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Dog River Pipeline Replacement

Environmental Assessment

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Barlow Ranger District
Mt. Hood National Forest
Hood River County, Oregon
T.1S., R.10E., S.34
T.2S.,R.10E., S2,3,4,9,10,11; Willamette Meridian

Vic Anderson and Paul Weigelt
at Dog River Pipeline Head Gate (8/19/1923)

for the greatest good

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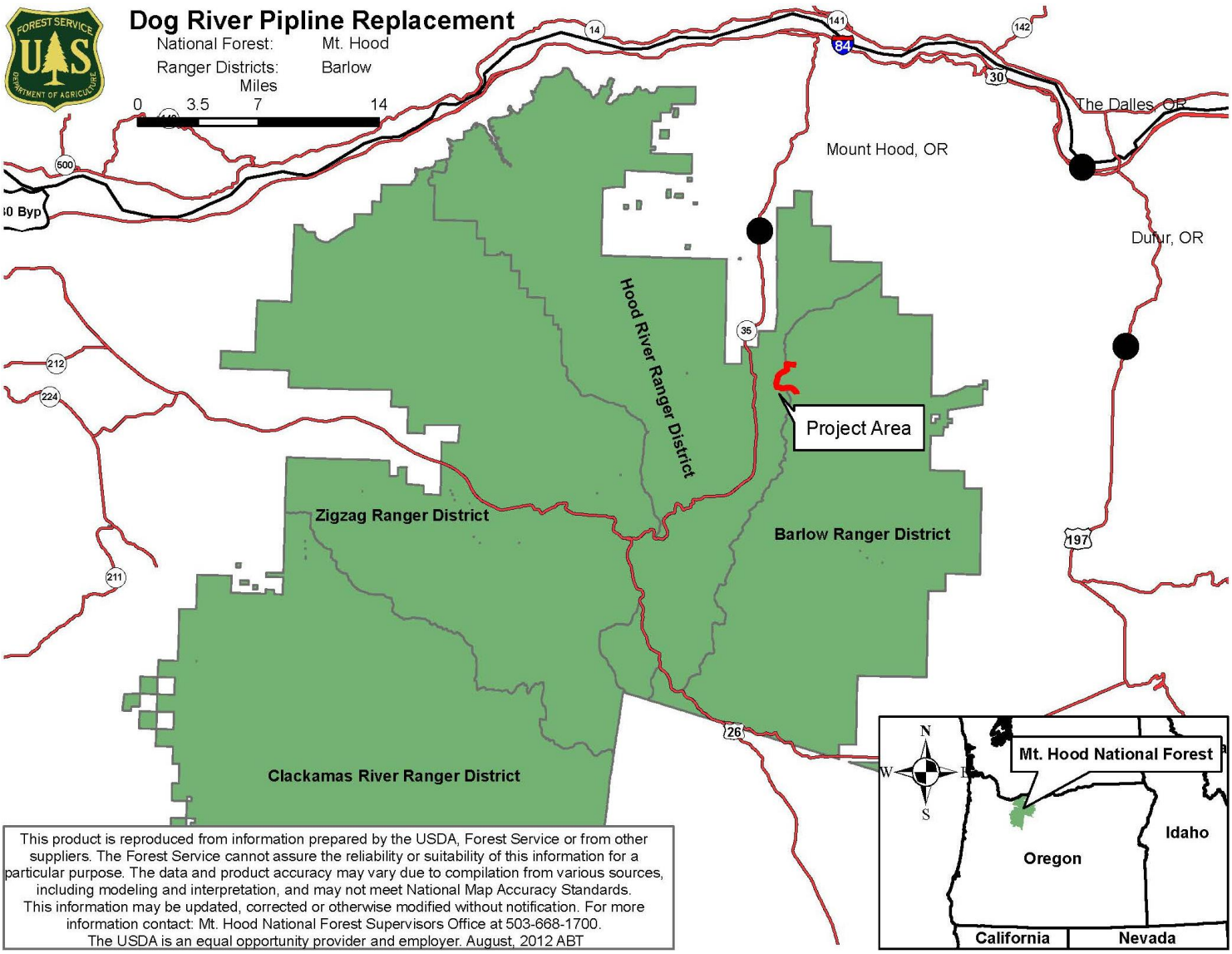
Figure 1. Vicinity Map of Dog River Pipeline Replacement Planning Area



Chapter 1 – Introduction

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations.

1.1 Document Structure

This Environmental Assessment discloses the direct, indirect, and cumulative environmental effects that would result from the No Action (baseline) and Proposed Action alternatives. The document is organized into four parts:

- Introduction: The section includes information on the background of the project and the purpose and need for action. This section also includes how the Forest Service informed the public and other interested parties of the proposal.
- Alternatives, including the Proposed Action: This section provides a description of the No Action and Proposed Action alternatives, project design criteria, and mitigation measures that were added as a result of environmental analysis.
- Environmental Consequences: This section describes the environmental effects of the No Action alternative as well as the trade-offs and effects of implementing the Proposed Action alternative. This analysis is organized by resource area. Within each section, the existing environment is described first, followed by the estimated effects of the alternatives.
- Consultation and Coordination: This section provides information on agencies consulted during the development of the Environmental Assessment.

Additional documentation, including more detailed analyses of planning area resources, may be found on the project's website (https://www.fs.usda.gov/project/?project=34721) and in the project record at the Barlow Ranger District office in Dufur, Oregon.

1.2 Background

The existing Dog River pipeline, which is an important component of The City of the Dalles' public drinking water supply, was constructed in the early 20th century. It consists of milled pieces of fir that were assembled in a circular shape and wrapped with heavy-gauge galvanized wire and coated with tar. Over the past 100 years, this pipe has deteriorated, is leaking, and is no longer conveying water efficiently. Because the pipe is in poor condition, the City of The Dalles has requested the pipeline be replaced with a 24-inch-diameter pipe.

The existing pipeline follows topographic contours along a circuitous route around Dog River Mountain to maintain gravity flow. Specifically, the pipeline travels north along the Dog River gauging station access road 4,000 linear feet to Forest Service Road (FSR) 44. It traverses to the west and then to the north along the base of Dog River Mountain, approximately 13,700 linear feet. The pipeline then travels 2,000 linear feet through a small hill by way of a 40-foot-deep hand-excavated notch. The pipeline crosses FSR 1700 and parallels the existing access road south of the Mill Creek gauging station, where it discharges into South Fork Mill Creek.

The legal description for the project area is: Township 1 South, Range 10 East, Section 34; and, Township 2 South, Range 10 East, Sections 2, 3, 4, 9, 10, 11; Willamette Meridian.

1.3 Purpose and Need for Action

The purpose of this project is to replace the existing Dog River pipeline. There is a need for action because the pipeline has become so deteriorated that it no longer provides the most efficient way of conveying water to the City of The Dalles municipal water supply to continue to fulfill the commitment under an existing Memorandum of Understanding (MOU).

1.4 Management Direction

This Environmental Assessment has been completed in accordance with direction contained in the National Forest Management Act, the National Environmental Policy Act, the Council on Environmental Quality regulations, Clean Water Act, the Endangered Species Act and all other applicable laws, policies and regulations. This Environmental Assessment is tiered to the Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) (USDA Forest Service 1990). In addition, management direction for the area is provided in the following Forest Plan amendments:

- The Northwest Forest Plan (NWFP) – Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA and USDI 1994);
- Survey and Manage – Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA Forest Service et al. 2001); and,
- Invasive Plants – Pacific Northwest Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision (USDA Forest Service 2005); and Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia Gorge Scenic Area in Oregon (USDA Forest Service 2008).

Mt. Hood National Forest Land and Resource Management Plan

There are three land use allocations (LUAs) as designated by the Forest Plan within the planning area: Scenic Viewshed (B2), Special Emphasis Watershed (B6), and Timber Emphasis (C1) (Figure 2).

B2-Scenic Viewshed (Forest Plan, pages 4-218 through 4-220): The goal for this LUA is to provide attractive, visually appealing forest scenery with a wide variety of natural appearing landscape features. The major characteristics are for the visual character of the landscape resulting from prescribed visual quality objectives within distance zones from selected viewer positions. For this project, Dufur Mill Road serves as the main viewer position.

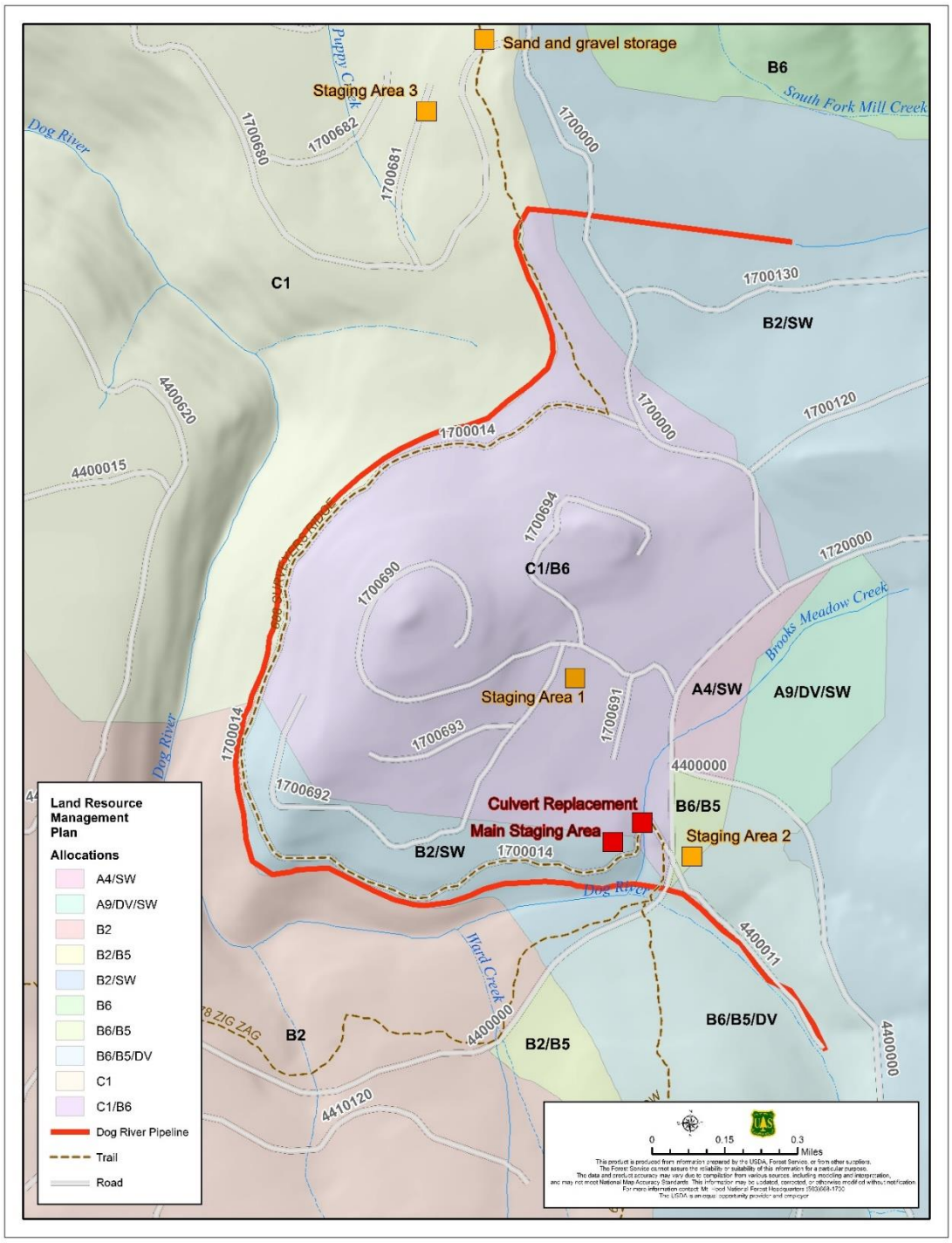
B6-Special Emphasis Watershed (Upper Dog River) (Forest Plan, pages 4-246 through 4-252): The Upper Dog River Special Emphasis Watershed was designated for the City of The Dalles Municipal Watershed. The goal of this area is maintain or improve watershed, riparian, and aquatic habitat conditions and water quality for municipal uses and/or long-term fish production. A secondary goal is to maintain a healthy forest condition through a variety of timber management practices.

