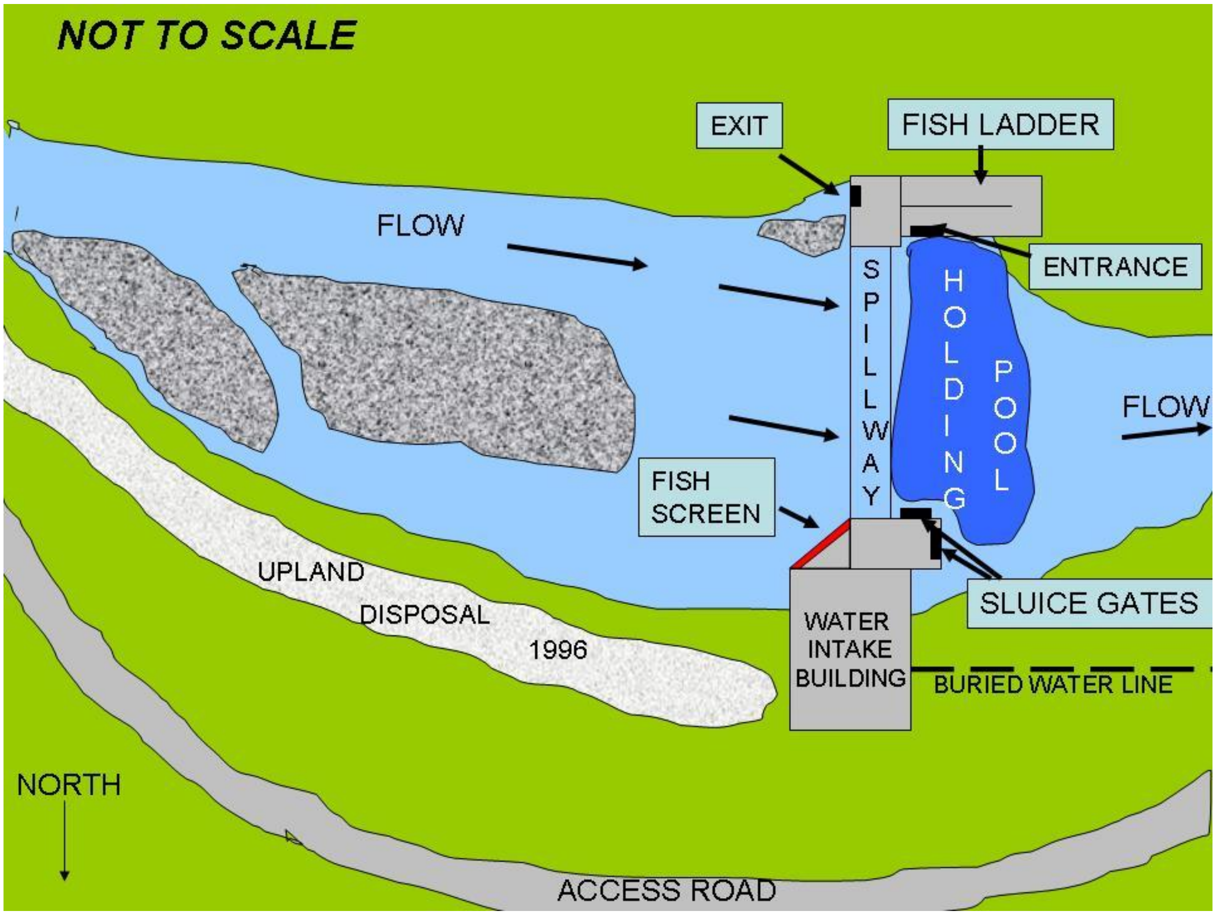

Figure 2. Schematic drawing of the CWWID showing the dam, fish ladder, intake, sluice gates, location of the water line, the holding pool below the dam, and the gravel bars in the reservoir and in front of the fishway exit. Mill Creek flows downstream around the gravel bar along the north and south banks.

Based on average flows measured at an instream gage approximately 150 feet downstream of the CWWID and discussions with long-term dam operators, the ordinary high water mark (OHWM) at the site has been delineated at an elevation of 2,421 feet mean sea level, roughly two feet above the level of the dam crest. Based on the nearly vertical bedrock/armored nature of the banks, there is relatively no discernible break in vegetation; therefore, vegetative conditions were not valuable in determining the OHWM. However, the year-round resident dam operator has indicated that the water surface level during spring freshets rises approximately 1- to 1.5-feet over the dam crest during the highest spring freshets. The nearly constant water surface elevation reflects the hydraulic control point at the dam, and the highly constricted nature of this canyon-like system. For the purposes of the USACE and the Oregon Department of State Lands (DSL) jurisdictional authority, all materials removed from the Creek would be included in cut and fill calculations for state removal permits and discharge authorizations (DA).

2.2 Action Area

The "action area" includes all areas affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). Any areas experiencing changes to the physical, biotic, and chemical environment are included in the action area.

In-Air Portion

The in-air portion of the action area is defined based on the effects of construction equipment to be used at the site. There would be no blasting or pile driving at this location. The three loudest pieces of noise-producing equipment anticipated to be used on site include an excavator, a front-end loader, and a generator. According to the Washington Department of Transportation (WSDOT 2012), this equipment can produce peak noise levels of 81 decibels (dB), 79dB, and 81dB, respectively. Decibel addition rules dictate to add extra dBs to account for the occurrence of multiple types of heavy machinery producing similar levels of noise. Based on the decibel addition rules presented in WSDOT (2012), the peak dB produced would be 85 dB. Although baseline levels for the project site are not available, they were assumed to be about 55 dB based on the rural location with the creek noise in the background (including dam spill and occasional operation of air burst cleaning screens), which is likely slightly louder than light traffic 50 ft from the source (WSDOT 2012). Using a point-source sound attenuation model where a noise reduction of 6 dB occurs per doubling distance from a point source activity, with an additional 1.5 dB of reduction due to soft site characteristics on-site, noise should attenuate to baseline levels approximately 800 feet from the project site. Therefore, the in-air portion of the action area extends 800 feet from the CWWID in all directions. This includes staging areas along the existing access road (Mill Creek Road), and bordering riparian habitat along the forebay access area.

Aquatic Portion

About 120 linear feet of stream channel upstream of the CWWID would be directly affected by the operation of instream equipment. The aquatic portion of the action area has been defined using the furthest extent of potential effect from proposed project actions that may modify the pre-project instream flow direction and/or habitat condition as they relate to ESA-listed aquatic species. Instream work has implied effects. However, the magnitude and extent of effects are based on a variety of parameters including volume, gradient and velocity of instream flow. Instream work and the presence of construction equipment would displace aquatic species to potentially less suitable habitats.

Based on the proposed project construction methods, the anticipated impacts of sedimentation from in-water construction, primarily initial sluicing, would likely be discountable 1,000 ft downstream of the proposed activities. In a recent consultation for a similar forebay debris removal project in the lower portion of Mill Creek, the USFWS determined that turbidity plumes resulting from the project would result in elevated levels of sediment that are likely to have adverse effects to bull trout in the forebay and at distances less than 180 meters (600 feet) downstream (Foltz et al. 2008 as cited in USFWS 2011; Newcombe and Jensen 1996, as cited in USFWS 2011) from the dam. Based on this information, combined with visual estimates of turbidity plumes observed during previous sluicing events at the CWWID, a conservative linear distance of 1,000 feet downstream was applied to this project.

Given the need for mechanical removal of instream debris from the dam forebay and potential displacement of aquatic species in the vicinity of instream work due to temporary hydraulic modifications, the upstream in-water portion of the action area would conservatively extend 500 ft upstream of the dam. Therefore, the aquatic portion of the action area includes that reach of Mill Creek extending approximately 500 ft upstream, and 1,000 ft downstream, of the CWWID.

2.3 Watershed Description

Seven percent of the 36 square mile Mill Creek watershed above the CWWID is owned by the City of Walla Walla, and 93% is owned by the USFS. Mill Creek originates in the Blue Mountains of Washington at an elevation of 5,600 feet, about two miles south of Table Rock. Mill Creek is a tributary to the Walla Walla River (4th Field Hydrologic Unit Code [HUC] No. 17070102), which flow into to the Columbia River (Lake Wallula). Roughly 75 percent of the basin is in Washington State. The Blue

Mountains are characterized as steeply sloped timbered terrain, and such terrain characterizes the action area.

From its headwaters in Washington, Mill Creek flows in a general westerly direction through a deep canyon for about seven miles before crossing into Oregon near Paradise Creek (elevation 2,700 feet). About two miles further downstream, the creek reaches the CWWID (elevation 2,400 feet; Figure 3). The land upstream from the CWWID is designated as a municipal watershed, and entry is prohibited without a permit. The watershed is 36 square miles and was established by a 1918 agreement between the City of Walla Walla and the U.S. Secretary of Agriculture. An extensive trail system is present and is used for patrol purposes. Ninety percent of the upper Mill Creek watershed is owned by the USFS and has been managed under an agreement between the USFS and City since 1922. The City owns the land on which the intake dam, fish ladder, ancillary facilities, and caretaker's residence are located. Grazing leases in the watershed were eliminated in the 1970s, as were public trail rides. Public access into the watershed is now limited to permit holders allowed to hunt elk under Washington Department of Fish and Wildlife (WDFW) and ODFW regulations.

The watershed immediately downstream of the CWWID is subject to sedimentation due to past logging, rural residential development, and the presence of Mill Creek Road along the north bank. Upstream of the CCWID, the watershed is relatively undisturbed and provides pristine habitat conditions for native salmonids. The upper watershed has been subject to minimal forest management and is comprised of a dense mixed conifer forest with heavy fuel loads making the area vulnerable to wildfire. The USFS has recently begun some fuel reduction efforts in the watershed, mainly by hand trimming, and pile burning, to reduce fuel loads to prevent a catastrophic fire that would severely affect the City's water supply. Chemical treatments for forest pests are not carried out in the watershed.

Between its source and the CWWID, many springs contribute hydrology to Mill Creek. A Rosgen B-type stream channel (moderately entrenched, moderate gradient, stable) is present through most of this reach. From the water intake structure downstream approximately 13 miles to the Bennington Lake diversion dam the valley floor widens, the stream channel changes from a B-type to a C-type (low gradient, meandering) and human development activities increase.

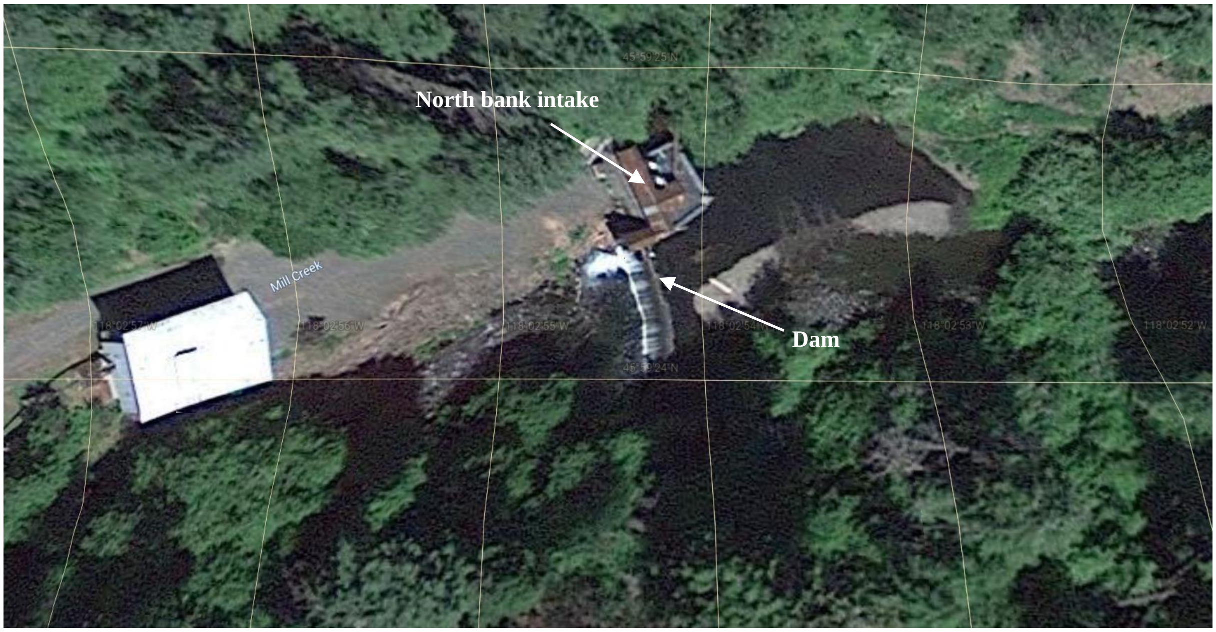

Figure 3. Aerial photo of site, showing dam and intake on north bank of Mill Creek. Gravel bars evident upstream.

2.4 Environmental Baseline

Areas upstream and downstream of the CWWID consist of fairly intact natural riparian habitat comprised of a mix of deciduous and coniferous trees and shrubs. Along the north bank immediately upstream of the dam, scattered clusters of ninebark (*Physocarpus capitatus*), mullein (*Verbascum thapsus*), and dock (*Rumex* spp.) have become established near the water's edge along the steep, armored banks (see photos in Appendix A). The north bank immediately downstream of the CCWID is devoid of functional vegetation as the bank has been significantly altered and consists primarily of riprap/large cobbles of various sizes. Just landward of the top of bank, the riparian corridor consists of fairly intact native vegetation dominated by a mix of deciduous and coniferous trees and shrubs. Along the south bank, bedrock outcrops create a nearly vertical bank that is vegetated with various conifers, snowberry, and sword fern. Upstream of the dam, banks are stable and relatively confined due to the canyon-like nature of the upper watershed.

The CWWID has prevented the natural downstream migration of sediments for many years. This has limited the availability of instream spawning gravels for salmonids that utilize reaches immediately downstream of the dam including ESA-listed bull trout (*Salvelinus confluentus*) and steelhead (*Oncorhynchus mykiss*), as well as recently reintroduced (non-listed) spring Chinook salmon (*Oncorhynchus tshawytscha*). Likewise, fine sediments important to other species have been captured behind the dam and precluded from their natural migration downstream. Fine sediments are essential to the early rearing of lampreys like the Western brook lamprey (*Lampetra richardsoni*), and the Pacific lamprey (*Entosphenus tridentatus*). Though not federally listed, the Pacific lamprey is a federal species of concern. Both lamprey species are considered sensitive in the states of Washington and Oregon and are culturally significant to local tribes.

Substrates upstream of the dam are primarily bedrock, though 3-6 feet of accumulated gravels, cobbles and fines currently covers the native substrate. Immediately downstream of the dam, substrates consist of gravels and small cobbles (1-6 inches) with scattered larger cobbles throughout. Fines are limited downstream since the dam precludes transport of the majority of fine materials.

Although not listed for any pollutant on the 303(d) list of impaired waters, Mill Creek from RM 22.9-26 is temperature limited (Category 4a) during the summer for bull trout (temperatures exceed 10°C). Still, temperatures in the action area remain cold year-round and are suitable for salmonid rearing. The City of Walla Walla records instream temperatures at the CWWID on an hourly basis. From 2008-2012, average monthly temperatures at the dam in July were 9.5°C (49.1°F) and 9.7°C (49.5°F) in August. Temperatures are recorded every hour at the dam, and often vary over the course of a day by up to 4°C (7°F), from 7.6°C to 11.6°C (45.7°F to 52.9°F) (Krebs, pers comm., 2012).

Flow conditions are altered in the vicinity of the CWWID, due to the presence of the dam and the withdrawal of water at the intake. Average monthly flows in the Mill Creek downstream of the action area indicate lowest flows occur in July and August (Table 1). Data from the gate at CWWID diversion from 2008- 2012 indicate that pre-diversion (i.e., upstream of the dam) flow quantities average 47 cfs in July and 39 cfs in August.

Table 1. Mill Creek Mean Monthly Flows (cfs).

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
134	150	159	175	140	78	37	31	31	37	71	111

Source: USGS gage 14013000, Mill Creek near Walla Walla, WA (period of record from 1913 to 2011)

Appendices C and D include a discussion of the current status of habitat indicators for bull trout (USFWS 1999) and for steelhead/Chinook (NMFS 1996), respectively. The status of specific parameters presented in the appendices was based on various sources, including previous consultations conducted in or near the action area (BPA 2000; USFWS 2011), the Walla Walla Subbasin Plan (Walla Walla Watershed Planning Unit and Walla Walla Basin Watershed Council 2004), site visits by HDR Biologists, and interviews with USFS and ODFW biologists familiar with the site. The following habitat parameters are included in the appendices:

- Water Quality
- Habitat Access
- Habitat Elements
- Channel Condition and Dynamics
- Flow and Hydrology
- Watershed Habitat Conditions and Species

2.5 Construction Period

The ODFW-recommended in-water work window for Mill Creek is July 1 – August 15 (ODFW 2008). The City proposes, therefore, to conduct the debris removal when pre-diversion flows approach 40 cfs, as measured at the intake. As described in Section 2.4, flows average about 39 cfs in August and it is likely that debris removal would occur sometime during the first two weeks of August.