C1-Timber Emphasis (Forest Plan, pages 4-289 through 4-290): This LUA includes approximately half of the planning area and the main pipe storage areas. The goal for this land is to provide lumber, wood fiber,

and other forest products on a fully regulated basis, based on the capability and suitability of the land. A secondary goal is to enhance other resource uses and values that are compatible with timber production.

Chapter 3 (Environmental Consequences) evaluates the Proposed Action's consistency with the Forest Plan Standards and Guidelines associated with these LUAs.

Figure 2. Forest Plan Land Use Allocations within Dog River Pipeline Replacement Planning Area



Northwest Forest Plan

There are three Northwest Forest Plan land use allocations included within the planning area, which are: Riparian Reserves, Late-Successional Reserves (LSR), and Matrix (Figure 3).

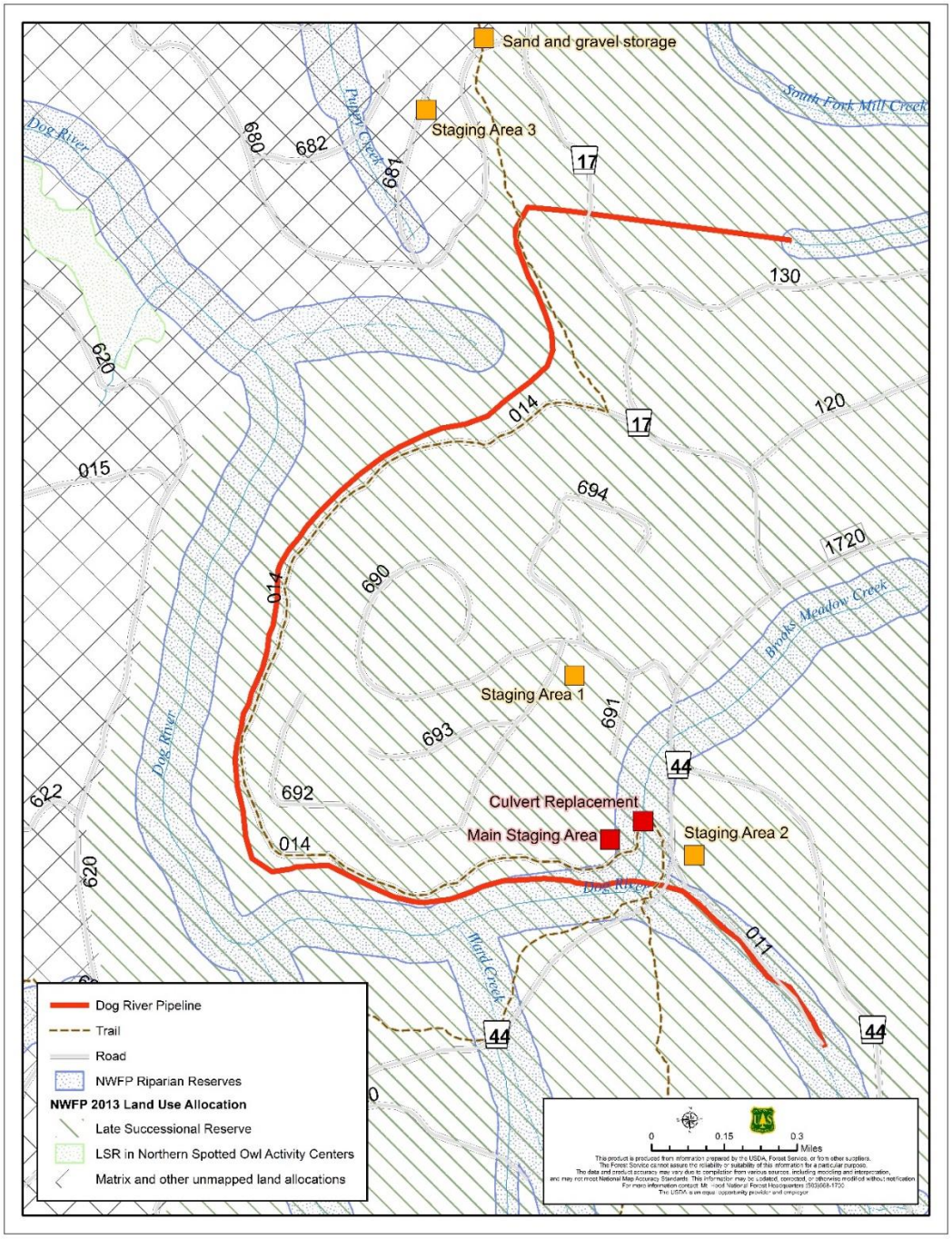
Riparian Reserves include areas along rivers, streams, wetlands, ponds, lakes, and unstable or potentially unstable areas where the conservation of aquatic and riparian-dependent terrestrial resources receives primary emphasis.

Late-Successional Reserves, in combination with other allocations and standards and guidelines, are to maintain a functional, interactive, late-successional forest ecosystem. The Surveyors Ridge LSR Assessment for this area includes The Dalles Municipal Watershed Pipeline Replacement Project as a detailed project proposal (USDA Forest Service 1997, p. 86).

Matrix areas consists of lands outside of designated areas (i.e., Congressionally Reserved Areas, LSRs, Adaptive Management Areas, Administratively Withdrawn Areas, and Riparian Reserves).

Chapter 3 (Environmental Consequences) evaluates the Proposed Action's consistency with the Northwest Forest Plan Standards and Guidelines associated with these land use allocations, including consistency with Aquatic Conservation Strategy (ACS) objectives.

Figure 3. Northwest Forest Plan Land Allocations within the Dog River Pipeline Replacement Area



1912 Cooperative Agreement & 1972 Memorandum of Understanding

Because much of the municipal water supply originates from National Forest System lands, a cooperative agreement was signed between the United States Department of Agriculture and the City of The Dalles in 1912 for the purpose of conserving and protecting it within a specified area that includes both Federal and non-federal ownership. The intent of the 1912 Agreement was formalized again in 1972 as per Forest Service Manual 2542 with a Memorandum of Understanding (MOU) between the City of The Dalles and the Mt. Hood National Forest to maintain and protect the quality and quantity of water originating from National Forest System lands for municipal use. It included management direction and a ten-year management plan for both Federal and City-owned lands.

The intent of the 1972 MOU was carried forth into the Forest Plan according to Forest Service direction (Forest Service Manual 2542, 2007), and National Forest System lands were designated further as a Special Emphasis Watershed, with specific management standards and guidelines.

1.5 Public Involvement

A scoping letter was shared with the public in 2012. One commenter responded. A second scoping letter was sent to the public in March 2016. Dog River was listed in the Mt. Hood National Forest quarterly planning newsletter (Schedule of Proposed Action [SOPA]) as an ongoing project in spring 2016. Five commenters responded during the second public scoping period. Scoping comments and responses are included in the project record.

In August 2016, a field trip to the project area included Forest Service staff and representatives from the NOAA National Marine Fisheries Service (NMFS), City of The Dalles, and the Confederated Tribes of Warm Springs. The intent of this field trip was to discuss issues and understand the City's operation of the pipeline and diversion.

A Preliminary Environmental Assessment was published on November 10, 2018 and a 30-day comment period concluded on December 10, 2018. Five commenters responded. Comments and responses are included in Appendix A. After the comment period ended, Forest Service staff met with the Confederated Tribes of Warm Springs (February 2019) and a representative from the City of the Dalles (March 2019). The purpose of these meetings was to discuss project concerns and next steps in anticipation of developing this Environmental Assessment.

1.6 Issues

Issues serve to highlight effects or unintended consequences that may occur from the Proposed Action, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the Responsible Official and public to understand. Issues are best identified during scoping early in the process to help set the scope of the actions, alternatives, and effects to consider; but, due to the iterative nature of the NEPA process, additional issues may come to light at any time. Issues are statements of cause and effect, linking environmental effects to actions, including the Proposed Action (Forest Service Handbook 1909.15, 12.4). Issues are used to generate additional action alternatives to the Proposed Action.

Several concerns and recommendations raised during the scoping and comment periods were addressed as either modifications to the Proposed Action, changes to the project design criteria, or as reason to conduct additional research and analysis. The following highlights some of the common concerns raised by

comments on the Preliminary Environmental Assessment, but all comments were considered and are responded to in Appendix A. While concerns were considered throughout the NEPA process, none were identified as issues for the purpose of formulating fully developed alternatives.

Since most of the comments received on the Preliminary Environmental Assessment pertained to hydrology and fisheries, the entirety of the Final Hydrology Report and Final Fisheries and Aquatic Fauna Biological Evaluation are included in this Environmental Assessment. In addition, the Biological Assessment submitted to National Marine Fisheries Service (NMFS) for this project can be found on the project website: https://www.fs.usda.gov/project/?project=34721.

Water Rights

Some comments expressed concern about water rights. Therefore, additional research and analysis was conducted to address water rights more fully, which is included in the hydrology section (Section 3.3) of this document.

City Plans for Future Water Use

Some comments expressed concern about the City's plans for future water use, within the context of current use and water rights. The hydrology section (Section 3.3) of this document provides more background, data, and analysis of the City's future plans.

Current Pipeline and Seepage

Some comments expressed concern about quantifying the amount of water lost to seepage under current conditions, and how that could be considered to inform the effects analysis of the Proposed Action. More information was added to Section 3.3 of this document to better address the expected effects of pipeline replacement, and the enhanced efficiency of water conveyance.

Fish and Fish Habitat

Some comments expressed concern about how the Proposed Action might affect threatened, endangered, and sensitive fish and other aquatic species, as well as native resident fish and other aquatic populations. The fisheries and aquatic fauna section (Section 3.4) of this document addresses projected effects to aquatic resources.

1.7 Differences between the Preliminary Environmental Assessment and the Environmental Assessment

The Proposed Action has been updated to show that the City of the Dalles will include 0.5 cubic feet per second (cfs) bypass flow below the point of diversion during August, September, and October, instead of only September and October as described in the Preliminary EA. Additional data were considered and further analyses were conducted for the hydrology and fisheries reports. Additional data included stream flow records from the City of The Dalles, USGS, USFS, and OWRD for Dog River, the South Fork of Mill Creek, and the Crow Creek reservoir. The Mt. Hood National Forest also collected data over the spring through summer of 2019. Effects were addressed more comprehensively, and refinements were made to Sections 3.3 and 3.4 of this Environmental Assessment to better describe effects. Also, consultation with the National Marine Fisheries Service (NMFS) was completed, which included all new and supplemental data. Lastly, project design criteria were refined to better protect cultural and natural resources.

Chapter 2 – Alternatives

This chapter is intended to describe the alternatives and how they were formulated for this project. This chapter provides readers and the Responsible Official with a description of the Proposed Action components, project design criteria/mitigation measures, monitoring requirements, and regulatory framework. Two alternatives were considered: the No Action Alternative and the Proposed Action Alternative. No other alternatives were considered for this project.

2.1 No Action Alternative

Under the No Action Alternative, current management plans would continue to guide management of the area. The existing pipeline would remain in place and would continue to degrade and leak. Additionally, the current diversion would remain in place, and no fish screens or diversion structures would be installed. This diversion would continue to serve as a barrier to aquatic and semi-aquatic fish passage.

In the long term, the pipeline would continue to degrade and would likely lose additional water as growing vegetation would continue to compromise the integrity of the wooden pipeline. At some point, the pipeline may suffer a catastrophic failure and no longer provide the City of The Dalles with this portion of their municipal water supply.

The No Action Alternative would not repair any crossings, and the unimproved ford crossing at Brooks Meadow Creek would remain in place. The current use pattern and crossing would not change, and the unimproved crossing would continue to serve as a potential barrier to aquatic and semi-aquatic organisms. Administrative use on this road system would not change. No action would mean that current minimal road maintenance would occur, and no road reconstruction would occur.

2.2 Proposed Action Alternative

The Proposed Action is the replacement of the existing pipeline with a new pipeline, allowing the City of The Dalles to utilize more efficiently the water being diverted from Dog River. The existing 3.4 mile antiquated pipeline would be abandoned in place. A seam-sealed 24-inch-diameter pipe would be constructed parallel and next to the existing alignment as much as possible. The existing pipeline would continue to be used to convey water to South Fork Mill Creek until the new pipeline is constructed.

In addition to pipeline replacement, the project would repair and improve the diversion structure and install fish screens and a fish passage structure. A new culvert would also be constructed under the service road (Forest Service Road (FSR) 1700-014) that crosses Brooks Meadow Creek to provide passage for aquatic organisms. Summer low flows in lower Dog River would be improved by adding 0.5 cubic feet per second (cfs) bypass flow below the point of diversion during August, September, and October. Implementation of the Proposed Action would include best management practices (BMPs) and project design criteria (PDCs), which are discussed in the following section, to minimize effects to natural and cultural resources.

Existing trees and dead wood would be cut and removed within a 25-foot corridor. Approximately 438 live trees ranging in size from six to 48 inches DBH would be removed. Of these 438 trees, approximately twelve trees are larger than 24 inches DBH, 170 trees are between 12 and 14 inches DBH, and the remaining trees are 11 inches DBH and smaller. In addition to the live trees, approximately 198 standing dead trees would be cut. Of these, over half are between 11 and 20 inches DBH, roughly three dead trees

are over 30 inches DBH, 22 dead trees are between 20 to 30 inches DBH, and the remainder of the dead standing trees are under 11 inches DBH.

A trench for the pipeline would be excavated and would be approximately 4-feet deep by 3 to 4-feet wide. Spoils would be stockpiled to either side of the trench to be used to re-bury and cover the trench after the pipe has been laid in the ground. Gravel and/or sand would be brought to the trench and staged within reach for use as bedding and backfill. The pipe would be placed on top of the bedding emplaced in the bottom of the trench. Then the trench and pipe would be backfilled and overlaid with more gravel and/or sand before being buried and covered using the removed spoils. The pipe inlet, discharge structure, and flow measuring facilities would also be replaced. The construction corridor would be accessed along the existing service road (FSR 1700-014) and would avoid operating over the old pipeline. Where the pipeline intersects Brooks Meadow Creek, it would be buried under the stream and the channel over it would be restored.

FSR 1700-014 would be used as the main access for the length of the pipeline. This road is currently a rough, native and gravel surface, single-lane road that crosses Brooks Meadow Creek at an unimproved ford. The project would first install a cement prefabricated open box culvert that would provide passage for aquatic organisms prior to pipeline construction, eliminating the need for a ford crossing. During the construction, the stream would be re-routed around the work area as the culvert is being installed using a temporary bypass line. During construction activities, FSR 1700-014 would be temporarily closed to the public.

There are several staging areas and a main staging area identified for use during the construction period (Figure 2). The main one-acre staging area would be located along the FSR 1700-014 west of the crossing at Brooks Meadow Creek, and would accommodate the transport of pipe to the construction corridor. It would also act as a temporary storage area for the trees and logs removed from the corridor. Minor realignment of FSR 1700-014 between Brooks Meadow Creek and the main staging area would be completed to allow for construction vehicle traffic. There are several other locations identified for storing pipe, gravel, and sand: 1) on either side of FSR 1700-691 where it intersects with FSR 1700-690; 2) along FSR 4400-011 at the junction with FSR 4400; or, 3) at an old landing off of FSR 1700. Gravel and sand may also be stored at the junction of FSRs 1700 and 700-680 roads (Figure 2). All of the staging areas would be rehabilitated upon completion of the project.

The new pipeline would continue to be maintained and operated as it conventionally has for many decades, conveying water diverted from upper Dog River to South Fork Mill Creek for municipal use by the City of The Dalles in accordance with existing state and federal authorizations. Pipeline operations would remain unchanged. In most years, the headworks at the pipeline inlet would be operated to increase diverted flow in the late fall and early winter to re-fill Crow Creek reservoir, typically by early or mid-February. Once full, the amount of diversion would be reduced to a maintenance flow that would supplement South Fork Mill Creek and contribute to storage in order to meet variations in seasonal demand.

2.3 Project Design Criteria and Mitigation Measures

The National Environmental Policy Act defines “mitigation” as avoiding, minimizing, rectifying, reducing, eliminating or compensating project impacts. The following project design criteria (PDC), best management practices (BMPs), and mitigation measures are an integral part of this project and would be carried out if the Proposed Action is implemented. BMPs are specified in *The National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide* (April 2012). The effects analysis in Chapter 3 is based on these PDC, BMPs, and

mitigation measures being implemented.

2.3.1 Aquatic Conservation Measures

2.3.1.1. Technical Skill and Planning Requirements

A. Any project element that will be designed or implemented by the City of The Dalles or their designee (contractor) must be reviewed by qualified Forest Service staff (e.g., fisheries biologist, hydrologist, engineer, silviculturist, fire/fuels specialist). A Forest Service fisheries biologist or hydrologist will be involved in the planning and design review of all instream elements of the project. For all contracted work, planning and design includes field evaluations and site-specific surveys, which may include reference-reach evaluations that describe the appropriate geomorphic context in which to implement the project.

B. A Forest Service Permit Administrator or their designee would monitor the implementation of the PDCs during construction and operations on a regular basis and will have the authority to provide direction and/or take action if construction or operations are not conducted according to the project design criteria.

2.3.1.2 In-water Work Period

A. Follow the appropriate state (ODFW 2008) or most recent guidelines for timing of in-water work (July 15-August 30). If in-water work needs to occur outside of this window, the Forest Service will request exceptions to the in-water work window with the Oregon Department of Fish and Wildlife, as well as through the Level 1 NMFS representative

2.3.1.3 Water Quantity

A. Maintain 0.5 cfs of bypass flow of water in-stream at the point of diversion between August 1 and October 31.

B. The City of The Dalles will monitor continuous streamflow in Dog River, both above and below their diversion structure. Instrumentation will be installed, operated, and maintained by the City. The streamflow data will also be collected, stored, and maintained by the City, and provided to the Forest Service upon request, such as at regular agreed-to dates.

2.3.1.4 Fish Passage

A. Fish passage will be provided for any adult or juvenile fish likely to be present in the action area during construction. Temporary stream isolation and dewatering at Brooks Meadow Creek will be necessary and will follow fish capture and release described below. After construction, adult and juvenile passage that meets ODFW's fish passage criteria will be provided for the life of the project.

2.3.1.5 Pollution and Erosion Control Measures

A. Identify a project contact (name, phone number, an address) that will be responsible for implementing pollution and erosion control measures.

B. List and describe any hazardous materials that would be used at the project site, including procedures for inventory, storage, handling, and monitoring; notification procedures; specific clean-up and disposal instructions for different products available on the site; proposed methods for disposal of spilled material; and employee training for spill containment.

C. Temporarily store any waste liquids generated at the staging areas under cover on an impervious surface, such as tarpaulins, until such time they can be properly transported to and treated at an approved facility for treatment of hazardous materials.

D. Procedures based on best management practices to confine, remove, and dispose of construction waste, including every type of debris, discharge water, concrete, cement, grout, washout facility, welding slag, petroleum product, or other hazardous materials generated, used, or stored on-site.

E. Procedures to contain and control a spill of any hazardous material generated, used or stored on-site, including notification of proper authorities. Ensure that materials for emergency erosion and hazardous materials control are onsite (e.g., silt fence, straw bales, oil-absorbing floating boom whenever surface water is present).

F. Best management practices to confine vegetation and soil disturbance to the minimum area, and minimum length of time, as necessary to complete the action, and otherwise prevent or minimize erosion associated with the action area.

G. No uncured concrete or form materials will be allowed to enter the active stream channel.

H. Steps will be taken to cease work under high flows, except for efforts to avoid or minimize resource damage.

I. Ensure pipeline is fabricated from materials meeting ODEQ standards for water quality.

J. Use suitable measures at the pipeline outlet to avoid or minimize erosion downstream of the structure when design flows are released.

2.3.1.6 Site Preparation

A. Flagging Sensitive Areas – Prior to construction, clearly mark critical riparian vegetation areas, wetlands, and other sensitive sites to minimize ground disturbance.

B. Staging Area – Establish staging areas for storage of vehicles, equipment, and fuels to minimize erosion into or contamination of streams and floodplains.

C. No Topographical Restrictions – Place staging area 150 feet or more from any natural water body or wetland in areas where topography does not restrict such a distance.

D. Topographical Restrictions – Place staging area away from any natural water body or wetland to the greatest extent possible in areas with high topographical restriction, such as constricted valley types.

E. Temporary Erosion Controls – Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls will be in place before any significant alteration of the action site and will be removed once the site has been stabilized following construction activities.

F. Stockpile Materials – Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Any large wood, topsoil, and native channel material

displaced by construction will be stockpiled in a previously disturbed site as feasible for use during site restoration. Materials used for implementation of aquatic restoration categories (e.g., large wood, boulders, fencing material) may be staged within the 100-year floodplain.

G. Hazard Trees within Riparian Areas – Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees when they pose a safety risk. If possible, fell hazard trees within riparian areas towards a stream. Keep felled trees on site when needed to meet coarse large wood objectives.

2.3.1.7 Heavy Equipment Use

A. Choice of Equipment – Heavy equipment will be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (e.g., minimally-sized, low pressure tires, minimal hard turn paths for tracked vehicles, temporary mats or plates within wet areas or sensitive soils).

B. Fueling and Cleaning and Inspection for Petroleum Products

1. All equipment used for instream work will be cleaned for petroleum accumulations, dirt, plant material (to prevent the spread of noxious weeds), and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (e.g., generators, canes, etc.), and gas-powered equipment with tanks larger than five gallons.
2. Store and fuel equipment in staging areas after daily use.
3. Inspect daily for fluid leaks before leaving the vehicle staging area for operation.
4. Thoroughly clean equipment before operation below ordinary high water or within 50 feet of any natural water body or areas that drain directly to streams or wetlands and as often as necessary during operation to remain grease free.

C. Temporary Access Points – Existing roadways will be used whenever possible. Minimize the number of temporary access points and travel paths to lessen soil disturbance and compaction and impacts to vegetation. When necessary, temporary access points will be decompacted and/or revegetated. Temporary points in wet or flooded areas will be restored by the end of the applicable in-water work period.

D. Streams, Riparian Areas and Wet Areas – Minimize disturbance in streams, riparian areas and wet areas. Minimize number and length of stream crossings. Such crossings will be at right angles and avoid potential spawning areas to the greatest extent possible. Stream crossings shall not increase the risk of channel re-routing at low and high water conditions. After project completion, temporary stream crossings will be abandoned and the stream channel and banks restored. Access, staging and stream crossing locations will be identified by a hydrologist or fisheries biologist prior to implementation

E. Work from Top of Stream Bank for Instream Work – To the extent feasible, heavy equipment will work from the top of the bank, unless work from another location (instream) would result in less habitat disturbance, less floodplain disturbance, less sediment in the stream channel, or less damage to the overall aquatic and riparian ecosystem.

F. Timely Completion – Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Complete earthwork (including drilling, excavation, dredging,

filling and compacting) as quickly as possible. During excavation, stockpile native streambed materials above the bankfull elevation, where it cannot reenter the stream, for later use.