It is anticipated that instream work would take place over a maximum of 5 days; however, the City would encourage the Contractor to perform the work as quickly as possible (2 days if feasible) to minimize irrigation water demand on City wells. Because the intake would need to be taken off-line during the instream mechanical debris removal effort, municipal water for City users would need to be supplied by wells located throughout the City. The holding capacity of the City's storage tanks is 24 million gallons, while peak summer demand is 24 million gallons, so pumping may be required for any outage lasting more than a day. Therefore, conducting the work as quickly as possible would reduce pumping costs (up to $25,000 per day) significantly.

3.0 Description of the Proposed Action

3.1 Proposed Action

The proposed action includes the following:

1. One-Time Instream Debris Removal Event
   A one-time instream sediment/debris removal event during the instream work window (July 1 – August 15) in 2023. Excavation is proposed to remove up to 887 cy of accumulated bedload (sands, fine silts, gravel) and woody debris for upland disposal.
2. Maintenance Debris Removal Every 5 Years, or After Major Flood Events
   Mechanical debris removal actions (for maintenance) may be required every 5 years or after major flood events, depending on flows and wood/sediment accumulation. Such removal would be accomplished in the same manner as described herein. If riprap is dislodged from the streambank during flood events it will be replaced in-kind.

Associated work protocols related to the Proposed Action are outlined below in Section 3.2, Work Protocols.

3.2 Work Protocols

Forebay Drawdown

The following protocol will be followed to initiate drawdown of the forebay:

1. Monitor pre-diversion flows at the CWWID. Once stream flows approach 40 cfs during the Mill Creek in-water work window (July 1 - August 15), forebay drawdown will be initiated.
2. Open sluice gates located at north side of the dam. Opening sluice gates would initiate drawdown of the forebay and would stop diversion of water through the intake as forebay water levels would fall below the intake elevation.
3. Drawdown forebay water elevation as low as possible while maintaining stream flow within the existing north stream channel.

Fish Salvage

The following protocol will be followed to isolate or remove fish from the dewatered work area:

1. As the forebay water levels are lowered, qualified fisheries biologists would check for and rescue any stranded fish.
2. A channel-spanning block net would be installed at an angle upstream of the north channel bypass (i.e., upstream of the existing gravel bars). Two metal fence posts would be driven by hand along the banks to affix the net, and rocks would be placed along the bottom of the net to anchor it to the bottom. This would effectively block fish from moving downstream into the work area during the instream work period. Due to on-going flow bypass through the sluice gates on the downstream side of the dam, a similar block net on the downstream end was not recommended by ODFW. If adults are observed moving upstream through the sluice gates into the bypass, they would be herded back downstream. Such fish would not have access to the excavation area once the north bypass channel is formed following reservoir drawdown.

3. Following block net placement, a team of qualified fisheries biologists would conduct 3 to 4 passes to herd fish downstream through the sluice gates and out of the forebay area where the excavator would operate. The habitat downstream of the dam is of good quality for these fish to hold during the up to 5-day instream work period as large turbidity inputs are not anticipated following initial sluicing due to the proposed placement of silt fencing along the isolation berms.
4. Qualified fisheries biologists would use seine nets or low-level electrical current (backpack electrofishers) to remove fish from the dewatered work area (i.e., behind the gravel berm with no access to flow bypass). Fish that are removed from the dewatered work area would be transported in buckets upstream of the work area. Herding and salvage would occur immediately following forebay drawdown when water levels are as low as possible.
5. Qualified fisheries biologists will record the number, species, and lengths of all fish captured.

Turbidity Monitoring

The City would monitor turbidity levels using a turbidity meter positioned approximately 200 feet downstream from the sluice gates. The levels would be recorded every 2 hours during instream work and would be available for agency review. Turbidity would be compared to that measured at a station upstream of the work area to establish a baseline prior to instream work.

Removal of Accumulated Bedload Materials

The protocol outlined below would be followed for removing accumulated debris, including bedload sands, fine silts, and gravel, and woody organic material. All procedures outlined below would occur only after drawdown of the forebay, fish salvage operations, and installation of turbidity monitoring have all been completed.

1. Position conveyor from the north bank staging area to the gravel bar upstream of the dam. The conveyor would be placed before the commencement of any instream work due to site constraints limiting the amount of equipment that can be present at any one time on Mill Creek Road (access location on north bank).
2. Mobilize excavator into the dewatered work area from north bank access area. This mobilization will require a short creek crossing. The approximate location of the creek crossing is shown on Figure 4.
    a. Limbing of shrubs (ninebark) near the creek may be necessary to gain excavator access to the creek. No trees would be removed.
3. Install silt fencing along the southern “bank” of the north channel instream bypass. This southern bank was naturally formed during drawdown of the forebay water levels.
    a. If necessary, mechanically assist in the creation of bypass berm if the drawdown of the forebay does not create a sufficient berm or channel bank.
4. Excavate accumulated silts, sands, gravels, and woody organic matter. A cross-sectional view of proposed debris removal is illustrated in Figure 5. Debris adjacent to the following structures would be removed, in subsequent order:
    a. Fish ladder exit.
    b. Water intake screens.
    c. Upstream dam face.
    d. Gravel bar.

5. Salvage large wood that exceeds 15 feet in length and 8-inches in diameter would be removed by the excavator, salvaged, and stored on-site to be donated to stream enhancement projects in the basin.
6. Place excavated debris on the conveyor and load onto haul trucks positioned on the north bank. Haul debris materials to an upland location, landward of the OHWM.

Instream Work Wrap Up

1. Upon completion of debris removal activities, incrementally remove any native gravels placed in creation of the north channel instream bypass. This incremental removal will limit the pulse of sediment that may be transferred downstream during the re-watering of the forebay.
2. Remove silt fencing and demobilize the excavator.
3. Remove upstream block netting.
4. Close the sluice gates to raise the forebay reservoir pool elevation to pre-diversion levels.
5. Re-engage the intake.

Upland Disposal of Excavated Materials

1. Transport of excavated sediments and unsalvageable woody debris to an approved upland location. A condition for selecting an upland disposal site would be that the site is not located adjacent to fish-bearing waterbodies.
    a. It is anticipated that up to ninety (90) haul trips would be required from the site to an approved upland disposal location, depending on the size of the trucks that can access the site.
    b. A possible disposal site includes City-owned property along Isaacs Avenue.
2. No new access roads would be required to the site, and existing developed areas would be used for staging.

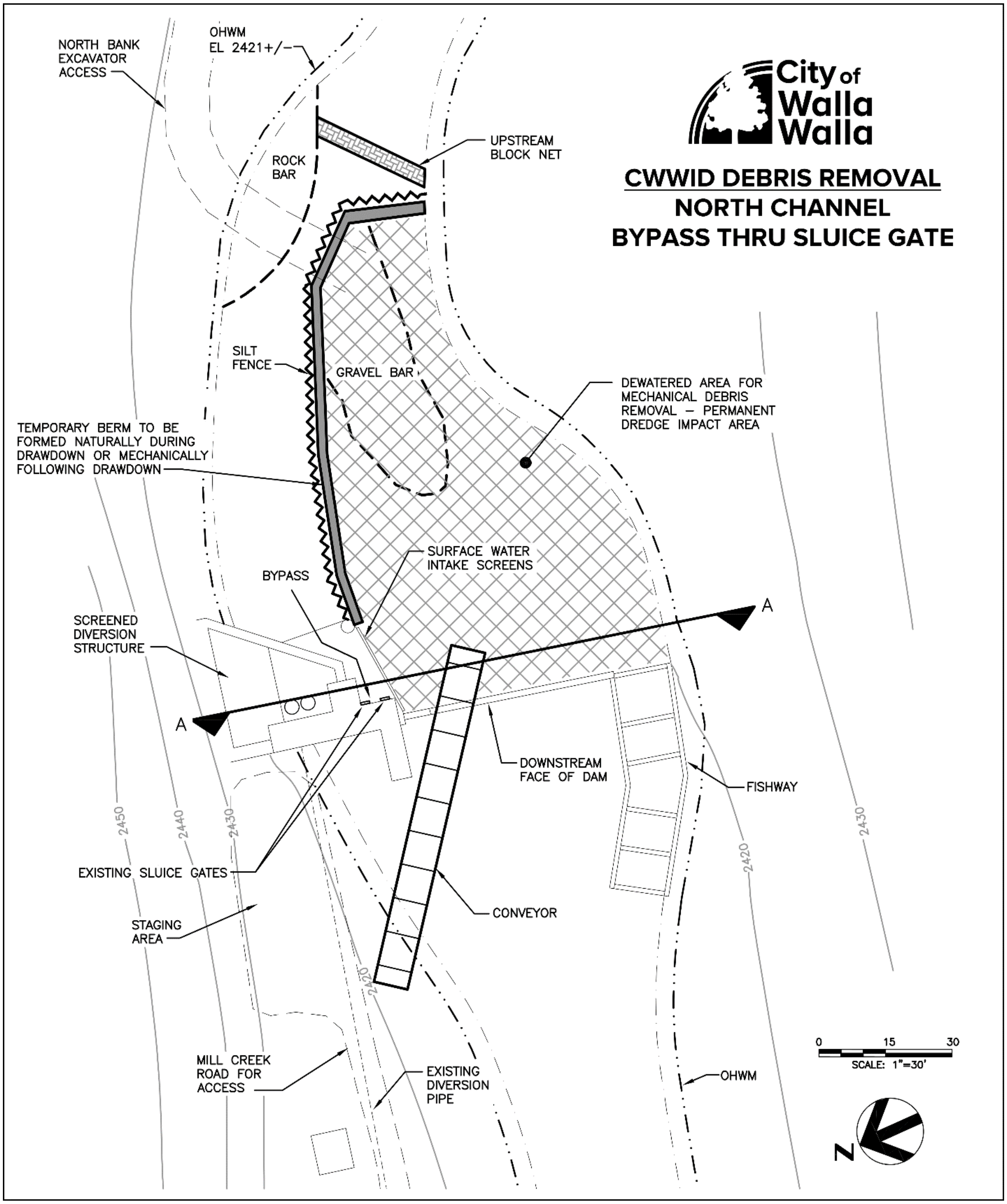

Figure 4. Instream debris removal project, showing dewatered area and north bank bypass concept.

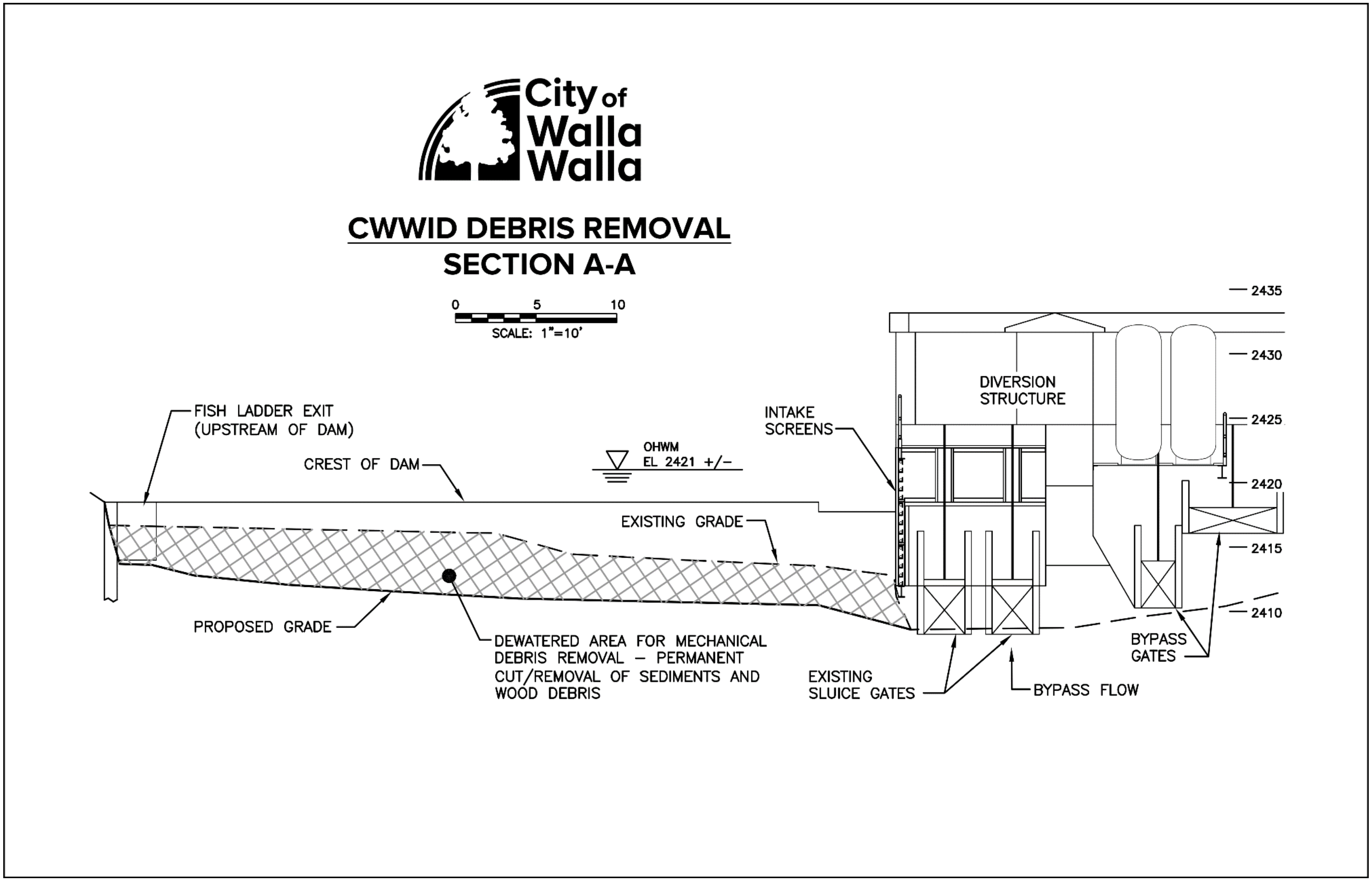

Figure 5. CWWID Debris Removal, cross-section immediately upstream of the dam, showing sluice gates on north bank, intake screens and fish ladder.

Maintenance Debris Removal Every 5 Years, or After Major Flood Events

The sluice gates do not pass large woody material. As such, sediment accumulates atop large wood, logs, broken limbs, etc., that settle in the dam forebay. Therefore, occasional removal of those logs and associated sediments is anticipated to be necessary over the operational life of the fish ladder and intake.

As needed, a repeat of the reservoir debris removal action would be carried out every several years depending on the rate of sediment and wood accumulation. It is estimated that such excavation would be necessary every 5 years; however, the frequency may increase if there is a large flood event that moves significant bedload. Particular attention would be given to keeping the fish ladder exit clear of debris and from being blocked by sediments. Any future excavation of materials would take place during the standard instream work window for Mill Creek. The July 1 – August 15 work window has been identified as the period during which in-water work at the CWWID would result in the least impact on summer steelhead and bull trout because it is between the spring spawning/hatching period for steelhead, and the fall spawning period for bull trout.

The effort required and frequency at which the proposed facility would require instream mechanical debris removal is completely dependent upon hydrologic, seasonal, sediment, bedload, and debris material transport variables. If mechanical removal of materials is required, the in-water work zone would cover the width of the river upstream of the dam, approximately 50 feet, and would extend roughly 120 feet upstream of the dam. It is estimated that future instream mechanical removal would remove up to 887 cy of materials for upland disposal. This quantity would be larger if a large flood event carries significant bedload downstream.

It is anticipated that future removal of sediments from behind the dam would implement the same strategy where materials would be transferred to haul trucks for upland deposition using a conveyer. During any maintenance excavation operation, the City would contract qualified biologists to properly handle stranded fish and return them to the creek. All fish salvage would occur according to the protocols described above.

Annual Sluicing of Sediments from Forebay

USACE has indicated that sluicing is a maintenance activity and is permit exempt. Long-term maintenance at the CWWID is a routine schedule for opening the sluice gates to allow the passage of sediments downstream before they accumulate to the level currently being addressed. Use of the sluice gates to pass sediments occurs during natural high-water events in the spring, to facilitate sediment passage and to coincide with natural turbidity events. Proposed debris removal in the forebay would create a larger pool, and sediments coming downstream from the watershed would accumulate with coarser sediments in the upstream portion, and fines closer to the dam. Opening the sluice gates periodically passes some of that natural instream material downstream each time, but more importantly, it deters buildup of sediments in front of the fish ladder and fish screens at the water intake. If the upstream fish ladder exit is passable, and the capacity of the water intake is maintained, excavation is not required. Therefore, it is recommended that the sluice gates be opened up to three times per year to move sediment downstream. This operation is proposed during spring runoff flows (February – May). Each sluice event is anticipated to convey up to 10 cy of material downstream of the dam. Large logs cannot be sluiced and would likely remain in the forebay unless significant flood flows carry them over the crest of the dam.

During sluicing, the City monitors the forebay to determine if any fish are stranded by the receding pool. If stranding is observed, the City would stop sluice gate operations and refill the reservoir immediately. Sluice gates would be opened for a few hours per sluicing event.

Contingency Plan for Sluice Gate Operation

The City would have the appropriate equipment on site or readily available to ensure that the sluice gates open properly. After the forebay has been excavated, and it is time to close the sluice gates, they will be inspected to ensure that no debris is blocking them, or sediment is caught in the gate channels. One gate will be closed, then the second. If necessary, a gate may be cycled open and closed to dislodge any material in the guides.

4.0 Effects of Project on Environment

Effects of the action are defined as "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR 402.02). These effects may occur as a result of both project construction and project operation.

4.1 Direct Effects

Direct effects result from the action and immediately impact the species or its habitat at the site of the action. Major project components would include: in river dewatering, fish salvage, and excavation of accumulated sediment/debris approximately 120 feet upstream of the CWWID. The aquatic environment may be affected by direct habitat modification during construction activities, including excavation and temporary loss of habitat due to placement of work isolation materials and instream activity, and fish salvage. Excavation may temporarily increase downstream sedimentation and turbidity, effecting water quality and habitat. However, debris removal would last only up to five days, and as such, effects would be temporary. Residual sediment would be flushed downstream with the following season's high flow event.

4.2 Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Possible indirect effects of the proposed project are limited. Potential minor modifications to the benthic macroinvertebrate prey base may occur associated with excavation and removal of sediments/debris and annual sluicing of accumulated materials upstream of the dam. Beneficial effects include the creation of a deeper reservoir holding pool for bull trout, and improved passage at the fish ladder due to the removal of accumulated debris at the upstream exit. CTUIR has requested that the pond be dredge for it can be used for salmon smolt acclamation for salmon smolt from the new fish hatchery.

4.3 Effects of Interrelated and Interdependent Actions

Interrelated actions are those that are a part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Both interdependent and interrelated activities are assessed by applying the "but for" test, which asks whether any action and its associated impacts would occur "but for" the proposed action. No future interrelated or interdependent actions are likely to occur but for this project.

4.4 Cumulative Effects

Cumulative effects are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

Habitat Improvements

Various groups are involved with aquatic and riparian habitat improvements in the lower reaches of Mill Creek, well downstream of the action area.

Salmonid Monitoring and Chinook Salmon Introduction Efforts

Mill Creek, including the action area, is subject to monitoring for bull trout and spring Chinook redds. The CTUIR no longer monitors for steelhead redds in the spring (Mahoney, pers comm., 2012). The CTUIR has stocked Mill Creek with adult Chinook salmon in recent years. These actions result in minor disturbances to substrate and ESA-listed fish that may be present in the vicinity of surveyors.

Continued Use of Mill Creek Water for Municipal Water

In the action area, the only water diversion is the City of Walla Walla diversion at the CWWID. It is likely that this diversion will continue in the foreseeable future. As such, on-going water quality degradation and flow reduction will continue to affect ESA-listed fish in the action area.

5.0 Measures to Minimize Effects of Proposed Action

A number of mitigation measures or construction techniques would be employed to minimize effects to listed species, designated and proposed critical habitat and EFH. The Impact Minimization Measures presented below are 1) components of the Proposed Action and 2) requirements of contractors during construction of the facilities. General measures to be applied to all phases of the project are listed first followed by measures that relate specifically to in-water work.

5.1 General Impact Minimization Measures

1. Use of heavy equipment would be implemented as follows:
    a. When heavy equipment is required, the equipment selected would have the least adverse effects on the environment (e.g., minimally sized).
    b. Heavy equipment would be thoroughly washed before mobilization to the construction site.
    c. Due to the very confined nature of the site, vehicle staging of haul trucks would occur along Mill Creek Road. However, cleaning, maintenance, refueling, and fuel storage would take place 150 feet or more from any stream, water body, or wetland.
    d. All vehicles operated within 150 feet of any stream, water body or wetland would be inspected daily for fluid leaks. Any leaks detected would be repaired in the vehicle staging area before the vehicle resumes operation.
    e. All equipment operated instream would be cleaned before beginning operations below the bankfull elevation to remove all external oil, grease, dirt, and mud.
    f. Equipment would be inspected before use to remove vegetation and dirt clots that may contain noxious weed seeds.
    g. Absorbent pads to soak up leaks and a fuel spill response kit of appropriate size for the equipment used will be readily available throughout the construction period.
2. To the extent feasible, machinery would primarily be operated from the top of the stream bank along adjacent upland and previously cleared areas.

The remainder of mitigation measures will be discussed as they relate specifically to instream activities.

5.2 In-Water Construction

The Impact Minimization Measures presented below are components of the Proposed Action and are requirements of contractors during mechanical debris removal actions.

1. The instream work would occur between July 1 and August 15, the ODFW-recommended instream work window established for Mill Creek in Oregon (ODFW 2008). All debris-removal related equipment would be removed from Mill Creek by August 15. If a major flood event occurred outside of the in-water work window, an emergency permit would be applied for.
2. Equipment would not be operated in flowing water, although creek crossings will be necessary to access the dewatered work area. Work would be conducted atop gravel and sediment islands to the extent feasible while moving instream material to isolate the excavation area and form the north-channel bypass, if needed.
3. A spill prevention plan would be required to be prepared by the Contractor.
4. To minimize material fallback and to prevent dripping and sediment from falling into the stream as debris is transported to haul trucks on the conveyor, the conveyor would be diapered using plastic sheeting or similar.
5. Immediately after forebay draw down (sluice gate opening), qualified fisheries biologists would herd and attempt to remove all fish species present from the immediate area where the excavator would operate. Herding would attempt to avoid physical handling of fish; however, some physical removal of juveniles may be necessary in the area to be isolated from the active flow of the channel. Protocols to be followed were coordinated with ODFW and CTUIR biologists familiar with the site, and are presented in Section 3.1, Fish Salvage.
    a. Juveniles or adults that do not displace voluntarily will be captured by seining. Following the removal of adults and subadults, juveniles, if necessary, will be removed by use of a conventional backpack electro-fisher. Once captured, fish will be placed into a 5-gallon bucket using small dip-nets. If electrofishing is required, biologists will adhere to NMFS Backpack Electrofishing Guidelines (NMFS 2000).
    b. If a listed fish is injured or killed at any point during the salvage operation, NMFS and USFWS would be notified. Fish salvage biologists would prepare a report for the USFWS and NMFS that summarizes the number of fish handled, species, and individual lengths.
6. A pollution and erosion control plan would be prepared and carried out by the Contractor to prevent pollution related to construction activities. The pollution and erosion control plan would address equipment and materials storage sites, fueling operations, staging areas, hazardous materials, spill containment and notification, and debris management. The contractor shall also identify the upland site where the material is hauled to. The site shall be inspected to make sure it is suitable.
7. Once in-water construction has ended, affected portions of the streambank will be stabilized, if needed. If vegetation is removed or disturbed during activities, disturbed areas will be replanted with appropriate native shrubs or trees, as determined though coordination with the USFS.

6.0 Species Lists

Table 2 summarizes the federally listed and proposed species that may occur in Umatilla County based on information provided in these agency lists, database searches of agency websites, and interviews with agency biologists with ODFW, USFS, and the CTUIR.

Table 2. Federally Threatened and Endangered Species in Umatilla County.

Common Name	Scientific Name	Federal Status	Critical Habitat
Columbia River DPS bull trout	*Salvelinus confluentus*	Threatened	Designated in action area
Middle Columbia steelhead DPS	*Oncorhynchus mykiss*	Threatened	Designated in action area

7.0 Occurrence of Federally Listed Species in the Action Area

7.1 Columbia River Bull Trout

Listing Status

Bull trout in the Walla Walla River basin are included in the Columbia River Distinct Population Segment (DPS), which was listed as threatened under the ESA in 1998. Bull trout recovery goals and targets for the Umatilla-Walla Walla Recovery Unit were developed by the USFWS and fisheries co-managers with the goal of recovering the species so that it may become self-sustaining and ultimately be removed from the endangered species list (USFWS 2002). To achieve that goal, the USFWS has determined that the populations in the Walla Walla River basin must reach an adult abundance target of 1,500 to 3,000 spawners, sustained over a 10 to 14 year period (USFWS 2002). More information regarding habitat and the general ecology of bull trout is presented in Appendix C, along with the USFWS Matrix of Diagnostics/Pathways and Indicators.

Population Status in Mill Creek

The USFWS (2002) classified all bull trout subpopulations in the Walla Walla River as “depressed”. In the draft chapter of the Recovery Plan (USFWS 2004) the Service listed the Mill Creek local population as "stable” based on redd count data. The trend criteria, to exhibit a stable or increasing trend in abundance for at least two generations (i.e., 10-14 years), is less clear. Mill Creek and South Fork Walla Walla appear stable when longer periods of time are considered, but in the short term the fluvial populations have been declining (Budy 2005, Howell *in litt. 2010*, as cited in USFWS 2011). ODFW determined that bull trout in Oregon portion of Mill Creek are “of special concern” (Buchanan et al. 1997), while WDFW classified bull trout in the Washington portion of Mill Creek as “healthy” (WDFW 1997).

Occurrence and Distribution in Mill Creek

From its confluence with the Walla Walla River upstream 25.6 miles, Mill Creek provides foraging, migration, and overwintering (FMO) habitat for adult bull trout (USFWS 2010b). Most of the upper reaches of Mill Creek provide spawning and rearing habitat for bull trout (Figure 6). As reported by the USFWS (2010b):

> *The upper portion of Mill Creek contains 7.9 miles of spawning and rearing habitat that supports an important bull trout local population. Studies indicate that many fluvial bull trout overwinter in lower Mill Creek between the Bennington Lake Dam and the City of Walla Walla Intake Dam, particularly in the section of above Blue Creek (Mendel et al. 2007). Most of the radio-tagged fish were located in the vicinity of the intake dam. Upper Mill Creek (including the tributaries listed) supports a significant bull trout local population. Over 120 redds have been counted annually in Upper Mill Creek and its tributaries from 1998 to 2005, with a high of 220 redds in 2001; redd numbers dropped to below 90 in 2006 and 2007 (Mendel et al. 2007).*

The ODFW (2005) estimated adult abundance of the bull trout population in Mill Creek at 480 individuals, and that spawning activity in Mill Creek occurs primarily upstream of Paradise Creek. Paradise Creek is approximately 2 miles upstream of the action area. A brief summary of bull trout life history stages, timing (Table 3), and the relative habitat conditions necessary for the successful development for each stage are presented below.

Table 3. Typical bull trout life history periods in the Mill Creek.

Life Stage	**Month[1]**											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult/subadult migration	░	░	░	■	■	■	■	■	░			░
Pre-spawn holding						■	■	■				
Spawning								░	■	■		
Adult downstream migration/ overwintering	■	■	■	■	■	■			■	■	■	■
Subadult presence	■	■	■	■	■	■	■	■	■	■	■	■
Incubation	■	■	■	░	░				■	■	■	■
Emergence				■	■	░						
Rearing	■	■	■	■	■	■	■	■	■	■	■	■

Sources: Howell 2009; Mendel, WDFW, pers comm., 9/13/10; Mahoney et al. 2012

[1] Lighter shades indicate potential, lesser periods of occurrence

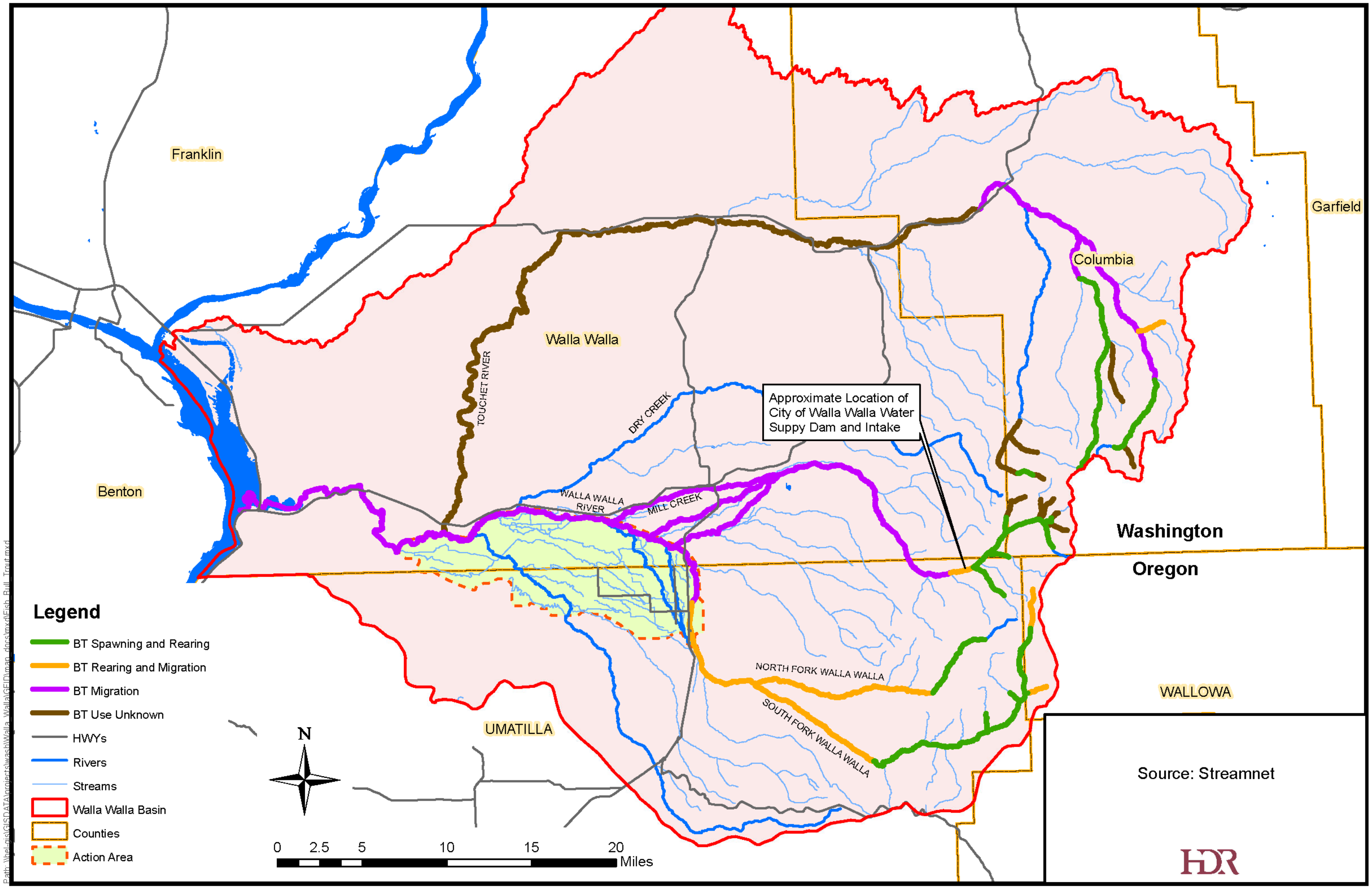

Figure 6. **Bull trout distribution in the Walla Walla River basin, showing approximate CWWID location.**

Occurrence in Action Area

Both Salmonscape (WDFW 2010) and Streamnet (2012) indicate that the CWWID (approximately) delineates the downstream extent of spawning and rearing habitat (Figure 6). As such, spawning, incubation and juvenile rearing are likely to occur in the vicinity of the CWWID. However, no spawning adults or incubating eggs would be present during the July 1 – August 15 instream work window since those life history stages occur after the closure of the window. Still, annual sluicing events are proposed during undefined high flow periods in the spring. As such, a brief discussion of all life stages that may occur in the Mill Creek action area is presented below.

Adult Migration and Spawning

Upstream Migration

Bull trout are known to congregate in the CWWID forebay pool as well as the scour pool immediately downstream of the dam. As part of its bull trout study in the Umatilla National Forest, the USFS has been trapping and studying bull trout movements in this part of Mill Creek, however this study has been completed. They have been using a fish trap associated with this facility and have also used a screw trap to sample sub-adults. Screw traps reportedly capture downstream migrants throughout each sampling season, though most downstream migrants have been captured in April, May, and June (Hemmingsen et al. 2001b, as cited in USFWS 2011). Bull trout hold in the reservoir pool from 1 week to 2 months. Peak movement of sub-adults past the CWWID occurs from late March through August. Peak upstream migration of adults occurs at the ladder trap from late June into October (Howell 2009).

Howell (2009) reports that, from 1998-2006, July and August accounted for 9% and 8%, respectively, of the downstream migrant subadults captured in a screw trap located approximately 0.25 miles upstream of the dam. During the instream work window, adult bull trout hold in the plunge pool below the dam, migrate upstream past the dam, and hold in the reservoir pool above the dam prior to spawning. In most years since 1999, upstream migrating adults begin passing the dam in early June with peak passage in late July. Since 2006, adult numbers have declined (Table 4), and passage at the dam has been later with bimodal peaks in late July and early September. In 2008, adults did not begin passing the dam until late July. Radio-tagged adults held below the dam for up to 2.5 months from June through September and remained in the reservoir pool above the dam for 1 week to 2 months during the same period after passing the dam.

Table 4. Bull trout adult abundance at CWWID, 1998-2010 (Howell 2009).