2.3.1.8 Site Restoration

A. Initiate Rehabilitation – Upon project completion, rehabilitate all disturbed areas in a manner that results in similar or better than pre-work conditions through removal from the National Forest of project-related waste, spreading of non-vegetation stockpiled materials (soil, etc.) seeding, or planting with local native seed mixes or plants and restoration of stream channel bed and banks.

B. Short-term Stabilization – Measures may include the use of Forest Service approved materials, weed-free certified straw, jute matting, and other similar techniques. Short-term stabilization measures will be maintained until permanent erosion control measures are effective. Stabilization measures will be instigated within three days of construction completion.

C. Decompact Soils – Excess materials should be stockpiled at an approved site, or dispersed and decompacted by scarifying the soil surface of roads and paths, stream crossings, staging, and stockpile areas so that seeds and plantings can root. The Forest Service will review and approve the need to disperse or stockpile excess material.

D. Pipeline Stream Crossing – Restore stream channel to pre-construction conditions.

2.3.1.9 Monitoring

Monitoring will be conducted by Forest Service staff, during and after the project to track effects and compliance to ensure it is consistent with this Environmental Assessment.

A. Implementation

1. Visually monitor during project implementation to ensure effects are not greater (amount, extent) than anticipated.
2. Fix any problems that arise during project implementation.
3. Regular coordination with the fisheries biologist or hydrologist if fisheries biologist or hydrologist is not always on site to ensure contractor is following all stipulations.

B. Post Project – A post-project review shall be conducted after winter and spring high flows. Adaptively manage for substantial deficiencies identified during monitoring (e.g., adding large wood to the outlet channel of South Fork Mill Creek).

1. For each element of the project, conduct a walk through and visual observation to determine if there are post-project affects that were not considered during planning. For fish passage and revegetation activities, monitor in the following manner:
2. Fish Passage Activities – Note any problems with channel scour or bedload deposition, substrate, and discontinuous flow.
3. Dog River Pipeline Outlet downstream to Crow Creek Reservoir (South Fork Mill Creek) – Monitor for any problems associated with additional flow (e.g., channel scour).
4. Headcut Stabilization – Monitor headcut stabilization sites for effectiveness (e.g., scour or evidence of further headcutting).

2.3.1.10 Installation of Aquatic Organism Passage (AOP) and Pipeline Crossing at Brooks Meadow Creek

A. The culvert design and pipeline crossing at Brooks Meadow Creek shall be reviewed by an interdisciplinary design team consisting of an experienced engineer, fisheries biologist, and/or hydrologist/geomorphologist. If the culvert is wider than 20 feet or the cost exceeds $100,000, it shall be reviewed by the USDA-Forest Service, Region 6, Aquatic Organism Passage Design Assistance Team.

B. All road-stream crossing structures shall simulate stream channel conditions per Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings (USDA-Forest Service 2008a), located at: http://stream.fs.fed.us/fishxing/aop_pdfs.html. Within the considerations of stream simulation, the structure shall, at a minimum, accommodate a bankfull wide channel plus constructed banks to provide for passage of all life stages of native fish species (for more information, reference Chapter 6, page 35 of the USFS Stream Simulation Guide).

C. Headcut and Grade Stabilization – Headcuts often occur in meadow areas, typically on Rosgen "C" and "E" channel types. Headcuts develop and migrate during bankfull and larger floods, when the sinuous path of Rosgen E type streams may become unstable in erosive, alluvial sediments, causing avulsions, meander cut-offs, bank failure, and development of an entrenched Rosgen G gully channel (Rosgen 1994). These stabilization BMPs would apply during activities in the vicinity of the stream crossing replacement location and at the pipeline stream crossing location.

   1. Armor headcut with sufficiently sized and amounts of material to prevent continued up-stream migration of the headcut. Materials can include both rock and organic materials which are native to the area. Material shall not contain gabion baskets, sheet pile, concrete, articulated concrete block, and cable anchors.
   2. Focus stabilization efforts in the plunge pool, the headcut, as well as a short distance of stream above the headcut.
   3. Minimize lateral migration of channel around headcut ("flanking") by placing rocks and organic material at a lower elevation in the center of the channel cross section to direct flows to the middle of the channel.
   4. Short-term headcut stabilization (including emergency stabilization projects) may occur without associated fish passage measures. However, fish passage must be incorporated into the final headcut stabilization action and be completed during the first subsequent in-water work period.

D. Isolate the construction area and remove fish from the project site.

   1. Isolate Capture Area – Install block nets at up and downstream locations outside of the construction zone to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets or traps remain in place more than one day, monitor the nets or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and minimize fish predation in the trap.
   2. Capture and Release – Capture and release of resident trout will be conducted by Mt Hood National Forest and ODFW fish biologist.
   3. Electrofishing –Electrofishing will be conducted by Mt. Hood National Forest and ODFW fish biologists.

E. Dewater Construction Site – When dewatering is necessary, divert flow around the construction site with a coffer dam (built with non-erosive materials), taking care to not dewater downstream channels during dewatering. Pass flow downstream with a by-pass pipe large enough to handle the diverted flow. Small amounts of instream material can be moved to help seal and secure diversion structures. If pumps are used to dewater, the intake must have a fish screen(s) and be operated in accordance with ODFW fish screen criteria. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.

F. Stream Re-watering – Upon project completion, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden release of suspended sediment. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.

2.3.1.11 Head-gate Diversion Replacement/Relocation & Screen Installation/ Replacement

A. ODFW Fish Passage Review and Approve – The Forest Service will ensure that the action is individually reviewed and approved by ODFW for consistency with fish passage criteria. This applies across the action area.

B. Diversion structures associated with points of diversion and future fish screens must pass all life stages of aquatic species that historically used the affected aquatic habitat.

C. Water diversion intake and return points must be designed (to the greatest degree possible) to prevent all native fish life stages from swimming or being entrained into the diversion. Abandoned ditches and other similar structures will be plugged or backfilled, as appropriate, to prevent fish from swimming or being entrained into them.

D. When making improvements to pressurized diversions, install a totalizing flow meter capable of measuring rate and duty of water use. For non-pressurized systems, install a staff gage or other measuring device capable of measuring instantaneous rate of water flow.

E. Do not flush or otherwise move sediment from behind diversion structure downstream. Deposit and stabilize sediment removed from behind diversion structure in a suitable designated upland site.

2.3.2 Transportation/Engineering

2.3.2.1. Forest Service Road 4400:

A. After saw cutting pavement to replace new pipeline, rebuild sub-grade and sub-base in 6-inch lifts to match existing asphalt.

2.3.2.2 Forest Service Road 4400-011:

A. Clear road of obstacles and danger trees where needed to provide safe passage for planned vehicles.

B. Maintain the culverts, ditchlines, and roadbed to reduce sediment delivery into waterbodies. install water bars to help drain surface and reduce sediment flows.
C. If road is to be used during wet conditions, surface road with 3-inch minus aggregate or other road surfacing material to reduce sediment delivery into waterbodies.

2.3.2.3 Forest Service Road 1700:

A. At new pipeline crossing rebuild sub-grade with 6-inch lifts, roll or compact and reestablish surface course.

B. Clean existing 18-inch culvert at the pipeline crossing if needed.

C. At existing pipeline maintenance access route, FSR 4400-011, which starts at FSR 1700 and runs adjacent to the pipeline, maintain ditchlines and roadbed to reduce sediment delivery into waterbodies and install rolling dips to help drain surface water.

2.3.2.4 Forest Service Road 1700-690:

A. Blade road to drain and replace surface material when needed to reduce dust and sediment flows.

2.3.2.5 Forest Service Road 1700-014:

A. Place, roll and compact ¾-inch minus aggregate material 100 feet in each direction of road crossing at Brooks Meadow Creek to minimize the delivery of sediment erosion to the stream.

B. If the road is to be used in the wet season, surface portions of the road that have a native soil surface with 3-inch minus aggregate or other road surfacing material.

C. Clear road of obstacles and danger trees where needed to provide safe passage for planned vehicles.

D. Turnouts should be located approximately every 1000 feet.

E. Slope road to drain or install water bars to reduce sediment flows.

2.3.2.6 Staging Areas:

A. Place 6 inches minimum compacted (8”-10” loose) aggregate base at primary pipe storage areas. Turn around areas would be required to have compacted aggregate base.

2.3.2.7 Miscellaneous:

A. If the access routes are to be used in the winter by wheeled vehicles, a snow plow permit would be required by the Forest Service and approved and signed by the District Ranger. The City of the Dalles/Director of Public Works will notify the Forest Service of any winter operations proposed.

B. A Forest Service road use permit may be required for maintenance and repair of damaged Forest System Roads used for this project.

C. A Forest Service engineer will review final plans of all project activities prior to implementation.

2.3.3 Wildlife

A. If a northern spotted owl nest is found, there would be timing restrictions between March 1 and July 15 for all activities within 65 yards of the owl nest patch.

B. Leave 5% of the largest felled trees (live or dead) on the site with even distribution and species selected for habitat considerations. Trees should be limbed and the slash piled.

C. If a wolf den or rendezvous site is found in or near the project area, no activities associated with the proposed action will be allowed within one mile of the den or rendezvous site from April 1 through July 15.

2.3.4 Fuels

A. All activity-created slash will be piled outside of riparian areas.

B. Slash piles should have a sound base to prevent toppling over and should be wider than they are tall. Pile branches with their butt-ends toward the outside of the pile, and overlap them so as to form a series of dense layers piled upon each other. Use a mixture of sizes and fuels throughout the pile. There should be no long extensions protruding from the piles. Do not construct piles on stumps or on sections of large down logs.

C. Any mechanical slash piling would be done with equipment capable of picking up (grasping) slash material and piling (as opposed to pushing/dozing). Piles need to be 8-feet wide at base, 6-feet high as a minimum. An allowance for a small deviation from the stated dimensions would be made as long as this deviation does not jeopardize meeting any other stated goals. Any piling of slash will be kept separate from the chip material.

D. Hand piles would be constructed with enough fine fuels to allow for ignition during fall and winter months, and covered, to facilitate consumption of piled fuels. Piles need to be 8-feet wide at base, 6-feet high as a minimum. An allowance for a small deviation from the stated dimensions would be made as long as this deviation does not jeopardize meeting any other stated goals.

E. Piles should be as compact and free of dirt as possible.

F. Pile size and location should be such to minimize damage to residual trees. Piles should be located at least within the construction corridor. Piles should not be placed on or in the following areas: pavement, road surface, ditch lines, or within 100-feet of a stream course.

G. Piles would be burned within two years of contract termination.

H. All boles remaining on site would be limbed and material would be piled.

2.3.5 Recreation

A. The Surveyors Ridge Trail would be closed for as little time as possible understanding that closure due to safety concerns and the need for new construction is necessary. Pipeline

replacement construction timing across the Surveyors Ridge Trail would be coordinated with Forest Service recreation staff to reduce impacts during times of high usage.

B. The City of The Dalles would work with Forest Service recreation staff to develop public information materials and outreach plan using a combination of key entry/exit portals, visitor information boards and outreach via websites and other information sources.

C. The public would be notified of trail closures, detours, or alternative routes as early as possible utilizing signs at trail heads as well as media outlets such as newspapers and websites. Trail closures would be posted no later than two weeks before the closure would occur.

2.3.6 Visuals

A. In order to keep the pipeline corridor visually subordinate along FSR 44, as many trees as possible would be retained along the FSR 44 corridor to maintain a visual buffer between the road and the pipeline corridor.

B. Piles would be visually subordinate along the pipeline corridor adjacent to FSR 44. They would be burned within two years of contract termination.

C. Tree stumps would be maintained at heights of 6 inches or less within the foreground (up to ½ mile) and be angled away from the roadway to meet retention standards adjacent to FSR 44.