Year	Adults	Year	Adults
1998	177	2005	207
1999	236	2006	113
2000	240	2007	71
2001	184	2008	70
2002	215	2009	58
2003	180	2010	63
2004	180		

Spawning

Spawning occurs from September through October in Mill Creek, though use of the action area is limited. It is reported that the primary spawning areas are upstream of Paradise Creek (USACE 2010b). Most spawning occurs more than one mile upstream of the CWWID (Howell 2009). Bull trout spawning has also been observed downstream between the CWWID and Tiger Creek (approximately 0.9 miles downstream of the dam), but there are usually only 1 to 3 redds in that section of Mill Creek (Crabtree 2010; Howell 2010). In 2008, 5 redds were found downstream of the CWWID, and in 2009, one redd was found below the dam adjacent to the caretaker's house, about 250 feet downstream of the dam

(Howell 2009). During spring Chinook spawning surveys conducted in 2008, the USFS identified five bull trout redds downstream of the CWWID (Howell 2009, as cited in Dugger 2010). This represented about 13% of the total redds in Mill Creek in 2008. It is possible that additional spawning occurred below the dam since the Chinook surveys were conducted before peak bull trout spawning occurs based on spawn timing above the CWWID.

Downstream Migration

After spawning, radio-tagged adults hold in the reservoir immediately above the CWWID an average of 42 days before continuing downstream. Based on peak spawning occurring in late September-early October from previous spawning survey data, most of the post-spawning adults migrate downstream of the dam by mid-November (Howell 2009). Based on this timing, post-spawned downstream migrants would not be present during the instream work window for mechanical debris removal.

Incubation and Emergence

Although the proposed debris removal would not overlap with bull trout spawning and incubation periods, annual sluicing is proposed during the spring. As such, it is possible that redds could be present if spring sluicing occurs prior to fry emergence. Bull trout eggs typically require 100 to 145 days to incubate depending on water temperature. Fry emergence may occur from March through May in the Walla Walla River basin (EES 2004), though Mendel (pers comm., 2010) indicated that most fry emerge by March. Optimal water temperatures during incubation range from 34° to 43ºF (Buchanan and Gregory 1997).

Juvenile Rearing

Rearing juveniles could be present year-round in the action area. Bull trout require cold temperatures for rearing. According to Buchanan and Gregory (1997), optimal temperatures for rearing fry range from 39° to 40ºF; however, juveniles can rear over a wider range of temperatures (39° to 50ºF). Habitat parameters that appear to be associated with rearing juvenile bull trout include high levels of shade and undercut banks, sufficient amounts of large woody debris, high percentage of gravel and low levels of fines in riffles, and low levels of bank erosion (Dambacher and Jones 1997). This habitat is available in the action area.

Critical Habitat

In October 2010, the USFWS finalized revisions to designated critical habitat for bull trout. The revisions confirmed the designation of Mill Creek as critical habitat for bull trout as part of the Walla Walla River Critical Habitat Unit (CHU). The Walla Walla CHU was designated as CHU 14 in the Mid-Columbia River Recovery Unit (USFWS 2010; 75FR 64012). Critical habitat includes the stream channels within the designated stream reaches and a lateral extent as defined by the bankfull elevation on one bank to the bankfull elevation on the opposite bank (USFWS 2010).

Within designated critical habitat, the PCEs for bull trout are those habitat components that are essential for the primary biological needs of foraging, reproducing, rearing of young, dispersal, genetic exchange, or sheltering. Designated critical habitat contains the following PCEs, all of which are present in the action area to varying degrees:

1. Springs, seeps, groundwater sources, and subsurface water connectivity (hyporheic flows) to contribute to water quality and quantity and provide thermal refugia;
    - In the action area, springs and seeps do not appear to be present. Hyporheic flow is likely present in areas containing significant gravel accumulation (i.e., dam forebay). However, in upstream areas that are characterized by typical sediment and flow transport, the

underlying bedrock nature of the substrate upstream of the dam likely precludes significant exchange of Mill Creek surface waters with ground or other subsurface flows.

2. Migratory 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

   - Mill Creek is FMO habitat for bull trout, and individuals stage/hold in the reservoir pool, as well as a scour pool immediately downstream of the dam. The action area includes a fish ladder, and the upstream exit is partially blocked by debris. Bull trout can currently pass through the ladder, although the enclosed nature of the ladder precludes observations of delay or other obstructions.

3. An abundant food base, including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish;

   - The action area, particularly upstream of the dam, contains high quality habitat with natural features and substrate that can support a diversity of benthic prey items. In the forebay there is more open water and less riparian cover, but some food items drift from upstream and small fish are present. There are also young steelhead and Chinook that likely make up some of the prey items for bull trout.

4. Complex river, stream, lake, reservoir, and marine shoreline aquatic environments and processes with features such as large wood, side channels, pools, undercut banks and substrates, to provide a variety of depths, gradients, velocities, and structure;

   - The forebay contains a large backwater pool. Bull trout are known to hold in this pool during staging, and hold there during downstream migration following spawning. Adults also hold and stage in the scour pool located immediately downstream of the dam (scour pool created by dam). Although there is some woody debris in the forebay reservoir, it is mostly comprised of broken limbs and small sticks that have been carried downstream and are backing up behind the dam.

   - Within the forebay reservoir, the stream channel is simple with no side channels or undercut banks. Substrate in the forebay is mostly silts, sands, gravels, and small cobbles. The habitat improves upstream.

5. Water temperatures ranging from 36 to 59°F, with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life-history stage and form; geography; elevation; diurnal and seasonal variation; shade, such as that provided by riparian habitat; and local groundwater influence;

   - Water temperatures in the action area are measured hourly at the CWWID (Krebs, pers comm., 2012). In July and August, daily averages approach the maximum ideal rearing temperature for juvenile bull trout in the hottest portions of the day, but typically drop at nighttime to levels that are suitable for rearing (39-54°F). Summer temperatures often exceed spawning and incubation suitability thresholds; however, those life stages are not present in the summer. Summer instream temperatures rarely exceed the ideal migration threshold of 59°F. Based on this information, although the warmest periods of the day may preclude rearing of juveniles for extended periods, adults and subadults are known to stage and hold in the reservoir and downstream pool. For these reasons, instream temperatures during July and August are likely suitable to most stages of bull trout.

6. Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal

amount (e.g., less than 12 percent) of fine substrate less than 0.85 mm in diameter and minimal embeddedness of these fines in larger substrates are characteristic of these conditions;

- Bull trout spawning primarily occurs upstream of the action area; however, several bull trout redds have been observed downstream of the dam. Habitat conditions immediately downstream of the dam are not ideal for spawning due to some scouring at the downstream face of the dam and dominance of larger cobbles. However, suitable spawning gravels are present within 100 feet of the dam. Upstream of the dam, accumulated sands and fine sediments overlay gravels and cobbles in the forebay. As such, minimal spawning habitat is present in the forebay.

7. A natural hydrograph, including peak, high, low, and base flows within historic and seasonal ranges or, if flows are controlled, they minimize departures from a natural hydrograph;

    - Mean monthly flow data (Table 1, Section 2.4) indicates a highly altered hydrograph in the vicinity of the dam due to the withdrawal of water for the City of Walla Walla's municipal supply. Water pools upstream of the dam so the intake screens are submerged. This causes water coming into the project area to slow and pool, and sediment to deposit in the forebay. However, the City of Walla Walla is mandated to provide minimum instream flows downstream of the dam to maintain passage for bull trout.

8. Sufficient water quality and quantity such that normal reproduction, growth, and survival are not inhibited; and

    - With the exception of summer temperatures, water quality in Mill Creek is generally excellent upstream of the dam. Upstream of the dam water quantity is generally suitable to provide fish passage that allows normal reproduction, growth, and survival. The City of Walla Walla is mandated to provide minimum instream flows downstream of the dam to maintain bull trout passage.

9. Few or no nonnative predatory (e.g., lake trout, walleye, northern pike, smallmouth bass; inbreeding (e.g., brook trout); or competitive (e.g., brown trout) species present.

    - Although predatory species are likely present in the action area, ODFW (2005) reports that brook trout are not present in the Walla Walla River drainage. In a Biological Opinion developed for forebay cleanout of the Mill Creek Flood Control Dam, the USFWS (2011) stated that "nonnative fish species are not documented as a problem to bull trout in the action area". The action area that was the subject of that consultation is downstream of this project in relatively degraded habitat. For this reason, it is assumed that nonnative fish species are also not an issue in the action area defined for this project.

Throughout the remainder of this BA, the PCEs will be referred to by the corresponding number as listed above.

7.2 Middle Columbia River Steelhead

Listing Status

Summer steelhead in the action area are part of the Middle Columbia River (MCR) DPS. The MCR steelhead DPS was listed as threatened under the ESA on March 25, 1999 (64 FR 14517) and reaffirmed as threatened on January 5, 2006 (71 FR 834). Final protective regulations for MCR steelhead were issued under section 4(d) of the ESA on July 10, 2000 (65FR 42422). This DPS includes all naturally spawned steelhead populations upstream from the Wind River, Washington, to and including the Yakima River, Washington (NMFS 2007).

Population Status in Walla Walla River Basin

Although the current number of wild summer steelhead that return to the Walla Walla River basin is not known, historic run sizes have been estimated between 4,000 to 5,000 adults (CTUIR 1990; Grettenberger 1992). Summer steelhead spawning ground surveys have been conducted in various reaches of the Walla Walla River basin since 1992 to estimate trends in adult returns. From 2001 to 2010, both natural and hatchery-origin steelhead have been counted at Nursery Bridge Dam, located on the mainstem Walla Walla River (Snake River Salmon Recovery Board 2010).

The Walla Walla River natural steelhead population is comprised of the main stem Walla Walla River, its 2 main forks (North and South Forks) and its tributaries including Mill Creek, Cottonwood Creek, Pine Creek, Dry Creek, and Yellowhawk Creek. Figure 7 illustrates the number of adult steelhead counted at the Nursery Bridge Dam, Bennington Dam on Mill Creek and at the trap on Yellowhawk. As can be seen, the number of steelhead counted at the Bennington Dam on Mill Creek is significantly less than the number counted at Nursery Bridge Dam on the mainstem Walla Walla River. It should be noted that the data illustrated in Figure 7 is considered partial because all trap locations have inefficiencies due to river conditions.

Based on estimates for returning summer steelhead in the Walla Walla River basin, the population was classified as “depressed” in 1992 (WDFW 1993), but was classified as “unknown” in 2002 (WDFW 2002) due to the lack of adequate abundance trend data for the stock. This depressed status is likely due to a variety of factors, including insufficient water quantity and poor water quality (WDFW 1993).

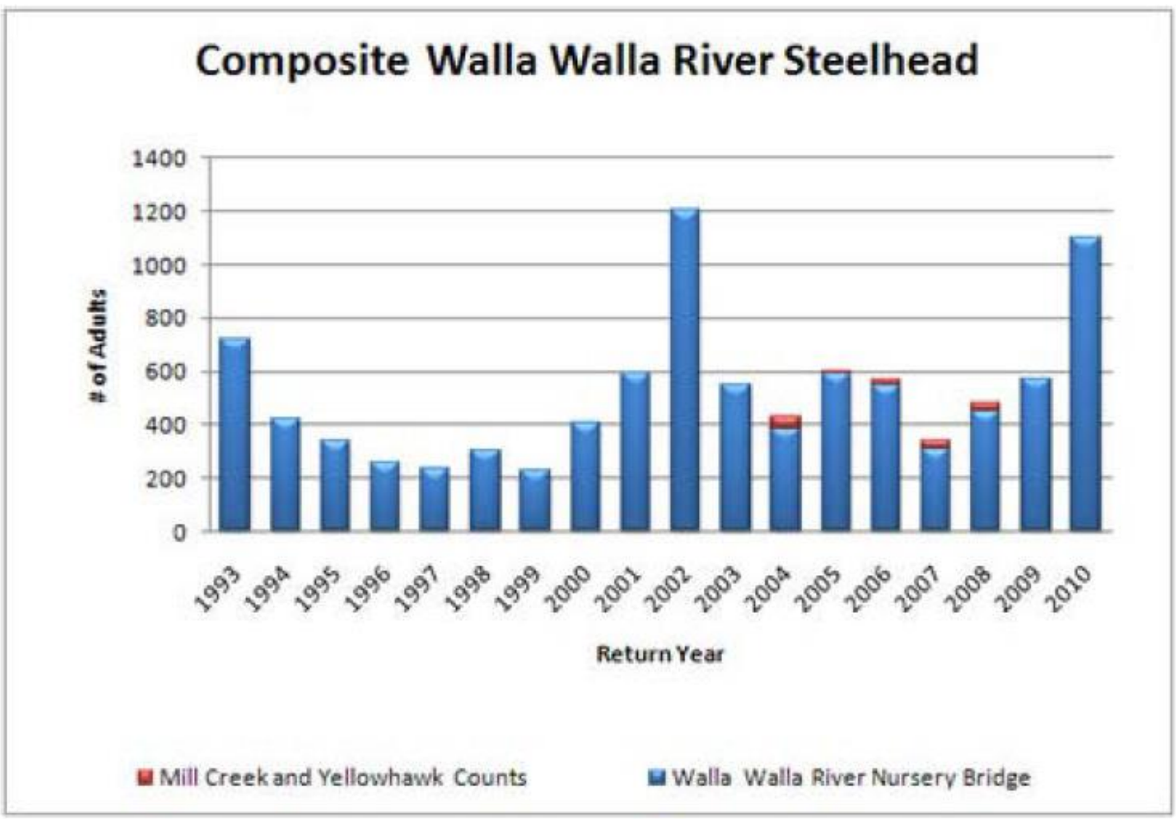

Figure 7. Number of adult steelhead counted at the Nursery Bridge Dam, Bennington Dam on Mill Creek and at the trap on Yellowhawk
Sources: Saul et al. 2001; Snake River Salmon Recovery Board 2010

Occurrence and Distribution in the Walla Walla River

Summer steelhead are found throughout much of their historic range in the Walla Walla River basin. Table 5 presents a summary of the timing of life history stages in the basin. Steelhead spawn and rear in the middle and upper mainstem reaches of Mill Creek (Figure 8), although limited spawning also occurs in the lower mainstem.

Table 5. Steelhead life history periods in the Walla Walla River Basin.

Life Stage	Month[1]											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult spawning migration												
Adult outmigration (kelts)												
Spawning												
Incubation												
Emergence												
Rearing												
Smolt outmigration												

Source: G. Mendel, WDFW, pers comm., 9/13/10; Mahoney et al. 2012
[1] Lighter shades indicate potential, lesser periods of occurrence

Although numbers are low, MCR steelhead are widely distributed within the Walla Walla River Subbasin and exist wherever habitat is suitable (NMFS 2006). In the Walla Walla River, suitable rearing habitat for juvenile steelhead is restricted in the summer to the mainstem Walla Walla and tributaries from the mouth of Mill Creek at RM 33.7 upstream. In the mainstem Walla Walla River, the highest densities of age 1+ steelhead per mile occurs from the East Little Walla Walla River mouth (RM 37.5) to Tumalum Bridge (RM 42.4) (NPCC 2004). A brief summary of each MCR steelhead life history stage and the relative habitat conditions necessary for the successful development for each stage are presented in the following sections.

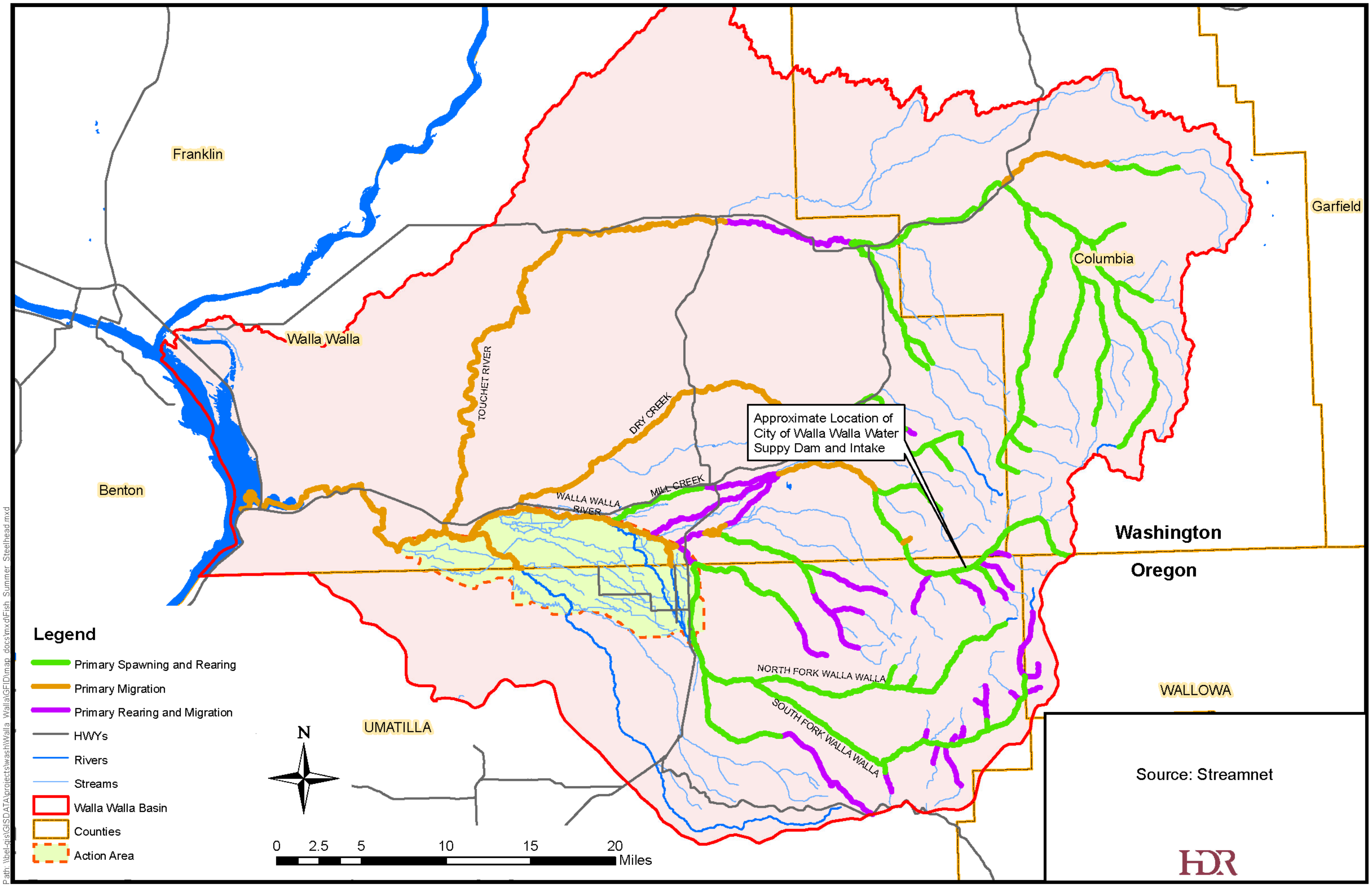

Figure 8. Summer steelhead distribution in the Walla Walla River basin, showing approximate CWWID location.

Adult Migration

Walla Walla River basin summer steelhead typically return to their natal grounds following two years of ocean residence (Saul et al. 2001). Adults enter the Columbia River during the months of June and July (Howell et al. 1985) and begin their migrations into the Walla Walla River system as early as September or October (EES 2004). More migration would likely occur in October or November if there were more water available in the season, either via rainfall or irrigation actions (Mendel, pers comm., 2010). If summer flows are too low or temperatures are too high to provide for suitable migration, adults may delay entrance to the Walla Walla River system until winter or early spring (December – March) (EES 2004; Saul et al. 2001). Downstream migration of kelts occurs from April through June (CTUIR 1990). Scale analyses from adults captured at Nursery Bridge Dam suggests that 7 percent of the adults returning to the Walla Walla River basin are kelts (NPCC 2004).

As adult steelhead migrate upstream, large woody debris, boulders, and other instream structures provide habitat complexity and pool habitats that serve as resting areas and, in shallow reaches, may provide predatory cover (Spence et al. 1996). During migrations, flows must be sufficient to allow passage over barriers (Spence et al. 1996) and to provide the minimum water depth for passage, which, for steelhead is approximately 5 inches (Bjornn and Reiser 1991).

Spawning

Steelhead spawn and rear in nearly all perennial waterways within the Walla Walla Basin east of the mouth of Mill Creek in the Walla Walla River Basin, and in Mill Creek, upstream of Hwy 12 (about 3 RM downstream of Dixie, WA) (Mahoney et al. 2012). Very limited rearing occurs downstream of those points, where summer water temperatures can be lethal (Mendel et al. 2007). In the Walla Walla River basin, steelhead spawning occurs over a period of several months primarily due to differences in water flows and temperature conditions in the various natal waters. Some individuals may spawn as early as February while others spawn into June, though the peak of spawning typically occurs in April and May. Wild steelhead adults migrate and spawn as far upstream as the North and South Forks of the Walla Walla River and into Mill Creek, and hatchery fish typically spawn in the Walla Walla River downstream of the forks.

Steelhead typically spawn in gravel ranging from less than ½ inch to 4 inches in diameter (Bjornn and Reiser 1991), with spawning gravel proportional to the size of fish (Marcus et al. 1990). The depth of water for spawning ranges from 5 to 35 inches with velocities ranging from 1.3 to 3.6 feet per second (Bjornn and Reiser 1991; Hunter 1973) and temperatures ranging from 40ºF to 57ºF (EES 2004).

Egg Incubation

Depending on water temperatures, steelhead eggs may incubate between 1 and 4 months before hatching and emerging from the gravel as young fry (EES 2004). According to Saul et al. (2001), the upper temperature limit for embryonic development is 65.3°F. In the Walla Walla River basin, incubation of embryos and residence of sac-fry in the substrate extends through June, and, depending on temperature, possibly into early July. Eggs subject to scour or deposited in areas prone to fine sediments may experience higher rates of mortality.

Juvenile Rearing

Following emergence in late spring to mid-summer, fry remain in pools until they are able to maneuver in the current, and are found in pools during nearly all seasons except summer, when they occupy riffle habitats (Wydoski and Whitney 1979). Juveniles typically occupy water 12 to 20 inches deep (Thompson

1972) in velocities ranging from 0.2 to 1.0 foot per second; instream temperatures from 50 to 55ºF (Everest and Chapman 1972; Moyle and Baltz 1985; Thompson 1972).

In the Walla Walla River basin, summer steelhead rear in tributaries until the spring following their emergence. In the mainstem Walla Walla River, most juvenile steelhead utilize the area upstream of Milton-Freewater, and rear in associated tributaries including the North and South Forks of the Walla Walla River, and Couse, Mill, Lower Pine, Cottonwood, and Dry creeks (EES/Parametrix 2003).

Smolt Migration

Smolts move downstream in response to changes in temperature and flow (Groot 1982). In the Walla Walla River watershed, most smolts migrate following two years of instream rearing, although a small percentage migrate after one or three years. The peak juvenile migration period for steelhead smolts occurs in April and May, although a secondary juvenile migration occurs during early winter and late spring.

Occurrence in Mill Creek Action Area

Mill Creek is a Major Spawning Area for MCR steelhead from the confluence with the Walla Walla River upstream to it headwaters. Regardless of spawner origin (hatchery vs. natural origin), the progeny of naturally spawning fish are afforded protection under the ESA. As such, all steelhead juveniles in the action area would be considered part of the MCR DPS and are therefore ESA-listed.

The action area includes portions of Reaches 4 and 5 of Mill Creek, as delineated by Mahoney et al. (2012). Reach 4, from Blue Creek to the WWCID, is used as primary steelhead spawning and rearing habitat. Reach 5 includes mainstem Mill Creek and tributaries and extends from the diversion to the upper limit of steelhead distribution. Reach 5 is used by steelhead for spawning and year-round residence in the lower portions. Timing of steelhead use in Mill Creek is likely similar to that presented in Table 5. However, Mahoney (pers comm., 2012) reports that steelhead emergence in the project action area likely occurs well before the work window (i.e., April-June), though a late June/early July emergence cannot be completely discounted.

In 2011, a PIT tag detection array was installed in the CWWID fish ladder (Mahoney et al. 2012), though, as of this writing, no steelhead data were located to report on abundance or passage at the ladder. In recent years, WDFW has estimated the Mill Creek steelhead population at less than 250 adults per year. Mahoney (pers comm., 2012) stated that the CTUIR recently stopped conducting steelhead spawner surveys in the action area due to high flow conditions during spawning. These conditions create poor visibility and, subsequently, provide poor and inconsistent data.

Based on the information presented above, the action area may be used by all life histories of ESA-listed steelhead, including spawning, incubation, rearing and migration. During the instream work window of July 1 – August 15, the vast majority of fry will have emerged from redds, and adults are unlikely to be present in the action area. For this reason, the primary life stage that could be affected by instream mechanical debris removal is the rearing juvenile. Adults, juveniles, and incubating eggs could potentially be present during annual sluicing, depending on the timing of sluicing during spring flows.

Critical Habitat

Critical habitat for the MCR DPS of steelhead is designated in Mill Creek and includes the action area (NMFS 2005). Critical habitat includes the width of the stream channel defined by the Ordinary High-Water Line (OHWL) as defined by the USACE in 33 CFR 319.11. In areas where the OHWL has not been defined according to 33 CFR 329.11, the width of the stream channel is defined by its bankfull elevation (FR 70.170.52666). In consideration of those physical and biological features that are essential to the conservation of steelhead and their critical habitat, NMFS has identified habitat factors necessary for the survival and recovery of the species (70 FR 52629; NMFS 2005). Within the action area, these include:

1. Freshwater spawning sites with water quantity and quality conditions and substrate that support spawning, incubation, and larval development.
2. Freshwater rearing sites with: (i) water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) water quality and forage areas that support juvenile development; and (iii) natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

8.0 Analysis of Effects of Proposed Action on Species and Critical Habitat

8.1 Aquatic Species

Effects to Species and Critical Habitat

Bull Trout

Mechanical Debris Removal Effects

The potential effects to individual bull trout due to instream mechanical debris removal are discussed below.

Displacement and Disturbance
Proposed mechanical debris removal actions (excavation of debris in the forebay and sluicing to lower reservoir pool) during the July 1 – August 15 instream work window would displace adults/subadults staging/migrating in the reservoir. The physical removal by herding or collection and capture for upstream translocation would result in direct handling and harassment. These actions would stress individuals and cause potential delays to upstream migration until they recovered. Instream noise created by the excavator could also result in individual displacement from occupied habitats in the action area.

The excavation activities would temporarily displace and result in the loss of potentially beneficial benthic organisms. However, the project only affects a very small section of stream, and these organisms would likely be recruited into the disturbed areas within a short time. Placement of the south channel sediment plug could potentially bury small fish if they do not move from the area of deposition. However, the relatively small area of channel affected by placement of the earthen plug would limit the potential for more than a few individuals to be affected.

Water Quality - Sedimentation
Accumulated sediments would be transported downstream of the dam during sluicing to lower the reservoir prior to instream mechanical debris removal. Disturbance and short-term increases in suspended sediment levels can reduce light penetration, inhibit primary production, abrade and clog fish gills, prevent feeding by sight feeders, stop migration, and cause any fish in the area to avoid the disturbed reaches of the creek. These impacts could result in a disruption to normal behavior, causing bull trout to

avoid available habitat, lose foraging opportunities near the project area, and delay or prevent movement to spawning habitat in upstream reaches.

The sediment plume created by instream work would be most extensive during initial sluicing to lower the reservoir pool. It is conservatively estimated that 5 cy of accumulated bedload material (primarily fine sediments and sands, with some gravel) would discharge through the sluice gates to the downstream side of the dam. Because instream debris removal would not occur until flows approach 40 cfs, it is anticipated that the resulting turbidity plume would flow along the north (right) bank and not disperse throughout the entire channel. For this reason, the south (left) portion of the channel is likely to experience minor increases in turbidity, allowing fish that may be present to avoid the plume.

Based on previous sluicing events at the CWWID, including one performed in June 2010 to reduce sediment accumulation in the forebay (following nearly of decade of no sluicing), it is anticipated that a turbidity plume would extend 500-1,000 feet downstream for a period of about 30 minutes. This action would likely result in a temporary exceedance of the water quality criteria for turbidity. The previous DEQ water quality standard (2005 Draft Turbidity Criteria Points of Compliance OAR 340-041-0036 (3)) stated that in streams with wetted widths greater than 30 ft but not greater than 100 ft, a conspicuous turbidity plume must not extend further than 100 ft from the point source. Currently, OAR 340-041-0036 states that no more than a ten percent cumulative increase in natural stream turbidities may be allowed, as measured relative to a control point immediately upstream of the turbidity-causing activity. However, the standard may be exceeded for dredging if authorized under CWA section 401 or 404 or DSL Removal-Fill Permits.

The estimated temporal and geographic extent of the plume is based on previous sluicing events at the dam, which have typically involved the sluicing of much higher quantities of material during higher flow events that disperse fine sediments across the channel. For this reason, the estimated turbidity plume extent and duration is likely conservative.

Following initial sluicing, the anticipated sediment plume is expected to extend less than 100 ft downstream from the sluice gates for the 2-day instream work period. This is because the majority of finer sediments would be transported downstream during initial sluicing, and the remaining sediments that would likely be larger gravels that have less mobility. Following initial sluicing, sedimentation is anticipated to result in minor effects to bull trout, particularly considering the use of minimization measures (i.e., silt fencing and fish salvage). A lack of response by salmonids to episodes of increased sediment loading is not contradictory to naturally occurring conditions as tolerance to brief periods of high sediment levels is a trait essential to survival in an environment of spring freshets and flooding (Gammon 1970). Downstream of culvert removal activities in Idaho, activities that produced much more sedimentation than that anticipated due to this project, turbidity levels peaked at 92 NTU above background. However, levels recovered to ambient conditions often at night following cessation of construction activity (Wegner 1998). While brief spikes in turbidity may be benign, frequent episodes are not (Shaw and Richardson 2001).

To further minimize the potential for impacts due to turbidity, the City will place a block net on the upstream entrance to the bypass to prevent downstream movement back into the forebay and attempt to remove bull trout from the forebay area using a seine net. However, if the proposed herding and removal efforts are not completely successful, or if some individuals are missed, those fish may be exposed to increased turbidity in the forebay. Some individuals may also remain in the area immediately downstream of the CWWID and would be exposed to increased turbidity below the sluice gates.

Isolation of Instream Work Area
As presented in Section 7.2, adults or subadults could be present during the instream work window. Immediately following forebay lowering and bypass development, a crew would use a seine to herd fish out of the work zone and install a blocknet at an angle across the upstream entrance to the bypass channel to keep fish from re-entering the work zone. This would displace bull trout for the removal period during the instream work window (July 1 - August 15). The block net would be maintained for the duration of the 2-day work period. If present, individuals could be subject to handling and associated harassment during fish salvage operations conducted prior to dewatering of the excavation footprint. Handling and removal operations (see Section 3.1) could result in stress and potential mortality to individuals in the work area; however, adherence to the protocols presented in Section 3.1 and Section 5 should minimize stress during salvage operations.

Passage
If any bull trout are present downstream of the dam during initial sluicing, there exists the potential for migratory delay since movement through the opened sluice gates during initial reservoir drawdown may be precluded due to high velocities and turbidity. However, this condition would likely only persist until the reservoir is drawn down and the bypass established, likely after about an hour or two. For fish present upstream of the dam during initial sluicing, reservoir drawdown could cause some individuals to get flushed downstream or to move upstream, beyond the action area.

During the first 30-60 minutes following the opening of the sluice gates, fish are unlikely to swim through the gates due to increased velocity and turbidity. However, during reservoir lowering, fish passage through the gates would be possible. The lowering of the forebay and the block net upstream of the work zone would also render the fish ladder inoperable. It is possible that pushing juvenile bull trout out of deep water cover and into more open water as they are herded may expose them to increased chance of predation; but this should be limited to the time during the actual herding activity since habitat upstream and downstream is of good quality. If bull trout are missed in the herding or salvage activities and remain in the forebay, or if they move upstream into the work area through the sluice gates, they could be exposed to stress due to elevated turbidity.

As stated in Section 3.1, the sluice gates are capable of conveying the anticipated flow past the dam. Although a block net is proposed to prevent fish from moving downstream into the work area, if agencies prefer to maintain upstream passage at the site during instream mechanical debris removal, anticipated velocities through the sluice gates would accommodate passage. Assuming 60 cfs through sluice gates and submerged gates with a cumulative opening of 24 square feet, anticipated velocities would be approximately 2.3-2.7 ft/s. This velocity would not exceed sustained and burst swim speeds for adult salmonids (Bell 1991); however, depending on the exact flows, juveniles may be precluded from moving upstream since their burst speeds are near the anticipated maximum velocities.

Introduction of Hazardous Materials
Petroleum products have the potential to negatively impact bull trout, in the unlikely event that individuals are present in the action area during in-water work. Sources of fuel and oil spills into the river include heavy equipment (e.g., excavator). Specific minimization measures have been established regarding fuel storage, fueling of equipment and spill containment (Section 5.1), including provisions for Contractor preparation of spill prevention plans. These measures should reduce or eliminate the potential for spill events, and thereby reduce or eliminate any effects to bull trout.

Anticipated Hydrologic Effects due to Sediment Removal
Removal of sediments from the dam forebay is anticipated to restore optimal operational flows the existing fish ladder, enabling the facility to be compliant with NMFS-passage criteria. The dam impedes the downstream movement of sediments and pools water; sediment/debris removal will not have any

effect on this baseline condition. However, the reservoir pool would be deepened, thereby increasing holding habitat in the forebay for adults/subadults.

Beneficial Effects

Beneficial effects associated with the proposed mechanical debris removal and annual sluicing events include the deepening and maintenance of the forebay holding pool for adult and subadult bull trout. Debris removal would clear the upstream ladder exit, thereby improving passage, and annual sluicing would allow for the downstream transport of sediments that contribute to build up at the ladder exit. Finally, annual sluicing would minimize the quantity of sediments that are flushed downstream compared to opening the gates every few years and introducing a larger sediment plume lasting for a longer duration.

Effects of Annual Spring Sluicing

Annual sluicing is proposed to pass sediments downstream. Up to three sluicing events are proposed during high flow periods during the spring. If migrating or overwintering bull trout are present downstream of the dam, a pulse of sediment would be introduced into occupied habitat. This sudden pulse could disorient individuals, causing some delay in migration or displacement from or avoidance of the turbid plume for a brief period of time. The extent of this effect would depend upon the amount of material sluiced past the dam and would be variable.

Sediments flushed below the dam during high flow events would likely disperse across the channel as flow moves downstream. However, immediately below the dam, sediments would likely be transported along the north bank for a distance (considering the constricted size and position of the sluice gates), and should therefore leave a clear area along the south bank for bull trout to move up the fish ladder. The sluicing would be of short duration (a few hours), resulting in a burst of turbidity that would disperse as the turbid plume followed the north (right) bank downstream. Once the sediments had been flushed for one to two hours, the sluice gates would be closed and the reservoir would refill.