D. Tree paint and boundary flagging would not be marked facing the roadway along FSR 44.

2.3.7 Soils

A. All disturbed ground, including temporary storage and access points would use erosion control measures. A qualified specialist would monitor disturbed areas, as needed, to verify that erosion controls are implemented and functioning as designed and are suitably maintained. Due to the rating of Moderate Compaction Hazard, a minimum of 60% effective groundcover is required before the first overwintering period.

2.3.8 Invasive Plants

A. Incorporate the standard contract provision that require cleaning of equipment. In order to prevent the spread of invasive plants, all equipment would be cleaned of dirt and weeds before entering National Forest System lands. This practice would not apply to service vehicles traveling frequently in and out of the project area that would remain on the roadway.

B. The process for locating all landings or stockpile locations would be coordinated with a Forest Service noxious weed specialist to insure these locations are not within any currently established noxious weed populations. If necessary, pre-treat existing landings and skid trails that may be used for project implementation where existing infestations present an unacceptable risk of spreading established invasive plant populations.

C. Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and rock that is judged to be weed free by Forest Service noxious weed specialists.

2.3.9 Cultural

A. In accordance with 36 CFR 800 and Section 106 of the National Historic Preservation Act (1966), all known cultural and archaeological sites within the project planning area which are eligible or potentially eligible (unevaluated) for listing on the National Register of Historic Places (NRHP) will be protected throughout the life of the project so that there are no adverse impacts caused by project activities.

B. Archaeological site boundaries will be flagged for avoidance. A map will be provided to the project lead prior to implementation with buffered site boundaries labeled as "Sensitive Resource – Area to Protect." The project lead will consult with a Forest Service Archaeologist on locations of equipment staging and access routes and any modifications in project location or design before any activities proceed.

C. A qualified cultural resource specialist(s) working under the direct supervision of an archaeologist meeting the Secretary of the Interior's professional qualification standards will conduct on-site monitoring during project activities occurring in or adjacent to areas modeled as 'high probability' under the Mount Hood National Forest Cultural Resource Inventory Plan (Burtchard, Greg C. and Keeler, Robert W. *Mt. Hood Cultural Resource Reevaluation Project.* Laboratory of Archaeology and Anthropology, Portland State University, 1994).

D. If during project activities cultural material is encountered, all work will cease immediately and a Forest Service Archaeologist will be contacted to evaluate the inadvertent discovery. A mitigation plan, if needed, will be developed in consultation with the Oregon State Historic Preservation Office (SHPO) and Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO), Tribal Historic Preservation Office (THPO).

E. All on-site monitoring will be documented in the Forest Service Heritage database. Any additional sites discovered during monitoring, or significant changes to the boundary or character of previously documented sites will be recorded in the SHPO site record form and submitted to SHPO.

F. Under continuing consultation and approval of the Mt Hood National Forest Heritage Program, install interpretive signs describing the history of the Dog River aqueduct along the Surveyors Ridge and Cook's Meadow Trails.

G. Under continuing consultation with Oregon SHPO and the Mt. Hood Heritage Program, as a separate facilities maintenance undertaking, repair and stabilize the Dog River Headworks Log Cabin. This may include amendments to and repair of the foundation, excavating the hill slope away from the cabin, leveling the cabin, replacing deteriorating logs, and re-shingling the roof with cedar shakes. Or;

    1. Repair the cabin and place it on a new foundation set back from the access road to protect it from traffic damage.

2. Repair the cabin, transport it to The Dalles, and place it on a new foundation in a City park.
3. File a copy of this report and site forms with the Wasco County Museum and the Hood River County Museum on archival paper.

H. If during project activities cultural material is encountered, all work will cease immediately and the Zone Archaeologist will be contacted to evaluate the inadvertent discovery. A mitigation plan, if needed, will be developed in consultation with the Oregon State Historic Preservation Office (SHPO) and when appropriate, the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO), Tribal Historic Preservation Office (THPO).

Chapter 3 – Environmental Consequences

This chapter presents information on the physical, biological, social, and economic environments of the affected planning area, and the potential direct, indirect and cumulative effects to those environments due to the implementation of the alternatives. Each resource area discloses the direct, indirect and cumulative effects for that resource area.

The Environmental Assessment hereby incorporates by reference the project record (40 CFR 1502.21). The project record contains specialist reports, biological evaluations, and other technical documentation used to support the analysis and conclusions in this Environmental Assessment. Specialist reports, which are incorporated by reference, were completed for resources. Separate biological evaluations were completed for aquatic, terrestrial wildlife, and botanical species. Also, biological assessments were completed for fish and wildlife. Full versions of these reports are available in the project record.

Each of the analyses conducts cumulative effects analysis resulting from this project. The table below lists projects considered in the cumulative effects analyses.

Table 1. Projects that the IDT considered in analyses.

Past Activities
The Dalles Watershed Fuels Reduction, Phase I and II
Timber harvests on federal, county and private lands (including associated road/landing construction)
Road decommissioning and road closures
Aquatic restoration projects
Cooks Meadow Trail relocation
Ongoing Activities
The Dalles Watershed Fuels Reduction, Phase I and II
Polallie Cooper Fuels Reduction
Timber harvests on federal, county and private lands (including associated road/landing construction)
Road decommissioning and road closures
Dog River Pipeline and Crow Creek Reservoir ongoing operations
Pre-commercial thinning
Dog River Trail relocation
National Forest System road and trail maintenance
Site-specific noxious plant treatments
Surveyors Ridge Trail relocation
Surveyors Ridge Trail maintenance
Highway 35 road maintenance and sanding
Dufur Mill Road (4400) maintenance

Snowmobile use
Developed and dispersed campsites
Future Activities
Timber harvests on federal, county and private lands (including associated road/landing construction)
The Dalles Watershed Fuels reduction activities
Re-issuance of The Dalles Watershed special use permits

3.1 Vegetation Resources

3.1.1 Existing Condition

The proposed project area is dominated by three plant associations, Grand fir (A*bies grandis*)/vine maple (*Acer circinatum*)/vanilla leaf (*Achlys triphylla*) (A1), Grand fir/queencup beadlily (*Clintonia uniflora*) (A2), and grand fir/vanilla leaf (A3). Common to the moist mix conifer plant associations (A1, A2, and A3) the overstory would be dominated by Douglas-fir (*Pseudotsuga menziesii*), grand fir, and ponderosa pine (Pinus ponderosa) and the understory would be dominated by a variety of shrubs like Oregongrape (*Berberis nervosa*), serviceberry (*Amelanchier alnifolia*), vine maple, greenleaf manzanita (*Arctostaphylos patula*) (refer to Table 2). Currently ponderosa pine is only representing less than 20% of the overstory component and very little to no shrub component is present in the stands due to high stand densities. Site productivity within the project area range in site indices between 125 to 135 feet on moderate to highly productive sites. They are usually found on moderate slopes with an average elevation between 2,800 to 5,300 feet.

Table 2 Existing Acres by Plant Association within Proposed Project Area.

Stand Group	Plant Association	Approximate Acres within proposed project area
A1	Grand fir/vine maple/vanilla leaf	32
A2	Grand fir/queencup beadlily	9
A3	Grand fir/vanilla leaf	4
TOTALS		45

Currently, the project area contains a mix of stands of immature commercial plantations less than 80 years old, sapling age plantations less than 30 years old in moist mix conifer plant communities and recently unmanaged stands (RUS) over 80 years old in both moist and dry mix conifer plant communities. The majority of the plantations, sapling and commercial, are in the stem exclusion stage dominated by small to medium size material with a quadratic mean diameter (QMD) ranging from 3 to 12 inches and an average height of 60 feet in the commercial plantations and 35 in the sapling plantations. The recently unmanaged stands range in age from 90-200 years old and are dominated by stands in the reinitiation stage in both the moist and dry mix conifer plant communities. The QMD within the RUS range from 5-12 inches in the moist mix conifer and 5-14 in the dry mix conifer with an average height range in both of 70-120 feet. Regeneration in the RUS is dominated by shade tolerant species like grand fir and western hemlock and is averaging around 700 trees per acre. Stands have an abundance of ladder fuels built up in the understory with very little to no shrub component.

3.1.2 Effects Analysis

No Action Alternative

Under the No Action alternative, stands would continue to progress through natural successional stages that are already occurring. There would be no forested lands removed. This alternative would have no effect on vegetation resources.

Proposed Action Alternative

Live and dead trees would be cut, in order to facilitate constructing the new pipeline. Removal of trees would vary depending on site and slope to accommodate the new pipe. Tree sizes would typically range in diameter from 5 inches 26 inches DBH and from 10 feet to 120 feet tall. With less than 50 acres of forested land being treated in the above mentioned plant communities there would be no considerable change in the forest structure for the plant association within the analysis area. During the tree removal process all residual trees would be protected from major damage. Overall, this alternative would have no considerable effect on vegetation resources.

All logging activities would be ground based operations. Existing landing and skid trails would be utilized to move the pipe material when possible. All merchantable (8”-23.9” DBH) trees removed would be staged near open roads for future removal. To meet wildlife habitat requirements, approximately 5% of the largest cut trees (boles only) would be left on site.

Cumulative Effects

For this cumulative effects analysis, all projects shown in the Cumulative Effects Table 1 were considered; however, only projects with effects to vegetation within the project area were analyzed, such as timber and fuels management activities. Since the Proposed Action would result in no measurable change to forested land or plant communities, there would be no cumulative effects for vegetation resources.

3.1.3 Consistency Determination

NFMA Findings for Vegetation Manipulation

As required by regulations (FSH 1909.12 5.31a), “all proposals that involve vegetative manipulation of tree cover for any purpose must comply with the seven requirements found at 36 CFR 219.27(b).” All of these requirements are met by the project (refer to project record).

Suitability for Timber Production

The primary objective of the proposal is fuel reduction rather than timber production. However, as a pre-cursor to the silvicultural diagnosis process, stand examinations are conducted to determine existing stand conditions, and a determination of suitability (in regard to management of the stand for timber production) is made for each stand. Stands proposed for harvest treatment were examined for suitability in accordance with 36 CFR 219.13, Timber resource land suitability. Stands were found to be suitable for timber management based upon the following:

Meet the definition of forestland as described in 36 CFR 219.3.

Technological feasibility exists to ensure soil productivity and watershed protection. All sites considered for treatment would use established harvesting and site preparation methods. In combination with resource protection standards in the Forest Plan and applicable Best Management Practices, these methods would be sufficient to protect soil and water resource values.

There is reasonable assurance that lands could be restocked within 5 years of final harvest (this generally does not apply to the proposed harvest units, as they would be thinned. Small openings in root disease pockets would be regenerated with rot resistant species).

Maximum Harvested Acres (36 CFR 219.12 (k)(5)(iii), 219.27 (d)).
Ensure that no timber harvesting occurs on lands classified as not suited for timber production, except for salvage sales or sales necessary to protect other multiple-use values where the Forest Plan establishes that such actions are appropriate (36 CFR 219.27 (c) (1)). The proposed actions meet the forest plan requirement for less than 40 acres of created openings.

Mt. Hood National Forest Land and Resource Management Plan (Forest Plan)
All of the action alternatives proposed would meet the goals and objectives of the Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) as defined by B-2, Scenic Management Area Direction, B-6, Special Emphasis Watersheds, and C-1, Timber Emphasis as amended, including Standards and Guidelines, Northwest Forest Plan, and Survey and Manage 2001 Record of Decision

Watershed impact areas should not excee "thresholds of concern (TOC) calculated for each of the special emphasis watersheds. (B6018-020).
Forest Plan guidelines advise that no more then 25% TOC for Upper Dog River be impacted by timber management activities. The proposal is consitant with this standard with less than 1% of the watershed being impacted by the proposed tree removal and piping.