Although initial mechanical debris removal would not overlap with bull trout spawning and incubation periods, annual sluicing would take place during high flow periods in the spring. Because bull trout eggs typically require 100 to 145 days to incubate depending on water temperature, fry emergence may occur from April through May in the Walla Walla River basin (EES 2004). As such, if there are any bull trout redds immediately downstream of the dam, spring sluicing events may subject eggs to sedimentation. If present, and if eggs are still incubating during sluicing activities, some eggs could suffer mortality due to smothering. However, since the majority of spawning occurs well upstream of the CWWID, the fewer number of redds downstream of the dam minimizes the potential for these adverse effects.

Maintenance Sediment/Debris Removal – Every 5 Years or after flood events

The zone of instream mechanical debris removal for proposed maintenance of the dam, intake and ladder, would extend approximately 120 ft upstream of the dam. Although the frequency of required maintenance debris removal would be greatly reduced as a result of proposed annual sluicing, occasional excavation may be required. Such debris excavation would reduce water quality during and immediately following instream work, resulting in increased turbidity in the vicinity. Any excavation that is required would take place during the July 1 – August 15 in-water work window established for Mill Creek in Oregon. Although this window was established to be protective of sensitive life history stages, subadult and holding/migrating adults would likely be present at this time and therefore would be subject to the effects described previously for the proposed 2023 mechanical debris removal.

Mechanical debris removal would result in the removal of shallow water macroinvertebrates that provide prey to bull trout in the action area. The reduction in prey items would occur over a relatively small portion of the river channel compared to the overall habitat available in the Mill Creek watershed. The exact time to recovery of epibenthic and benthic organisms in the excavation area is unknown. Epibenthic organisms typically utilized as food by bull trout would recover more rapidly than benthic organisms and should recover relatively rapidly (Waters 1995). McCabe et al. (1998) found no significant differences in total benthic invertebrate densities between dredged and undredged areas of the lower Columbia River (at RM 44.0) in as little as 6 days post dredging. Two measures of community structure, diversity, and equitability, were likewise similar (no significant difference) in dredged and undredged areas (McCabe et al., 1998). Although this information cannot be applied directly to the action area, based on the best available science, the effects of occasional excavation on the benthic prey community at this site for bull trout are expected to be discountable on a watershed scale.

Bull Trout Critical Habitat

Potential short-term adverse effects to bull trout critical habitat are mostly related to increased sediment and turbidity as a result of instream work, primarily due to excavation and sluicing actions. A potential fuel spill from construction equipment would also increase the contaminant level of the system, thus reducing the quality of all PCEs in the project area. A summary of anticipated effects to PCEs is presented by PCE, below.

PCE 1. Hyporheic flows should not be measurably affected due to proposed project actions. Excavation of materials would occur to depths equivalent to the existing streambed elevation. No excavation would occur below the existing streambed elevation (i.e., the elevation of the streambed in the north and south portion of the channel that currently convey flow through the forebay). Annual sluicing during high spring flows should not measurably affect this PCE since the quantity of sluiced materials is not anticipated to alter downstream bathymetry.

PCE 2. Construction activities (including noise, fish salvage, and operation of instream equipment) would create a temporary physical migratory barrier, adversely affecting PCE 2. The two-day closure of the fish ladder, fish herding, and delay of passage through the forebay work area would adversely affect this PCE. However, project actions are intended to improve sediment transport through the action area and reduce sediment accumulation at the upstream fish ladder exit. Annual sluicing during high spring flows could temporarily degrade water quality (e.g., increased turbidity) and cause passage delays if adults or subadults are present immediately downstream of the dam along the north bank.

PCE 3: The expected short-term removal of substrate associated with instream excavation in the forebay could adversely affect aquatic macro invertebrates and other forage fish species in the project area, thus temporarily reducing the functionality of PCE 3. However, because the area just upstream from the action area contains high quality habitat with natural features, and the proposed action will result in enlarging an existing and already simplified pool in the forebay, it is unlikely that the food base available to bull trout will measurably change. Annual sluicing during high spring flows would temporarily increase turbidity for a few hours, particularly along the north bank.

PCE 4. The proposed project would remove some silts and sands from the project area, but the bottom substrate would likely remain mostly silt with some gravel just upstream from the dam. The proposed project would not add any cover or shelter to the forebay area, and would remove woody debris, resulting in a simplification of habitats in the forebay. Annual sluicing during high spring flows would temporarily increase turbidity for a few hours, particularly along the north bank. Downstream sedimentation could fill pools, adversely affecting this PCE until subsequent high flows flush accumulated sediments.

PCE 5. Water temperature should not change as a result of the proposed action, including annual sluicing during high flows.

PCE 6. Although spawning in the immediate action area is reportedly infrequent, initial sluicing associated with reservoir draw-down would result in the deposition of sediment downstream of the dam. Fine materials would therefore be dispersed to downstream habitats that may be used for spawning. Spawning downstream of the dam is limited, but redds have been observed. If spawning occurs downstream of the dam and sluiced sediments are not flushed from the substrates prior to spawning activities, the increased amount of fine materials in the substrate may reduce suitable habitat for successful redd construction and egg survival. This is an adverse effect, though the quantity of utilized spawning habitat downstream by bull trout likely limits this effect on a watershed scale. Since spawning does not typically occur in the immediate forebay/reservoir area targeted for mechanical debris removal (Mahoney, pers comm., 2012; Howell 2009), it is unlikely that excavation would measurably affect this PCE upstream of the dam. Annual sluicing during high spring flows would temporarily increase turbidity for a few hours; however, subsequent high flows would likely flush any associated fine sediments prior to spawning the next season.

PCE 7. Because the dam serves as a hydraulic control point, the proposed project will not change the hydrograph, though deepening of the reservoir would increase storage capacity until sediments again accumulate and reduce the pool depth.

PCE 8. Bull trout use the action area for migration, rearing, and to a lesser extent, spawning. The proposed project would not change the amount of water flowing through the area or the temperature of the water. Water quality would be reduced during instream work associated with mechanical debris removal due to turbidity, estimated to occur for 2 days out of the July 1 – August 15 work window. Although some fine sediments carried downstream during sluicing would be remobilized during the first high flow flushing event, turbidity levels would ultimately return to ambient condition following instream debris removal. During annual sluicing, temporary increases in turbidity would occur for the first 30-60 minutes of sluicing, which, on average, would last only a few hours for each occurrence. Turbidity impacts are discussed in more detail above in effects to bull trout and are incorporated here by reference.

PCE 9. Nonnative fish species are not documented as a problem to bull trout in the action area and the proposed actions, including mechanical debris removal and annual sluicing, should not affect this PCE.

Summary of Effects to Critical Habitat

In summary, effects to critical habitat include a short-term (2-day) impact to adult bull trout migration (PCE 2) due to installation of block netting, lowering of the forebay, and the resultant inoperable fish ladder. The City's effort to herd fish out of the forebay, keep them out with a block net, and limit the duration of the in-water activity should limit the impact to a small number of sub adult bull trout. There would also be short-term impacts on water quality due to increased sedimentation and associated turbidity (PCE 8). The impacts to critical habitat would be of short in duration but would occur multiple times associated with infrequent mechanical debris removal and annual sediment sluicing. After implementation of each discrete action, the action area should return to its current condition and provide for forage, migration, and overwintering habitat for the bull trout.

With regard to critical habitat for bull trout, beneficial effects include maintaining a large pool above the dam, which would provide deeper habitat for sub-adult and adult bull trout than a reservoir filled with sediment and debris. Maintaining good exit conditions at the top of the fish ladder would provide better connectivity than the partially blocked situation at the head of the ladder now.

Steelhead

Mechanical Debris Removal Effects

As shown in Table 5, the instream work window avoids steelhead spawning and incubation periods and occurs after the typical fry emergence period. Juvenile steelhead rear in Mill Creek year-round and, therefore, could potentially be present in the action area during the work window.

Migrating adult MCR steelhead are not typically present in the action area during the in-water work window. In the unlikely event that adult steelhead are observed holding below or migrating upstream through the action area during in-water construction, they would be subject to similar effects presented above for bull trout.

Displacement, Disturbance and Loss of Habitat

The area downstream of the CWWID is a significant steelhead spawning area (Mahoney et. al. 2009). However, no steelhead adults are expected to be in the area during the July/August window, and it is likely that fry will have emerged from redds by the end of June, before the initiation of work in July or August (when pre-diversion flows approach 40 cfs). If incubating eggs are still present during the early portion of the instream work window, and mechanical debris removal is conducted in early July, such eggs could be subject to smothering if redds are located immediately downstream of the dam, particularly along the north bank downstream of the sluice gates.

Placement of the south channel sediment plug could potentially bury small fish if they do not move from the area of deposition. However, it is unlikely that newly emerged juvenile steelhead would be present in the forebay since spawning habitat is not present there. Further, the relatively small area of channel affected by placement of the earthen plug would limit the potential for more than a few individuals to be affected.

Newly emerged juveniles or yearlings could be affected by a number of construction-related activities including fish salvage, presence of equipment and personnel in the creek, excavation, noise, and reservoir lowering. These actions would result in harassment (potentially including handling) and displacement or habitat-abandonment during project activities. Since fish rapidly re-colonize areas following construction activities (Waters 1995), the effects would be temporary, lasting for a period of a few weeks. During the in-water construction period, the essential behaviors of feeding and sheltering would be interrupted as the displaced fish may be forced into sub-optimal habitat or into areas that place them in greater competition with other fish. However, given the relatively high quality of upstream and downstream habitats where fish would be herded or relocated, effects should be minor and short-lived.

According to NMFS (2003), "salmon and steelhead are generally able to avoid the adverse conditions created by (in-water) construction if those conditions are limited to areas that are small or local compared to the total habitat area, and if the system can recover before the next disturbance. This means juvenile and adult salmon and steelhead will, to the maximum extent possible, readily move out of a construction area to obtain a more favorable position within their range of tolerance along a complex gradient of temperature, turbidity, flow, noise, contaminants, and other environmental features. The degree and effectiveness of the avoidance response varies with life stage, season and the frequency and duration of exposure to the unfavorable condition, and the ability of the individual to balance other behavioral needs for feeding, growth, migration, and territory." NMFS goes on to state that, with due diligence and implementation of a full range of impact minimization measures, "the threat is negligible that the environmental changes caused by events at any single construction site associated with a proposed activity, or even any likely combination of such construction sites in proximity, could cause chronic or unavoidable exposure over a large habitat area sufficient to cause more than transitory direct affects to individual salmon or steelhead." For these reasons, adverse effects to individuals are expected to be temporary, and fish should recover relatively quickly following disturbance.

Water Quality - Sedimentation

Disturbance and short-term increases in suspended sediment levels would result in effects to steelhead that are similar to those described above for bull trout. Such effects could result in a disruption to normal behavior, causing individuals to avoid available habitat and potentially lose foraging opportunities in the action area. Conducting in-water work during summer low flows should ensure that suspended sediments redeposit within a short distance downstream of the action. Regardless of whether the area is used for spawning during the construction year, in-water work timing would minimize the potential for redds to be susceptible to sedimentation. Rearing juveniles would be mobile and able to avoid the disturbance. Further, construction-related turbidity is not expected to span the width of the river, meaning that juvenile MCR steelhead would still have access to non-turbid areas. Following in-water construction, higher flows would redistribute construction-related sediment prior to adult migration and spawning periods.

Isolation of Instream Work Area

Although some juvenile steelhead (and adults in the unlikely event they are present), may move away from the construction area during reservoir drawdown, remaining fish in the forebay work area would be subject to removal and salvage operations. Fish salvage would be conducted as described above for bull trout and would result in harassment, stress and, possibly, mortality. Direct effects on juvenile steelhead from work area isolation and fish relocation include injury during capture, holding, or release; potential transmission of disease and pathogens; increased exposure to predation, and short-term stress-related effects (Wedemeyer et al. 1990). If electrofishing is used to capture fish, stress effects could increase; however, fish would only be exposed to the stress caused by work area isolation one time. If debris removal took place without work area isolation more fish would likely be injured or killed.

Introduction of Hazardous Materials

Effects to steelhead due to the introduction of hazardous materials would be similar to those discussed previously for bull trout. If juveniles are present during in-water construction, there is some risk associated with potential releases of fuel or oil into Mill Creek from equipment working in the channel (excavator and conveyor), although it would be greatly reduced with the implementation of the spill prevention, containment, and control plan to be prepared by the Contractor and included as part of the project. Potential effects due to exposure of juvenile steelhead to hazardous materials would depend upon the nature of the material and exposure level, with higher levels of exposure over longer durations resulting in potentially lethal conditions.

Beneficial Effects

Beneficial effects to steelhead associated with debris removal primarily relate to improved passage at the dam due to debris removal at upstream exit to the fish ladder. Other beneficial effects, including deepening of the reservoir pool (possibly used for rearing), would be similar to those described previously for bull trout. Implementation of annual sluicing is anticipated to greatly reduce the amount of instream mechanical debris removal maintenance necessary to ensure the continued functionality of the intake and fish ladder.

Effects of Annual Spring Sluicing

Depending on the timing of annual sluicing during spring high flow events (likely March – May), adult steelhead could be present, and redds may be created downstream of the dam. Though the number of redds downstream of the dam is currently unknown, it is believed to be relatively low in number (Mahoney et al. 2012). If redds are present a few hundred feet downstream of the dam during annual sluicing, eggs could be subject to smothering and potential mortality if subsequent high flows do not flush sediment from the eggs in a timely manner as described above for bull trout.

Maintenance Sediment/Debris Removal

As stated above for bull trout, maintenance debris removal may occasionally be required to remove sediments from the forebay, intake screens and fish ladder exit. As described in Section 3.1, the sediment removal effort and frequency at which the proposed facility would require maintenance is completely dependent upon hydrologic, seasonal and sediment, bedload, and debris material transport variables. It is anticipated that mechanical removal may be required every 5 or after floods or forest fires. The potential effects of occasional mechanical debris removal upstream of the dam would include displacement, increased turbidity and harassment of individuals present in the vicinity of instream activities. Mechanical removal of material would be required to occur during the standard in-water work window, during which flows are low. As such, any excavation would likely produce a relatively short-lived sediment plume.

The timing of instream work (July 1 – August 15) should minimize potential effects to MCR steelhead. No migrating or spawning adults or redds are likely to be in the action area during the instream work window. Juveniles, including newly emerged individuals, would be mobile and, therefore able to move away from the disturbance. Subsequent higher flows in late fall and winter would redistribute these sediments before the adults returned to spawn. The increase in turbidity would be minor and of such short duration that it would not affect the MCR steelhead population on a watershed scale.

Steelhead Critical Habitat

Mill Creek is included as designated critical habitat for MCR steelhead. As stated in Section 7, three PCEs are present within the project action area: freshwater spawning sites, freshwater rearing sites, and freshwater migration corridors. The following presents an analysis of effects to each PCE due to actions considered in this assessment including: 1) one-time mechanical debris removal in summer 2013; 2) annual sluicing at dam during spring high flows; and 3) maintenance debris removal every 5-10 years to remove accumulated debris upstream of the dam in front of the fish ladder and intake screen. See Appendix D for an analysis of baseline conditions relative to the NMFS Matrix of Pathways and Indicators for steelhead, and the anticipated impact of project actions on those indicators.

Freshwater Spawning PCE Effects

Habitat in the action area is occasionally used by spawning steelhead; suitable gravels are present downstream of the dam for redd development, but spawning does not likely occur in the forebay. During mechanical debris removal, the freshwater spawning PCE could be affected by several actions. Reservoir lowering by opening of the sluice gates would introduce fine sediments to potential spawning habitat during the summer instream work window. However, higher flows in the late fall and early winter should redistribute any accumulated sediment prior to springtime spawning. Construction techniques previously described, such as placement of silt fences along the gravel berm fringe to contain disturbed soils, would reduce the volume of sediment that could be flushed downstream as a result of construction activities. Some heavy equipment would be used during the proposed project. Specific contracting requirements have been established regarding fuel storage, fueling of equipment and spill containment to protect water quality in the river. These measures include daily inspections of equipment for leaks and fueling a minimum distance of 150 ft from the river. These measures should reduce or eliminate the potential for deleterious effects to critical habitat due to construction actions.

Annual sluicing could also introduce fine sediments to potentially suitable spawning habitat downstream. While the extent and magnitude of effects to the spawning PCE would depend upon the constituents in the sluice stream as well as flow, it is likely that some deposition of sediment atop suitable spawning gravel would occur, potentially during spawning. However, by sluicing during high flow periods, subsequent flushing flows are likely to redistribute sediment throughout the downstream channel, and thereby limit the quantity of fines potentially deposited in any discrete area. Further, by sluicing up to two times annually, over time, the quantity of fine materials present in the sluice stream should be minimized.