Suitability for even-aged and uneven-aged management
Forest Plan guidelines advise against uneven aged management in stands with dwarf mistletoe and/or root disease. Even-aged management is the effective way to manage dwarf mistletoe and root disease). (Forest wide Standards (FW) 316 and 317), (C1-019-021),(C1-024). Created openings should be no more than 2 acres (FW 323 and 324) and should be focused in areas of stands that are diseased, infested with damaging insect populations, or damaged by storms (C1-022).
The Forest Plan states "However, silvicultural prescriptions may specify appropriate mitigation measures in Management Areas where uneven-aged management is being considered to fulfill resource objectives other than timber production." (Mt. Hood FP Four-88)(FW 318-347). The resource objective here is fuel reduction while maintaining structure for aesthetics, wildlife, nutrient cycling, and future stand composition and health (FW 148-169). Project design features/mitigation measures such as patch openings, and risk of windthrow are written into the design of the proposed action to meet Forest Plan direction.

3.1.4 Summary of Effects

The Proposed Action would result in no considerable direct, indirect, or cumulative effects to vegetation resources. With less than 50 acres of forested land being treated in the above mentioned plant communities there would be no considerable change in the forest structure for the plant association within the analysis area.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.2 Soil Productivity

3.2.1 Existing Condition

Several field reviews have occurred during the planning lifespan of the project and no soils related issues were discovered.

Currently, there are sufficient levels of effective groundcover across and adjacent to the proposed area of disturbance since no unusual erosion was observed.

Soils across the planning area have been derived from numerous ashfall deposits, primarily from Mt. Hood eruptions. Prevailing winds have a south or west component to them and as the mountain would erupt, ash clouds would be carried downwind and deposited across the entire planning area. Wind, precipitation events, and landslides continue to alter the original depositional pattern by removing ash completely in some places exposing bedrock, and depositing it in others resulting in very thick ash deposits. Soil characteristics are generally similar under the forested terrain across the length of the pipeline footprint.

The soil in the project area is identified as SRI soil map unit 168, with a moderate compaction hazard and surface erosion potential. As explained above, erosion rating of moderate which is based upon *bare* soil (no vegetative or duff cover). The compaction hazard is estimated as moderate, and the susceptibility to soil displacement is high.

3.2.2 Effects Analysis

No Action Alternative

Soil Erosion Risk

The risk of erosion within the analysis area would remain unchanged because the amount of groundcover protecting the soil surface from erosional influences is common and widespread. The expected effect is the landscape would respond and change proportionate to the severity of natural events, such as storms or wildfire.

Detrimental Soil Conditions

It is assumed that soils damaged by previous activities would continue to recover and change at an unknown rate as roots, animals, and other influences slowly break up existing compaction. The effect of soil recovery is a gradual increase in available soil (therefore nutrients and water) for all normally expected soil biological, chemical, and physical functions to occur.

Organic Matter Levels

Soil organic matter and corresponding soil functions would continue without much change. Similar to erosion risk, the expected effect is that the soils at landscape and site scales would respond and change proportionate to the severity of natural events, such as storms or wildfire. In addition, organic matter decomposition is influenced substantially by temperature, moisture, and fire, thus the rate of decay and cycling would continue accordingly.

Proposed Action Alternative

Soil erosion risk

No active erosion from previous management was observed during the field reconnaissance for this project. The project footprint is expected to meet the effective groundcover standard following ground disturbing activities.

Detrimental soil conditions

Soils within the disturbance footprint, and especially the pipeline installation itself, will remain in an intentionally detrimental condition, much like a permanent road. Given the thin, linear nature of the impact, it is not expected to have a measurable effect on the surrounding forest in terms of growth or sustainability.

Organic Matter Levels

Soil organic matter and corresponding soil functions would continue without much change. Similar to erosion risk, the expected effect is that the soils at landscape and site scales would respond and change proportionate to the severity of natural events, such as storms or wildfire. In addition, organic matter decomposition is influenced substantially by temperature, moisture, and fire, thus the rate of decay and cycling would continue accordingly.

Direct and Indirect Effects

Soil Erosion Risk

Soil erosion risk would increase with the Proposed Action because bare soil would be exposed during implementation. As the amount of bare, bare/compacted soil increases, so does the risk of soil movement. Actual resource impairment (erosion and/or sedimentation) is dependent on weather events that provide the energy to move soil material from one location to another. In order to diminish this risk while soils are exposed, certain erosion control techniques are practiced to lessen erosive energies. The effectiveness of these ‘Best Management Practices’, or BMPs, is discussed by Rashin et.al. (2006) in an applicable publication of the Journal of the American Water Resources Association. Comparing the Proposed Action to their application of studied BMPs would indicate that the proposed project and associated design criteria would substantially reduce the risk of resource damage should a storm event occur while the ground is exposed. For example, the study showed an assessment of surface erosion and sediment routing during the first two years following a timber harvest activity indicated a 10 meter (approximately 30 feet) setback from ground disturbance can be expected to prevent sediment delivery to streams from about 95 percent of harvest related erosion features. Therefore, by maintaining proper amounts of protective groundcover along with BMPs and PDCs, the risk of erosion and subsequent sediment delivery caused by the Proposed Action is extremely small.

Detrimental Soil Conditions

Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas, but is not expected to result in a measurable decrease in site productivity.

Organic Matter Levels

Sufficient tonnage is expected to remain on site to provide for organic matter input to the ecosystem once all activities are complete.

Cumulative Effects

Potential cumulative effects projects from cumulative effects in Table 1 have been reviewed and no projects overlap in either time or space within the soils analysis areas, therefore there are no effects to accumulate from these projects.

The effects of leaving the existing pipeline in the ground (pollution from tar and galvanized wire) was analyzed.

The concentration and extent of pollutants that could be generated by leaving the existing pipeline abandoned underground would be expected to be very low and localized. Materials that were originally used to assemble the wooden pipeline included galvanized wire and tar (presumed to be coal tar pitch). Being manufactured materials, consideration has been given to the potential for their toxicity to the environment. They have been in place for over 100 years, and remain around the outer surface of the pipeline.

The galvanized wire has been subject to corrosion from underground weathering and oxidation. Soils the pipeline is buried in exhibit pH values that are slightly acidic (greater than 6.0, but less than 7.0, SRI 1979). So the corrosion potential is considered to be relatively low. The rate of breakdown has been, and would continue to be very slow. Any oxidation of metals such as iron, tin, and zinc would generate minute particulate, with a likelihood to become adsorbed into the soil. The potential for it to become mobile and available for soluble transport in a concentrated form for uptake or ingestion in toxic quantities is very low to unlikely.

The tar would not be expected to be soluble in the soil-water matrix. Chemical reaction to soil-water and mineral content would be considered to be very low. Any degradation by sunlight would be unlikely. Breakdown of phenols and hydrocarbon compounds in the tar would be expected to be infinitesimal. The likelihood that toxic concentrations would form and become mobile and available for uptake or as a pollutant would be considered to be very low.

3.2.3 Consistency Determination

The Proposed Action is consistent with all applicable laws, regulations, and Forest Plan guidance.

3.2.4 Summary of Effects

The project footprint is expected to meet the effective groundcover standard following ground disturbing activities. Soil erosion risk would increase with the Proposed Action because bare soil would be exposed during implementation. Given the thin, linear nature of the impact, it is not expected to have a measurable effect on the surrounding forest in terms of growth or sustainability. Similar to erosion risk, the expected effect is that the soils at landscape and site scales would respond and change proportionate to the severity of natural events, such as storms or wildfire. Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas, but is not expected to result in a measurable decrease in site productivity. Sufficient tonnage is expected to remain on site to provide for organic matter input to the ecosystem once all activities are complete.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.3 Hydrology

3.3.1 Existing Condition

The affected area for the Dog River Pipeline Replacement Project includes the Dog River and South Fork Mill Creek subwatersheds located on the eastern side of the northern Cascade Mountains of Oregon. Both Dog River and South Fork Mill Creek are low- to mid-elevation streams that eventually drain into the mid-Columbia River. Dog River is located to the southeast of the town of Parkdale, Oregon; and the South Fork Mill Creek is situated to the southwest of The Dalles (Figure 1).

The hydrologic regime in each of the subwatersheds is dominantly snow, supplemented by rain and groundwater. The principle runoff season occurs in spring months and is fed by an average persistent winter snowpack of about 80 to 100 inches at the highest elevations (CTD 2017). Additional precipitation in the form of rain occurs primarily in late fall and winter months. High intensity winter precipitation events can also drive peak flows. Given that the watersheds partially sit within the transient snow zone between 2,500 to 5,000 feet elevation, periodic rain-on-snow events can cause rapid snowmelt and heavy runoff, often resulting in unusually high peak flows. Ordinary peak flows are most commonly attributable to spring snowmelt. Snowfall typically accumulates between November and late March, and melts out beginning in April and ending usually by early or mid-June. Base flows are maintained by perennial tributaries and groundwater inputs from springs and wetlands.

Dog River

The Dog River subwatershed comprises about 8,142 acres (12.7 sq. mi.). The highest elevation of the subwatershed is the top of Lookout Mountain at 6,525 feet, and the lowest elevation is at the mouth of Dog River at about 2,105 feet. The long-axis of the subwatershed is oriented primarily south to north, being nearly 10 miles long and about 2 miles wide at its widest. Dog River flows north from its origin at the wet meadow known as High Prairie to its confluence with the East Fork of Hood River (EFHR), a principle tributary to Hood River, which is tributary to the Columbia River. The subwatershed is made up of four smaller nested perennial catchments: Lower Dog River, Puppy Creek, Brooks Meadow Creek, and Upper Dog River. Average precipitation in this subwatershed has historically ranged between 55 inches annually at the lowest elevation in the Lower catchment, to 75 inches at the higher elevations in the Upper catchment (Figure 4).

The Lower Dog River catchment comprises 62 percent (5,507 acres) of the larger Dog River subwatershed. Terrain of the lower catchment is typified by a steeply sided narrow canyon that is dissected by a number of high gradient intermittent/ephemeral streams, and several perennial tributaries. It contains the perennial main stem of Dog River between stream miles 0.0 at the mouth and 5.5 at Cooks Meadow. Stream surveys document a number of unmapped and unnamed springs, particularly along the left stream bank (as facing downstream) between river mile (RM) 1.9 and 5.0. There is a 60 foot waterfall located at RM 2.6 that is considered a barrier to passage by fish. At the higher end of this catchment the Dog River pipeline traverses mid slope around Dog River Butte before entering the South Fork Mill Creek subwatershed. About 96 percent of the Lower catchment is located within the bounds of the Hood River Ranger District of the Mt Hood NF, the remaining 4 percent near the mouth is non-Federal ownership.

The Brooks Meadow catchment is tributary to the Lower catchment below the City's pipeline intake, and makes up about 11 percent of its area. Terrain is gentle and nearly level, being mostly the wet feature

known as Brooks Meadow. Brooks Meadow Creek flows perennially into Dog River at about RM 5.4 just below Cooks Meadow. The Dog River pipeline crosses underneath Brooks Meadow Creek several hundred yards upstream from its confluence with Dog River. This catchment is within the Barlow Ranger District.

The Puppy Creek catchment is also tributary to the Lower catchment below the City's pipeline intake, and makes up about 28 percent of its area. Terrain in this catchment is very steep and highly dissected, except for the uppermost segment of the main stem of Puppy Creek which is broad and gently sloped. Puppy Creek flows perennially into Dog River at RM 0.2. This catchment is within the Hood River Ranger District.