Freshwater Rearing PCE Effects

Potential effects to freshwater rearing habitats due to instream debris removal and annual sluicing would be similar to those described above for spawning. Disturbance of streambed substrate due to excavation associated with in-water work and occasional maintenance excavation, as well as annual sluicing at the dam would result in temporary water quality exceedances (e.g., turbidity) that would degrade rearing habitat in the short-term. Physical disturbance and increased sedimentation downstream of the action as well as within the excavated area in the forebay would temporarily disrupt invertebrate prey production. However, invertebrates are expected to rapidly recolonize the affected area following disturbance of streambeds. At pipeline crossings of freshwater streams, full recovery of benthic invertebrate communities usually requires 6 months to a year (Tsui and McCart 1981; Young and Mackie 1991; Vinikour and Schubert 1987).

In summary, the relatively small amount of instream habitat affected by this project compared to habitat available in the Mill Creek drainage is not anticipated to diminish the function of this PCE on a watershed scale. Further, with the implementation of annual sluicing, the subsequent decrease in large-scale instream maintenance efforts should improve the function of this PCE in the forebay pool.

Freshwater Migration PCE Effects

The freshwater migration PCE would be affected by the proposed action during mechanical excavation as equipment would be present in the active channel and instream isolation would temporarily block upstream migration for the duration of instream work (i.e., 2 days during the summer instream window). However, although juveniles would be present, migratory habitat in the action area is not occupied by adult steelhead during the summer work window.

Annual sluicing would create a temporary high velocity, high turbidity flow current on the north bank that could impact migratory individuals if present immediately downstream of the dam during the spring sluicing events (lasting a few hours). At the same time, conditions related to passage at the fish ladder would improve under the proposed action. Improvements would take the form of decreased sediment accumulation at the upstream portion fish ladder exit due to mechanical removal of accumulated sediments, and due to annual sluicing of materials, which would reduce the amount of sediments upstream of the dam that could build up in front of the ladder.

The project would result in a temporary and minor decrease in water quality due to construction activities that may introduce fine sediments and potential chemical contaminants through leaks or spills of petroleum products from heavy equipment.

9.0 Effect Determinations

Based on field work conducted by project biologists, interviews with USFS, ODFW and CTUIR biologists familiar with the project action area, evaluation of the proposed debris removal design, instream work timing, review of pertinent literature, and analysis of effects presented in this BA, the following determinations (Table 6) are recommended for ESA-listed species that have potential to occur in the project action area.

9.1 Bull Trout

Species

The proposed action includes salvage operations to herd fish from the forebay debris removal area. Due to the likelihood that rearing juveniles and resident or fluvial subadults and adults could be present in the action area during the instream work period (both the initial 2013 debris removal and future maintenance actions), construction activities **may affect**, and are **likely to adversely affect (LAA)** listed bull trout. Further, annual spring sluicing of sediments through the sluice gates during high flow periods would produce pulses of sediment that may harass bull trout during the sluicing event. The LAA determination is based on the following information:

1. Removal and salvage operations associated with reservoir lowering and in-water work in general may harass or "take" bull trout if present.
2. Annual sluicing would introduce pulses of sediment downstream of the dam when the sluice gates are raised during high flow events in the spring.
3. Displacement from the action area and salvage activities associated with herding or removal of fish from the excavation footprint in the forebay of the dam would harass bull trout, if present, and cause delays to upstream migration.

Although the recommended effect determination is LAA, the following biological information specific to Mill Creek and/or implementation of minimization measures would minimize the potential for adverse effect:

1. Possible harassment or displacement of individual bull trout from increased turbidity as well as equipment and personnel working in or near the creek would be temporary and short-term in nature.
2. Fish salvage operations would be conducted in coordination with ODFW and the CTUIR. The CTUIR has volunteered a couple of times in the past (Mahoney, pers comm., 2012) to assist with herding and removal of fish from the excavation area. CTUIR biologists are highly experienced with salvage operations in the Walla Walla River basin and have conducted numerous salvage operations involving debris removal actions.
3. Long-term beneficial effects would be realized through removal of debris from the upstream fish ladder exit, and the creation of a larger holding pool in the reservoir.

Critical Habitat

The determination for designated bull trout critical habitat is **LAA**. The LAA determination is based on the following information:

1. Construction activities would create a temporary physical migratory barrier, adversely affecting PCE 2.
2. A potential fuel spill from construction equipment would also increase the contaminant level of the system, thus reducing the quality of PCEs 3, 4 and 8 in the project action area.
3. Mechanical removal of accumulated sediment would remove some benthic prey items from the excavated area. The expected short-term increase in sediment downstream of the sluice gates could also adversely affect aquatic macro invertebrates and other forage fish species in the project area, thus temporarily reducing the functionality of PCE 3.
4. Sedimentation could affect the suitability of spawning gravels downstream of the dam (PCE 6, 8).

Adverse effects would be minimized because:

1. Long-term effects to other PCE components such as water quality, quantity, temperature, food, cover and space should not occur as a result of project actions.
2. In-water work associated with instream mechanical debris removal would occur over a maximum of 2 days during the ODFW-recommended instream work window for Mill Creek in Oregon, July 1 – August 15.
3. Disturbance to streambank vegetation due to equipment access would be limited to limbing of shrubs.

9.2 Steelhead

Species

Juvenile steelhead may be present in the action area during instream work, including mechanical debris removal, sluicing, and fish salvage to herd individuals from the forebay debris removal area. Juveniles and adults could also be present downstream of the dam when annual sluicing during spring high flows would occur. For these reasons, the proposed actions **may affect**, and **are likely to adversely affect (LAA)** MCR steelhead. The LAA determination is based on the following information:

1 Removal and salvage operations associated with reservoir lowering and in-water work in general may harass or “take” steelhead if present.
2. Annual sluicing in the spring would introduce pulses of sediment downstream of the dam when the gates are opened during high flow events. Depending on the timing of spring sluicing relative to redd development and location, this action could affect spawning activities, or smother redds if present within the turbidity plume along the north bank of the creek downstream of the dam.

Although the recommended effect determination is **LAA**, the following biological information specific to Mill Creek and/or implementation of mitigation measures would minimize the potential for adverse effects:

1. Mechanical debris removal would occur over 2 days during the in-water work window of July 1 – August 15, which should avoid any effect to spawning or incubating steelhead.
2. Any sediment produced by in-water debris removal activities related to this project should be redistributed and dissipated downstream so that spawning habitat in the action area is not adversely affected by accumulated sediment during the next spawning season.
3. Possible displacement of individuals that may be present in the project area due to presence of equipment and personnel working in or near the river is temporary and short term in nature. Waters (1995) states that in-river construction activities such as cofferdam placement may cause fish to move away from the immediate construction area; however, fish populations are likely to re-colonize the site quickly following disturbances. Potential displacement of fish is considered discountable on a watershed scale and would not result in measurable impact to individuals as ample suitable habitat is available adjacent to instream construction locations.
4. Fish salvage operations would be conducted in coordination with ODFW and the CTUIR. The CTUIR has volunteered a couple of times in the past (Mahoney, pers comm., 2012) to assist with herding and removal of fish from the excavation area. CTUIR biologists are highly experienced with salvage operations in the Walla Walla River basin and have conducted numerous salvage operations involving debris removal actions.

Critical Habitat

The determination for designated MCR steelhead critical habitat is **LAA**. The LAA determination is based on the following information:

1. In-water construction would temporarily degrade designated critical habitat due to a decrease in water quality, primarily associated with turbidity due to sluicing for reservoir draw down prior to mechanical excavation, and on-going annual sluicing in the spring.

Adverse effects would be minimized because:

1. Long-term effects to other PCE components such as water quality, quantity, temperature, food, cover and space should not occur as a result of project actions.
2. In-water work would occur over 2-5 days during the ODFW-recommended instream work window for Mill Creek in Oregon, July 1 – August 15.
3. Disturbance to streambank vegetation due to equipment access would be limited to limbing of shrubs.
4. The proposed action would improve sediment transport and reduce accumulated sediments at the upstream fish ladder exit.

Table 6. Recommended Effect Determination Summary for ESA-Listed Species and Designated Critical Habitat in the Action Area.

	Recommended Effect Determination	
Listed Species	**Species**	**Critical Habitat**
Columbia River DPS Bull Trout	LAA	LAA
Middle Columbia River Steelhead	LAA	LAA

10.0 EFH Determinations and Rationale

The fish species of concern under the MSA that could be affected by this project includes only Chinook salmon, since coho are considered extinct from the basin. EFH for the Pacific coast salmon fishery is defined as those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem. Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California. Exceptions are made for those areas upstream of certain impassable manmade barriers and longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for several hundred years). Wild Spring Chinook and coho salmon have been extinct in the Walla Walla River basin for over 50 years. However, stray fish do occur, and there have been recent efforts to restore spring Chinook to the Walla Walla River Basin, as described below.

Spring Chinook salmon historically inhabited the Walla Walla River and Mill Creek, but water diversions and withdrawals made the lower river impassible nearly a century ago. The last significant Chinook run occurred in 1925. After that, the species was considered extirpated in the watershed. However, in recent years the CTUIR reintroduced spring Chinook into the Walla Walla Basin, including Mill Creek. Increasing numbers of spring Chinook have been observed in recent years, with several caught in the WDFW trap in Yellowhawk Creek (an alternate route to upper Mill Creek) and counted over the Mill Creek Diversion Dam into the upper watershed (Tice, pers. comm, 2010, as cited in Dugger 2010). Spring Chinook spawn in upper Mill Creek between Stateline and the CWWID, mostly the result of adult outplants (Mahoney et al. 2012). The highest concentration of redds has been found from Kooskooskie to the CWWID with 3.15 redds per rkm (Mahoney et. al. 2009). The progeny of any naturally-spawning spring Chinook that spawn in the Mill Creek basin would be included in the MCR Chinook ESU, which is not ESA-listed.

The timing of spring Chinook in the Walla Walla River Basin is likely similar to that in Mill Creek (Table 7). Mahoney et al. (2012) report that spawning begins in mid to late-August and peaks in early September, ending by the first of October. With regard to the project action area, most spawning occurs below the dam beginning in mid to late-August, and that the CWWID is the upstream limit of spring Chinook spawning (Mahoney, pers comm., 2012). Based on spawn timing in Mill Creek, it is unlikely that spring Chinook redds would be present in the action area during the instream work window. Pre-spawn adults could be present, though Mahoney (pers comm., 2012) reports that most spawning occurs well downstream of the dam (nearer Kooskooskie), and it is unlikely that mobile adults would be adversely affected by increased turbidity due to sluicing during the instream work window.

Table 7. Typical timing of Spring Chinook in Walla Walla River Basin.

Life Stage	Month[1]											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adult spawning migration												
Pre-spawn holding												
Spawning												
Incubation/emergence												
Rearing												
Smolt outmigration												

Source: Mahoney et al. 2012
[1] Lighter shades indicate potential, lesser periods of occurrence

EFH for Pacific Salmon (Chinook) is present in the action area of the project. The proposed action would result in a temporary affect on water quality over a short in-water work period. Effects to EFH would be similar to those effects to steelhead critical habitat described above. Although no permanent adverse effects to Chinook salmon EFH are anticipated to occur, temporary degradation of water quality would occur due to increased sedimentation associated with instream mechanical debris removal and annual spring sluicing. This water quality degradation ***may adversely affect*** EFH for Pacific Salmon. This determination is based upon the following information:

1. Instream construction would temporarily degrade portions of EFH that are suitable for spawning, rearing and migration of Chinook. Increased sedimentation due to mechanical debris removal and sluicing would particularly affect potentially usable spawning substrate, as defined under EFH.
    a. The area downstream of the dam is a significant spring Chinook spawning area (Mahoney et. al. 2009).
    b. Spawning could potentially occur during the extreme latter portions of the instream work window, as spring Chinook spawning typically begins in mid-August in Mill Creek. As such, if early spawners are present downstream of the dam, and if mechanical debris removal and sluicing were conducted near the end of the instream work window, the proposed action could potentially result in deposition of sediments atop occupied redds. However, because spawning does not typically occur until mid-August, after the closure of the window, this effect is minimized.
    c. Annual sluicing during spring high flows would likely occur after juveniles have emerged from redds (by March); however, depending on instream temperatures, some redds may still be present downstream of the dam during the suitable spring freshets.
2. The proposed mechanical excavation and sediment sluicing would decrease the amount of sediment upstream of the dam and improve flow and passage through the upstream fish ladder exit. This would benefit migratory life stages.
3. Short-term, annual sluicing would result in increased turbidity downstream of the dam; however, long-term effects to other habitat features such as water quality, quantity, temperature, food, cover and space would not occur as a result of project actions.

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APPENDIX A: PROJECT PHOTOGRAPHS (NOVEMBER 2012)

Photo 1. CWWID looking upstream from north bank to dam crest. November 2012 – flow is about 150cfs, over 100cfs greater than flows anticipated during summer debris removal activity.

Photo 5. View of intake building on north bank. Bypass would convey flow through opening at base of concrete guide wall, and through sluice gates on face of dam, as shown by arrow.

Photo 6. Panoramic view of proposed instream work area; photo taken from north bank and is slightly distorted.


August, 2022   CTUIR hires contractor to upgrade exit and entrance of fish ladder

APPENDIX B: USFWS SPECIES LIST – UMATILLA COUNTY, OREGON

FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES
AND SPECIES OF CONCERN
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE
WHICH MAY OCCUR WITHIN UMATILLA COUNTY, OREGON

LISTED SPECIES

Fish
Inland:

Bull trout	*Salvelinus confluentus*	CH T

PROPOSED SPECIES

None

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

CANDIDATE SPECIES

Mammals
Terrestrial:

Washington ground squirrel	*Urocitellus washingtoni*
North American wolverine	*Gulo gulo luscus*

SPECIES OF CONCERN

Mammals

Pallid bat	*Antrozous pallidus pacificus*
Townsend's western big-eared bat	*Corynorhinus townsendii townsendii*
Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis bat	*Myotis ciliolabrum*
Long-eared myotis bat	*Myotis evotis*
Long-legged myotis bat	*Myotis volans*
Yuma myotis bat	*Myotis yumanensis*
Preble's shrew	*Sorex preblei*

Birds

Northern goshawk	*Accipiter gentilis*
Tricolored blackbird	*Agelaius tricolor*
Western burrowing owl	*Athene cunicularia hypugaea*
Upland sandpiper	*Bartramia longicauda*
Ferruginous hawk	*Buteo regalis*
Olive-sided flycatcher	*Contopus cooperi*
Willow flycatcher	*Empidonax traillii adastus*
Yellow-breasted chat	*Icteria virens*
Lewis' woodpecker	*Melanerpes lewis*
Mountain quail	*Oreortyx pictus*
White-headed woodpecker	*PIcoides albolarvatus*

Reptiles and Amphibians

Northern sagebrush lizard	*Sceloporus graciosus graciosus*

Last Updated October 16, 2012 (4:39:02 PM)
U.S. Fish and Wildlife Service, Oregon Fish and Wildlife Office
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APPENDIX C: BULL TROUT USFWS MATRIX OF PATHWAYS AND INDICATORS

Table C-1. Matrix of Diagnostics/Pathways and Indicators for Bull Trout for Mill Creek in the Action Area.