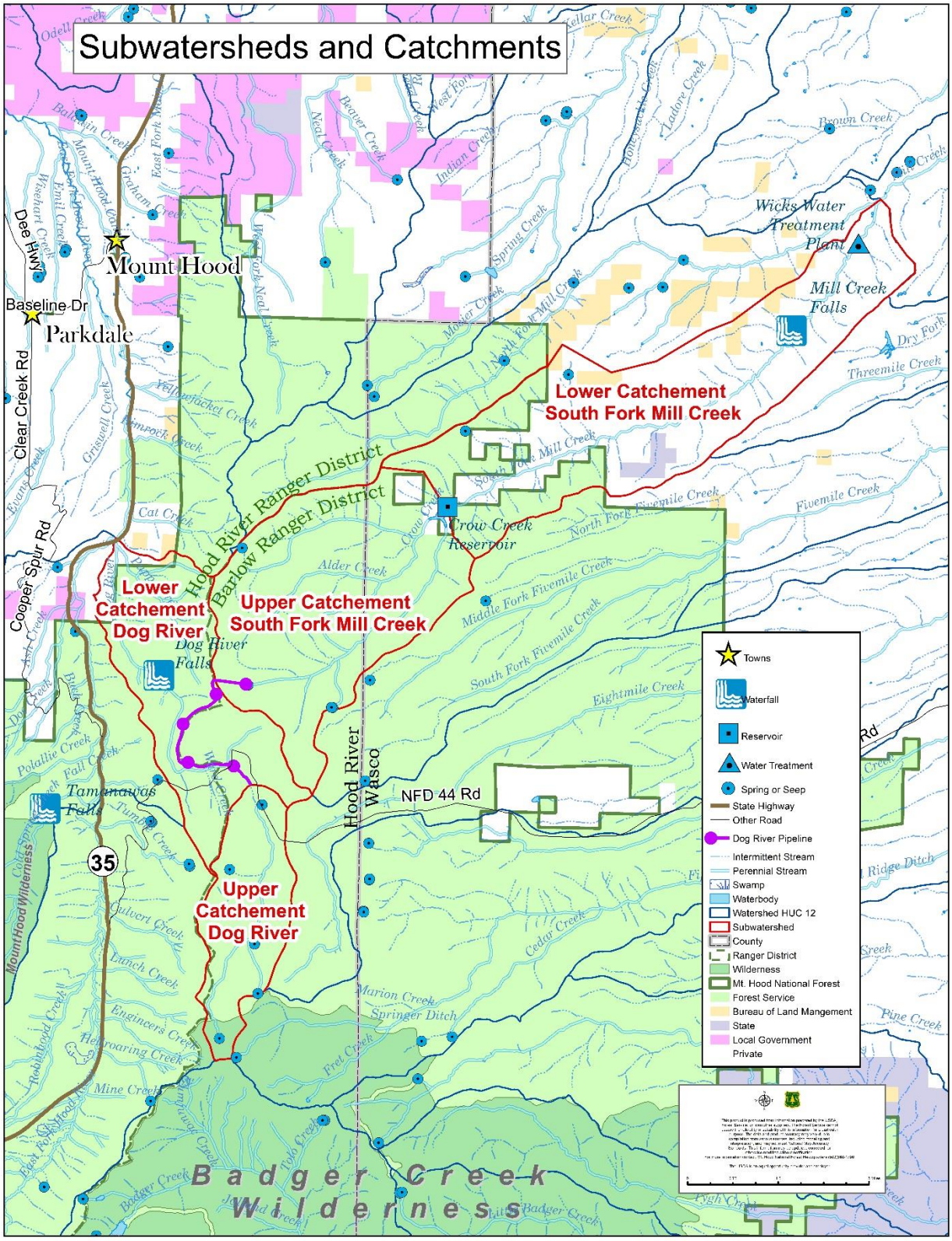
The Upper Dog river catchment comprises 38 percent (3,085 acres) of the larger Dog River subwatershed. Terrain of the upper catchment is somewhat uniform and broad, gently rounded, weakly dissected, and moderately sloped. It contains the mostly perennial main stem of Dog River between RM 5.5 at Cooks Meadow and 10.7 at High Prairie. There are a number of named and unnamed perennial springs and wet meadows, including Agnes Spring, Blue Bucket Spring, Dog River Spring, and High Prairie. At the lower end of the catchment is located the City of the Dalles diversion and the intake for the Dog River Pipeline at RM 6.0. The Upper catchment is located within the bounds of the Barlow Ranger District, as well as the designated Dalles Muncipal Watershed and is 100 percent federal ownership.

For context at a larger scale, the Dog River 12th-field subwatershed is the smallest of four that make up the larger East Fork Hood River watershed (72,337 acres), comprising only 11 percent of its contributing area above the confluence with the Middle Fork Hood River. Each of the other three contributing subwatersheds is more than twice the size of the Dog River subwatershed.

Dog River subwatershed is mostly forested and dominated with conifers. Past management has included commercial activities such as road development and timber harvest. But there have not been any new road construction or regulated timber harvest in over two decades. More recently, recreation use in the subwatershed has increased considerably, particularly mountain biking on the Dog River, Surveyor's Ridge and Cooks Meadow trails.

The Watershed Condition Framework is a national forest-based, reconnaissance-level evaluation of watershed condition. In 2016, the overall condition class rating for the Dog River 12th-field subwatershed was, "Functioning At Risk". A number of indicators that rated in the "fair" condition category contributed to this overall rating, including: listed as "impaired" (for iron) on DEQ's 303(d) list, altered hydrologic regime, and forest insect and disease issues.

Figure 4. Dog River Pipeline Project Subwatersheds and Catchments.



South Fork Mill Creek

South Fork Mill Creek subwatershed comprises about 18,240 acres. The highest elevation is about 5,050 feet on Mill Creek Buttes to about 740 feet at the confluence with North Fork Mill creek approximately 7 miles downstream from the National Forest Boundary. The long-axis of the subwatershed is oriented primarily southwest to northeast, being a little more than 16 miles long and 3 miles wide at the widest. The South Fork Mill Creek flows northeast from its headwaters in the Mill Creek Buttes area to its confluence with the North Fork Mill Creek to form Mill Creek, a direct tributary to the Columbia River. The South Fork Mill Creek subwatershed can be subdivided into two nested catchments: the Lower catchment and the Upper catchment. Average precipitation in this subwatershed has historically ranged between about 60 inches annually at the higher elevations in the Upper catchment, to 17 inches at the lowest elevations to the east in the Lower catchment (Figure 4).

The Lower South Fork catchment below Crow Creek dam comprises 55 percent (10,112 acres) of the subwatershed. The terrain is a long, steep sided, dissected corridor canyon. The subwatershed contains the perennial main stem of South Fork Mill creek between RM 0 and 11.4. There are no perennial tributaries to the stream in the Lower catchment. Mapped springs include Saddle and Schoolmarm. Between RM 8.4 and 11.4 the stream flows through non-federal in-holdings. The Forest boundary is at RM 11.4, all ownership in the subwatershed below that is non-federal. About 65 percent of the Lower catchment is non-Federal ownership, including a large tract of private industrial forest lands. The Wicks water treatment plant that supplies the City of The Dalles with municipal water is located about a mile and a half above the confluence with the North Fork of Mill creek. About a mile and a half above that is Indian Hollow, where there is a waterfall that is a barrier to fish passage.

The Upper South Fork catchment above Crow Creek dam comprises 45 percent (8,128 acres) of the subwatershed. Terrain is mountainous, variably dissected, and moderately steep to steep, being dominated by Mill Creek Buttes. The subwatershed contains the perennial main stem South Fork Mill between RM 11.4 and 15.9. Alder Creek is a perennial tributary to perennial Crow Creek, which flows into Crow Creek Reservoir about a half-mile northwest of the inflow of South Fork Mill Creek. Outflow from the Dog River pipeline deposits into a tributary to the South Fork Mill at about RM 15.7. Mapped perennial springs include Shellrock and Stroud, which are tributary to Crow Creek and South Fork Mill Creek respectively. About 93 percent of the Upper Catchment is in Federal ownership, and is entirely on the Barlow Ranger District.

For context at a larger scale, the South Fork Mill River subwatershed comprises 65 percent of the larger North Fork – South Fork Mill 12th-field, 27,938-acre subwatershed. Both the North Fork and South Fork of Mill Creek merge to form one of nine subwatersheds that make up the larger Mid-Columbia/Mill Creek 10th-field watershed.

The South Fork Mill subwatershed is mostly forested and dominated with conifers, except for the eastern third which is comprised of a drier ecotype of scrub-oak and juniper. Past management has included commercial activities such as road development and timber harvest. There has not been any new road construction in the subwatershed in many years. Since 2005 there has been a notable amount of vegetation management in the subwatershed, particularly on Federal lands, where the City of The Dalles and the Forest Service have mutually endorsed the thinning of dense forest to reduce fuels and minimize the risk of the municipal watershed being subjected to the effects of high-severity wildfire. Salvage of fire-killed timber has also occurred on privately owned industrial forestlands after the 2013 Government Flats fire.

The Watershed Condition Framework overall condition class rating for the North Fork – South Fork Mill 12th-field subwatershed in 2016 was, “Functioning At Risk”. A number of indicators that rated in the “fair” condition category contributed to this overall rating, including: altered hydrologic regime, some unstable stream banks, low abundance of in-stream woody debris, loss of cover by recent wildfire, and forest insect and disease issues.

The Dalles Municipal Watershed

The Dalles municipal Watershed (DMW; Figure 5) is an approximately 24,000 acre designated management unit and source water protection area. Lands within the DMW encompass the upper catchment of Dog River above the pipeline intake, the pipeline where it is routed around Dog River Butte, Brooks Meadow, and the entire South Fork of Mill creek extending down to the Wicks water treatment Plant located eight miles downstream of the Crow Creek dam. Water diverted and transferred from the upper catchment of Dog River to the South Fork Mill creek, the waters of South Fork Mill Creek itself, Crow Creek, Alder Creek, and contributing waters from springs flow into Crow Creek Reservoir. The reservoir allows for controlled release down the South Fork of Mill creek to the Wicks water treatment plant. The earthen Crow Creek dam was constructed in 1967.

Because much of the municipal water supply originates from Forest Service System lands, a cooperative agreement was signed between the United States Department of Agriculture and the City of The Dalles in 1912 for the purpose of conserving and protecting it within a specified area that includes both Federal and non-federal ownership. The intent of the 1912 Agreement was formalized again in 1972 as per Forest Service Manual 2542 with a Memorandum of Understanding (MOU) between the City of The Dalles and the Mt. Hood NF to maintain and protect the quality and quantity of water originating from National Forest System lands for municipal use. It included management directions and a ten-year management plan for both Federal and City owned lands. As per the MOU, the DMW remains closed to public entry except for a set number of walk-in hunters during selected fall big-game seasons. Roads are closed to all except for administrative use.

Due to the high value beneficial use of Dog River (drinking water), the intent of the 1972 MOU was carried forth into the Mt Hood National Forest (MHNF) Land and Resource Management Plan (LRMP) of 1990 according to Forest Service direction (FSM 2542, 2007), and National Forest System lands were designated further as a Special Emphasis Watershed, with management standards and guidelines.

Then in 1994, when the Northwest Forest Plan was adopted, all of the DMW and portions of neighboring watersheds were included into the Mill/Fivemile/Eightmile Tier 1 Key Watershed management allocation, which on Federal lands is intended to maintain and protect watersheds that contribute to anadromous fish habitat. The upper catchment of Dog River was included in the Tier 1 designation because of the pipeline which transfers water to South Fork of Mill Creek and eventually Mill Creek where there is listed steelhead habitat.

In January of 1996 the City requested that the Forest Service reclassify the municipal watershed from a Tier 1 Key Watershed to a Tier 2 because of concerns about administrative barriers that could potentially arise if any future development or enhancements to their infrastructure were to be proposed. But the watershed analysis conducted for Mill Creek in 2000 determined that with either designation, standards and guidelines would be applied to a proposed activity to ensure consistency with the Northwest Forest Plan and the Key Watershed allocation. Likewise, exceptions could preclude application of standards and guidelines under either the Tier 1 or Tier 2 Key Watershed designation if they contradict existing law or regulation (MHNF 2000b).