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Criteria	Present condition	Functionality (F/FR/ FU)*	Restore	Maintain	Degrade
Subpop. Characteristics: Subpopulation Size	Draft recovery plan (USFWS 2004) includes criteria to achieve and maintain bull trout numbers within the range of 1,500 to 3,000 spawning adults in the Walla Walla River Core Area; 480 spawning adults in Mill Creek.	Approaching abundance thresholds (USFWS 2011)	F		X	
Growth and Survival	F = Adult/young ratio >.1 & <.1 extent habitat 70,000 square m; FR= adult/young ratio <.1or habitat <70,000 sq m; FU = adult/young ratio <.1 and habitat <70,000 sq m, and subpopulation is at very low numbers	Recovery Plan (USFWS 2004) stated Mill Creek pops stable, though declining trend; Howell (2009) indicates declining trend in Mill Creek	F			
Persistence and Genetic Integrity	Strong populations: >5; Connectivity to WW populations may be limited due to downstream conditions (irrigation diversions, high instream temperatures) that may pose migration barriers.		F		X	
Life History Diversity and Isolation	F=Migratory form is present and subpopulation is close and connected to other spawning/rearing groups; FR=Migratory for is present, but not well connected to other spawning/ or rearing groups; FU=Migratory form is absent	present, but not well connected to other spawning groups	FR		X	
Water Quality: Temperature (7 day average)	• Incubation 36-41°F[1]; Rearing 39-54°F • Spawning 39-48°F; Migration < 59°F 7 day average max (F<12 ºC, FR 12-15ºC, FU >15ºC)	See information below	F		X	
Sediment	F = % fines <20% surface fines ≤6mm or natural conditions; FR = < natural to 75% of natural conditions; FU = <75% natural cond.[1]	See information below	FR - forebay	X – long term improvement thru clean out		X – temporary degradation during excavation
Chemical Contamination/Nutrients	Low levels of chemicals; no CWA 303d reaches F = Low levels; FR = moderate levels; FU = High levels	See information below	F		X	
Habitat Access: Physical Barriers	Human made barriers do not restrict passage	See information below	FR	X – long term improvement thru clean out		X – 2-day upstream migration restriction during excavation

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Criteria	Present condition	Functionality (F/FR/ FU)*	Restore	Maintain	Degrade
Habitat Elements: Substrate Embeddedness	Embeddedness <20%; mostly gravel and cobble	See information below	FR – forebay F - downstream		X	
Large Woody Debris	>20 pieces/mi >35ft long >12" diameter F = LWD frequency at or exceeds observed natural (or attainable) conditions; FR = <natural but ≥75% natural conditions; FU= ≤75% of natural conditions	See information below	F		X	
Pool Frequency	F = pool frequency 60 pools/mi, good cover, cool water; or at natural conditions. FR < natural but >75%; FU <75% natural conditions	See information below	F		X	
Pool Quality	>1m deep with good cover	See information below	F		X	
Large Pools	Each reach has many large pools (>1m deep)	See information below	F		X	
Off-channel Habitat	F= Many backwaters, side channels, low energy areas; FR=some backwaters, etc., FU= few or no backwaters	See information below	F		X	
Refugia	F= Population strong and well established. FR= Population strength and distribution weak and connected to refugia, FU=neither the pop strength and distribution is strong nor is refugia available	See information below; connectivity is questionable	FR		X	
Channel Conditions and Dynamics: Avg. Wetted Width/Max. Depth Ratio	F=w/d ratio > natural condition; FR= Channel w/d ratio < to 75% of nat. cond.; FU >75% of nat cond.	See information below	F		X	
Streambank Condition	F=Streambank meets or exceeds natural condition, FR Streambank < nat. cond >75% nat cond.; FU streambank <75% nat. cond.	See information below	F		X	
Floodplain Connectivity	F=Off channel areas are frequently linked to main channel hydrology, FR=Off channel habitats infrequently linked to main channel; FU= Off Channel habitat not linked.	See information below	F		X	
Flow/Hydrology: Change in Peak/Base Flows	F=Comparable to an undisturbed watershed; FR= Some evidence of altered peak flow/base flow and/or flow timing; FU=Pronounced changes in peak flow	See information below	F		X	
Increase in Drainage Network	F=Minimal increases in active channel length correlated with human disturbance; FR= Low to moderate increase in active channel length correlated with human disturbance; FU Greater than moderate increase in active channel length.	See information below -1.3% increase (BPA 2000)	F		X	
Watershed Conditions: Road Density & Location	F < 1 mi/square mile, no valley bottom roads; FR =1 -2.4 miles/square mile few valley bottom roads, FU >2.4 miles/square mile	See information below	F		X	
Disturbance History	F= <15% ECA of entire watershed with no concentration of disturbance in unstable or potentially unstable areas, refugia, and/or riparian area; FR=<15% ECA of entire watershed but disturbance concentrated in unstable areas, refugia, or riparian area, FU= >15% ECA of entire watershed and disturbance concentrated in refugia	See information below – ECA 1.3% (BPA 2000); events are minor and localized	F		X	

DIAGNOSTICS/ PATHWAYS INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
	Criteria	Present condition	Functionality (F/FR/ FU)*	Restore	Maintain	Degrade
	and/or riparian area ECA <15%, areas of disturbance noted in refugia and riparian area.					
Riparian Reserve	F=Provides adequate shade, LWD recruitment, habitat protection and connectivity in subwatersheds, refugia >80% intact, adequately buffer impacts on rangelands; FR=Moderate loss of connectivity, incomplete protection of habitats, refugia 70-80% intact and adequately buffer impacts on rangelands; FU= RCA are fragmented, poorly connected, and provide inadequate protection of habitat for sensitive aquatic animals, (<70% intact, refugia does not occur, percent similarity to potential natural community/composition is <25%)	See information below	F		X	
Integration of Species and Habitat Conditions	F=Habitat quality and connectivity among subpopulations are high. Migratory form is present. FR=Fine sediments, stream temperatures, or availability of suitable habitats have been altered, recovery to predisturbance conditions > 5 years. Connectivity occurs but habitats are more fragmented. FU= Cumulative disruption of habitat has resulted in a clear declining trend in subpopulation size. Little or no connectivity remains among subpopulations.	See information below	F		X	

* F = Functioning appropriately, FR = Functioning at risk, FU = Functioning at unacceptable risk

Bull trout exhibit both resident and migratory life-history strategies (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in the streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear one to four years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989; Goetz 1989), or in certain coastal areas, to saltwater (anadromous) (Cavender 1978). Bull trout normally reach sexual maturity in 4 to 7 years and may live longer than 12 years. Spawning typically occurs from August to November during periods of decreasing water temperatures. Water temperatures during spawning generally range from 4º to 10 ºC (39 to 51 ºF). Migratory bull trout frequently begin spawning migrations as early as April and have been known to move upstream as far as 250 kilometers (155 miles) to spawning grounds in Montana (Fraley and Shepard 1989; Swanberg 1997). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989; Pratt 1992; Rieman and McIntyre 1996). Repeat and alternate-year spawning has been reported, although repeat-spawning frequency and post-spawning mortality are not well documented (Fraley and Shepard 1989; Pratt 1992; Rieman and McIntyre 1996). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992). The total time from egg deposition to emergence of fry may surpass 200 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992).

Bull trout have more specific habitat requirements than most other salmonids (Rieman and McIntyre 1993). Watson and Hillman (1997) concluded that watersheds must have specific physical characteristics to provide the habitat requirements necessary for bull trout to successfully spawn and rear and that these specific characteristics are not necessarily present throughout these watersheds. Thus bull trout often exhibit a patchy distribution, even in pristine habitats. Spawning areas are often associated with coldwater springs, groundwater infiltration, and the coldest streams in a given watershed (Pratt 1992; Rieman and McIntyre 1993).

WATERSHED CONDITION INDICATORS (WCI'S)

Water Quality

Present Conditions

Temperature

Although not listed as a pollutant on the 303(d) list of impaired waters, Mill Creek from RM 22.9-26 is temperature limited (Category 4a) during the summer for bull trout (temperatures exceed 10°C). Still, instream temperatures in the action area remain cold year-round and are suitable for juvenile rearing. The City of Walla Walla records instream temperatures at the CWWID on an hourly basis. From 2008-2012, average monthly temperatures at the dam in July were 9.5°C (49.1°F) and 9.7°C (49.5°F) in August. Temperatures often vary over the course of a day by up to 4°C (7°F), from 7.6°C to 11.6°C (45.7°F to 52.9°F) (Krebs, pers comm., 2012), and therefore exceed adult migration thresholds during portions of the day.

Sediment

The action area in the upper Mill Creek basin exhibits acceptable levels of fines downstream of the diversion dam; however, sediment transport is altered due to the presence of the dam. In the forebay, accumulated sediments contain significant amounts of fine materials layered atop gravels and cobbles. Therefore, this indicator is not properly functioning in the action area.

Chemical Contamination and Nutrients

Although discharges of heavily chlorinated water into Mill Creek were documented between 1999 and 2001, the immediate action area does not contain excessive contamination or nutrient levels. This indicator is properly functioning.

Anticipated Effects to Water Quality

Instream temperatures would be maintained. Minimal vegetation removal is planned along the riparian corridor to accommodate access for the excavator, conveyor and haul trucks. Rock slope protection is present immediately downstream and upstream of the dam along the north (right) bank, and, as such, this area does not contribute significantly to instream shading. No mature trees would be removed associated with this activity (or maintenance actions) and no effects to instream temperatures would occur on a watershed scale.

Mechanical removal of debris (including sediments and wood), and annual spring sluicing would result in temporary increases in turbidity and sedimentation. The proposed project would cause short-term impacts on water quality from increased sediment caused by lowering the forebay, which would mobilize fine sediment near the CWWID, and increase turbidity. Although increased turbidity would last over the two day instream work period, the vast majority of sedimentation would occur during the first 30-60 minutes following initial sluicing during reservoir lowering.

Lowering the forebay, and removing material from the front of the intake screen should result in the most sediment and turbidity released into Mill Creek. Once these two tasks are complete, only minor increases in turbidity are expected for short durations periodically during the remainder of the project. If individual bull trout remain and the City efforts to herd them out with seine nets prior to the project are unsuccessful, or if they miss a few bull trout, those individuals may be exposed to increased turbidity in the forebay, or in the area immediately downstream of the CWWID.

In a recent consultation for a similar forebay debris removal project in the lower portion of Mill Creek, the USFWS determined that turbidity plumes resulting from the project would result in elevated levels of sediment that are likely to have adverse effects to subadult bull trout in the forebay and at distances less than 180 meters (600 feet) downstream (Foltz et al. 2008, Newcombe and Jensen 1996, as cited in USFWS 2011) from the dam.

Habitat Access

Present Conditions

Physical Barriers

Within the action area, the CWWID is a barrier to fish under low flow conditions, though a fish ladder is present along the south bank at the site. However, although passable, the upstream exit of the fish ladder is partially blocked by debris and is therefore not properly functioning.

Anticipated Effects to Habitat Access

During the two-day instream work period, upstream passage would be unavailable due to the presence of a block net along the upstream bypass entrance. Fish could still enter the sluice gates from the downstream side; however, adults would be herded from the work area for the duration of instream work. During initial sluicing, flow through the gates may prohibit passage due to high velocities and turbidity. The removal of debris at the upstream exit of the fish ladder would improve passage conditions at the site.

Habitat Elements

Present Conditions

Substrate Embeddedness

Embeddedness downstream of the dam is properly functioning; however, high amounts of embeddedness occur in the forebay. The dam precludes movement of spawning gravels downstream. For this reason, the reaches of Mill Creek downstream of the dam may be gravel-limited.

Large Woody Debris

Large woody debris (LWD) is present in the action area, and the upper headwaters are likely fuel-loaded due to heavy stands of timber that may require thinning. LWD is lacking immediately downstream of the CWWID as the structure typically blocks transport of large logs, with the exception of transport during very high flow events that overtop the dam crest significantly.

Pool Frequency and Quality

Mill Creek has moderately complex habitat up to the CWWID (Walla Walla Watershed Planning Unit and Walla Walla Basin Watershed Council 2004). There are fair to good quality pools through this stretch of Mill Creek (USACE *in litt. 2004,* as cited in USFWS 2011*).*

Off-Channel Habitat

Due to channelization in the immediate vicinity of the dam, the availability of access to potential off-channel rearing habitat in the action area is lacking. No off-channel refugia are present in the action area. This indicator is functioning at risk.

Anticipated Effects to Habitat Elements

The proposed project should only result in a minor change in habitat elements in the action area. The Mill Creek forebay already exists and is managed as a large pool for the City's municipal water supply. The proposed action will make the pool larger and deeper, and therefore more accessible to holding bull trout. Limited riparian vegetation would be removed as a result of the proposed action; only limbing of trees and shrubs is proposed. Due to the lack of trees along the north (right) bank near the intake screens, mature tree removal would not be required. Potential LWD removal from the forebay debris jam would not affect LWD abundance on a watershed scale. Any LWD that is salvageable would be kept on site and available for use for local stream enhancement actions. Pools downstream of the project reach may temporarily experience sedimentation during initial sluicing associated with reservoir lowering. This effect would likely be diminished following the first post-excavation high flow event. No effects to off-channel habitat are anticipated to occur as a result of the proposed action.

Channel Conditions and Dynamics

Present Condition

<u>Width/Depth Ratio</u>

This indicator is properly functioning, though altered in the immediate vicinity of the CWWID.

<u>Streambank Condition</u>

In the vicinity of the CWWID, streambanks are stable. Banks have been armored along the north side using various sized cobbles and boulders, along with some riprap. The south bank is comprised primarily of a nearly vertical bedrock wall that is densely vegetated with vegetation along the channel.

<u>Floodplain Connectivity</u>

Many dikes and roads within the watershed restrict channel migration and limit floodplain connectivity. Off-channel habitat is not available in the vicinity of the CWWID due to the canyon-nature of the site.

Anticipated Effects to Channel Conditions and Dynamics

Width to Depth Ratios and Streambank Conditions would incur some minor effects at the project reach scale associated with forebay lowering and pool deepening of the reservoir. Sedimentation and post-operational sediment and bedload movement would improve following initial sedimentation associated with mechanical debris removal.

Flow/Hydrology

Present Condition

<u>Change in Peak/Base Flows</u>

The City of Walla Walla reports that, on average, they divert 20-23 cfs at the intake during the July/August instream work window (Krebs, pers comm., 2012). This amount is adjusted frequently to maintain mandated minimum instream flows to accommodate bull trout passage. There are few other hydrologic modifications in Mill Creek upstream of the City's diversion dam. Due to the withdrawal at the intake, this indicator is not properly functioning.

Increase in Drainage Network

Little data are available regarding whether drainage network density has increased with road development. However, BPA (2000) report that there has been a 1.3% increase in drainage network in the action area.

Anticipated Effects to Flow/Hydrology

Following construction, minor modifications to the flow and hydrologic regime would occur associated with annual operation of the sluice gates. However, no measurable hydraulic changes are anticipated with the exception of the few hours that the sluice gates would be opened, thereby increasing flow and potential scour immediately downstream of the dam. No increase or change in the amount of water diverted at the intake is proposed by this project.

Watershed Conditions

Present Condition

Road Density and Location

Road development in headwater reaches create a lot of damage, because the canyons where they are built are extremely narrow. Therefore, the roads are practically built on top of the streams, causing accelerated runoff and erosion during high water events. BPA (2000) reported road density in the action area of 0.5mi/mi^2. Mill Creek road parallels the creek and ends at the City's diversion dam. Upstream of the dam, roads are infrequent. This indicator is functioning properly.

Disturbance History

In the immediate action area, riparian and instream habitat is degraded due to the presence of the CWWID, associated infrastructure and access roads. Collectively, these features have resulted in a lack of off-channel areas and LWD in the vicinity of the dam. This indicator is not properly functioning in the action area, but, overall, disturbance history in the upper basin is low.

Riparian Reserves

Though the extent of the riparian zone has been reduced in the immediate vicinity of the dam due to the presence of related infrastructure and the north bank access road, species composition appears close to the natural condition outside of the immediate dam location. In general, this indicator is properly functioning in the action area.

Anticipated Effects to Watershed Conditions

No new roads would be constructed or obliterated due to this project. The river access area would be improved through limbing of vegetation, if necessary, to allow access to the excavator.

Disturbance History and Disturbance Regime would not be affected as a result of this action. Though no trees are anticipated to be removed associated with construction at the project site, minor losses of riparian shrubs (a few ninebark shrubs at most) would occur at the streambank access location on the north bank. Any negative effects to this indicator would be temporary in nature, persisting until disturbed vegetation recovers from limbing or crushing due to equipment driving over some vegetation. In the long-term, watershed conditions would be maintained.

APPENDIX D: NMFS MATRIX OF PATHWAYS AND INDICATORS

Table D-1. Matrix of diagnostics/pathways and indicators for steelhead/Chinook - Mill Creek (NMFS 1996a)

DIAGNOSTICS/ PATHWAYS	POPULATION AND ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION		
INDICATORS	Properly Functioning Criteria	Present condition**	Functionality (F/FR/FU)*	Restore	Maintain	Degrade
Water Quality: Temperature Avg Max Summer	40-57°F for spawning and incubation[1]	High summer temperatures. See bull trout data, above	FR		X	
Sediment	<12% fines	High sediment accumulation in forebay, see bull trout data above	FR	X – long-term improvement in the forebay		X – temporary degradation during sluicing and dredge
Chemical Contamination/Nutrients	Low	Relatively pristine upstream habitat	F		X	
Habitat Access: Physical Barriers	Human made barriers do not restrict passage	Existing fish ladder partially blocked by debris and sediments on upstream exit	FU	X		
Habitat Elements: Substrate Embeddedness % clean substrate	Embeddedness <20%; mostly gravel and cobble	Acceptable	F		X	
Large Woody Debris	>20 pieces/mi >35ft long >12" diameter	Lacking LWD	FR		X	
Pool Frequency	Channel width #pools/mi 5' = 184; 10' = 96 15' = 70; 20' = 56 25' = 47; 50' = 26 75' = 23	Pools not limiting	F		X	
Pool Quality	>1m deep with good cover	present	F		X	
Large Pools	Each reach has many large pools (>1m deep)	Forebay and downstream plunge pool	F		X	
Off-channel Habitat	Numerous ponds and backwaters with cover	Lacking in vicinity of CWWID	FR		X	
Refugia	Sufficient in size and number to maintain pop.	Lacking in vicinity of CWWID	FR		X	
Channel Conditions and Dynamics: Avg. Wetted Width/Max. Depth Ratio	<10	functioning	F		X	
Streambank Condition	>90% stable or >80% of reach has = 90%	stable	F		X	
Floodplain Connectivity	Frequent with overbank	Lacking due to steep, armored banks	FR		X	
Flow/Hydrology: Disturbance History/ Change in Peak/Base Flows	<15% ECA	Altered due to CWWID withdrawals	FR		X	
Increase in Drainage Network	Zero or minimum increase in drainage network	1.3%[1]; Few withdrawals other than CWWID	F		X	
Watershed Conditions: Road Density & Location	$<2mi/mi^2$; no valley bottom roads	Moderate road density	FR		X	
Riparian Reserves	Riparian corridor at least 80% intact; composed of 50% endemics	Lacking immediately up/down of dam, F in watershed	F		X	

* F = Functioning appropriately, FR = Functioning at risk, FU = Functioning at unacceptable risk

** See habitat baseline conditions and analysis of effects to bull trout indicators and effect to those indicators, above, for specific information on the present condition and anticipated effects to each indicator. Sources: [1]Rhodes, Sean. Biological Assessment, Mill Creek Fish Screen Project (Project #901100). Bonneville Power Administration. August 14, 2000.