Management of natural and cultural resources on Forest Service System lands within the DMW is administered by the Forest Service, whom collaborates with the City of The Dalles as per the MOU. Operations of the City's facilities located on National Forest System lands, such as the Dog River pipeline and Crow Creek Reservoir, are authorized via Special Use Permit, also administered by the Forest Service.

However, the use and management of the water that originates in the DMW for municipal purposes is administered by agencies of the State of Oregon. Water rights in the name of the City and municipal use in the DMW fall under the jurisdiction of the Oregon Water Resources Department (OWRD). In Chapter 690 of the Oregon Administrative Rules, Division 504, the Hood Basin Program, sub-section (1)(a), Dog

River above its point of diversion is classified exclusively for municipal use (OAR 2019). The quality of the water that is used as a designated drinking water supply in the DMW falls under the jurisdiction of the Oregon Department of Environmental Quality (ODEQ). In response to requirements of OWRD and ODEQ, the City of The Dalles prepared a master development plan in 2006 (CTD 2006)for the management of their municipal water supply, which addressed principally their drinking water system. In 2014, the City also prepared a Water Conservation Management Plan (CTD 2014), which was required by OWRD as a condition of being a municipal water supplier.

In 2013 the Government Flats wildfire burned across about one-third of the Municipal Watershed, mostly in the lower catchment. About 100 acres were on Federal lands, the remainder were on non-federal lands.

3.3.1.1 Stream Network and Channel Condition

Dog River

There are approximately 28 total miles of stream channel mapped within the Dog River subwatershed. About 63 percent (17.5 miles) are characterized as flowing perennially. The total length of the main channel of Dog River is about 10.7 miles long. About 86 percent of that total length flows perennial in most years. The other 14 percent flows intermittently, and includes two short sub-reaches that amount to about 1.5 miles in length. They include the uppermost mile, where streamflow tends to dry up mid-summer to mid-fall. The other is immediately downstream from the pipeline diversion, which dries up for about a half-mile when the total flow in the river is diverted, typically from early July until late October. Just below this sub-reach, flow usually surfaces again in Dog River where it flows through Cooks Meadow.

An August 2000 Stream Survey (MHNF 2000a) differentiates Dog River into four unique stream reaches extending from its mouth to its headwaters (Figure 5). Reach 1 extends about 1.8 miles up from the mouth of Dog River, and Reach 2 extends further upstream to near FSR 44. These two lower reaches make up the main channel in the lower catchment of Dog River below the pipeline intake. Their gradient is generally steep, averaging about 9 percent (Table 3).

Most of Reach 1 and all of Reach 2 are very confined in a narrow v-shaped valley with steep canyon walls. The lowest segment of Reach 1 near the mouth is moderately confined as it issues from the upstream canyon into the East Fork Hood River valley. Floodplain features in the upstream canyon are generally narrow, alternating, and sometimes absent on steep sections of the channel. The bankfull width of Reach 1 averaged about 18.2 feet, whereas Reach 2 upstream was a bit narrower averaging about 16.7 feet. A channel spanning, 60-foot waterfall is located in reach 2 at about RM 2.6.

Reaches 3 and 4 occupy the Upper Catchment of Dog River between FSR 44 and the headwaters at High Prairie. These two upper reaches make up the main channel of the upper catchment. The gradient of Reach 3 is shallow, averaging about 3 percent, while the gradient of Reach 4 is steep averaging 10 percent. Reach 3 is moderately confined in a gentle, trough-like valley form that transitions upstream in Reach 4 into a moderately confined mountain ravine. Floodplain features in Reach 3 are common, defined and in places connected to small wet meadow features, and in Reach 4 they are more narrow with split channels or nonexistent. Bankfull width in Reach 3 averaged about 13.5 feet, and narrowed notably in Reach 4 to about 9.3 feet.

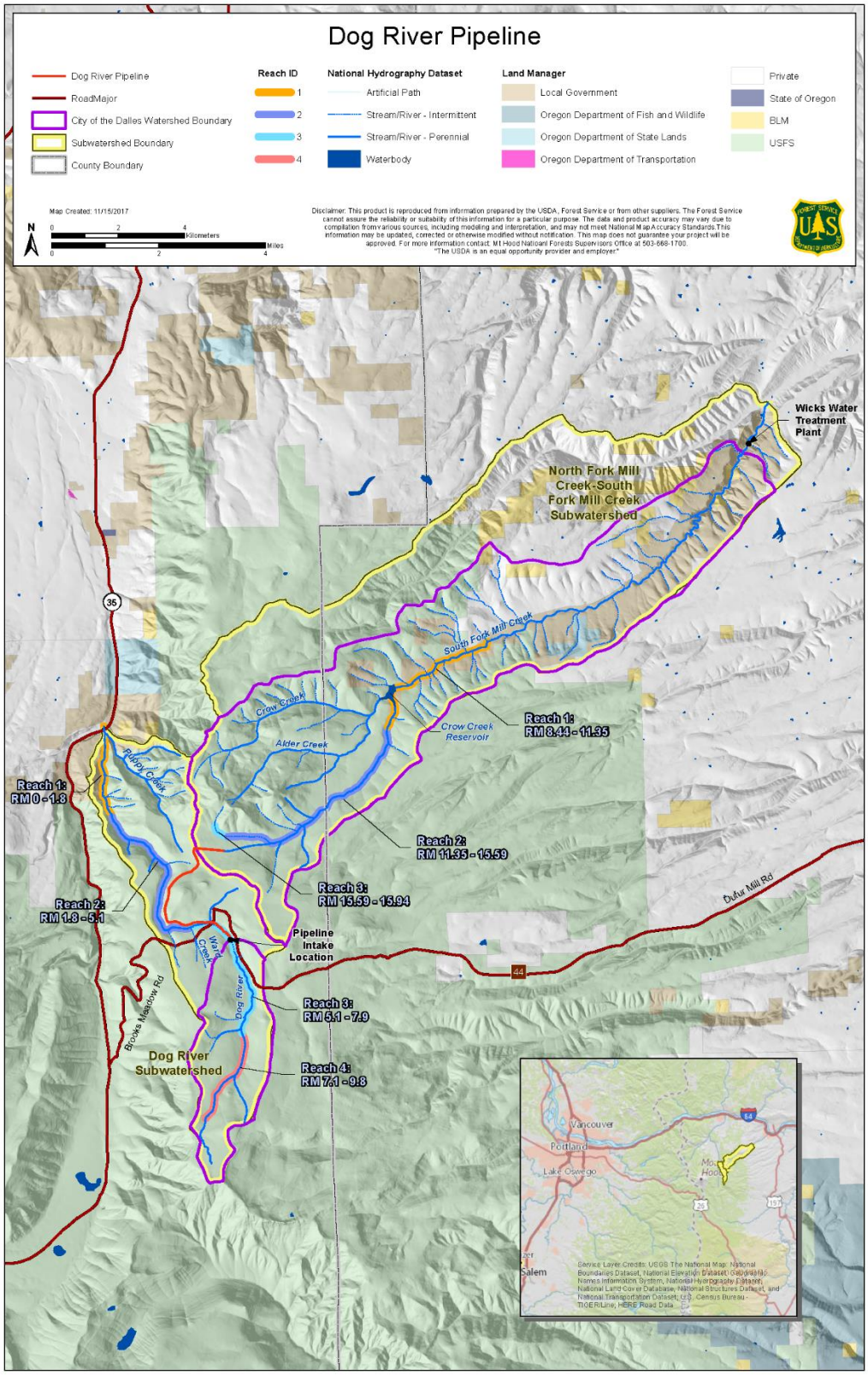
In Reaches 1 and 2 there were 9 tributaries that were contributing flow to Dog River when surveyed in late July. It was estimated by surveyors that they were contributing as much as 25 percent of the stream flow at the time of the survey. Two of these were the perennial streams of Brooks Meadow and Puppy Creek. The other seven were springs or seeps issuing from near or upslope of the left bank, and the intermittent Ward Creek.

There were 24 tributaries observed in Reaches 3 and 4. All of them were contributing flow to Dog River when observed in late July. Surveyors estimated they contributed the majority of the stream flow observed at that time. Three of the tributaries were unnamed streams fed by mapped springs. Most of the remaining tributaries were unmapped springs or seeps issuing from near or upslope of the right bank.

Reaches 1 and 2 are step-pool channel types (Rosgen "A" channel types), dominated by pools. The lower reach had 36 total pools, and Reach 2 had 42. There were 10 primary pools observed in Reach 1, and 13 observed in Reach 2. The depth of the primary pools in both reaches was measured to be greater than 2 feet during summer low flows of July.

Reach 3 is a pool-riffle channel type, and Reach 4 is more of a cascade chute (Rosgen "B" and "A" channel types respectively). There were 61 total pools in Reach 3, but only two were considered to be primary as most were pocket pools. Reach 4 had a total of 67 pools but all were small pocket pools, none of them were concluded to be primary. The majority of the hydraulic controls in the stream consisted of cobble-sized substrate (79%). A combination of wood and substrate controls made up 11 percent of the total pools and wood controls were 10 percent of the total pools. Woody debris was the primary hydraulic control creating pools in both Reaches 3 and 4.

Figure 5. Dog River Diversion Pipeline Project Surveyed Stream Reaches in the Affected Area.



The pool frequencies observed in all four reaches were below standards listed in the LRMP and by NMFS as indicators of properly functioning channel processes. Given however, the small size of this stream and channel type, the formation of deep pools would not be expected because the stream power and discharge to scour deeper and mobilize larger sizes and quantities of substrate is inherently low and infrequent.

Table 3. Select Channel Characteristics of the Dog River Subwatershed.

Reach	Channel Type	Confinement	Avg. Gradient (%)	Avg. Bankfull Width (ft.)	Number of Perennial Tributaries, Springs, or Seeps	Dominant Substrate	Total Pools	Primary Pools
1	step-pool	very confined	7	18.2	1	cobble and coarse gravel	36	10
2	step-pool	very confined	11	16.7	8	bedrock and gravel	42	13
3	pool-riffle	moderately confined	3	13.5	8	coarse gravel	61	2
4	cascade	confined	10	9.3	16	small cobble	67	0

Source: MHNF 2000a

Substrate in Reach 1 was dominated by small cobbles and coarse gravel, while Reach 2 was primarily bedrock and coarse gravel. Sampling estimated that fine sediment amounted to 8 and 14 percent respectively of the total substrate. Substrate in Reach 3 was dominated by coarse gravel, and Reach 4 was dominated by small cobbles. Estimated fine sediment that was sampled amounted to 12 and 6 percent respectively of the total substrate.

There were 23 side channels identified in all four reaches, with an average depth of 0.8 feet, an average length of 97 feet, and an average width of 5 feet. Most were observed in Reach 4.

Data from the 2000 stream survey of Dog River indicated that the overall abundance and density of in-stream large woody debris in all reaches of Dog River was low to moderate (Table 4). Small wood comprised 52 percent of the total wood counted in the stream channel at the time of the survey. Some of the small wood was a component of debris jams, but the majority of it was found as individual pieces. The density of medium and large pieces of in-stream wood did not meet the LRMP standards for woody debris density in any reach. It did however, meet the NMFS woody debris density standards for all reaches.

Table 4. Number of in-channel woody debris and woody debris density (total of both medium and large size classes) observed in the 2000 Dog River stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	71	40	78	189	16.7	26.7	43.4	106	20
2	119	47	55	221	18.6	21.7	40.3	106	20
3	226	123	47	396	39.2	15	54.2	106	20
4	153	119	43	315	64.8	23.4	88.2	106	20

Source: MHNF 2000a

There were 103 debris jams counted during the survey of Dog River. Twenty-four percent of the total wood inventoried was in these jams. Of the wood in debris jams, 47 percent was in the small size category, 31 percent in the medium size class, and 22 percent in the large size class.

Since the 2000 survey, there have been additional inputs of in-stream woody debris. Large woody debris recruitment along all reaches of Dog River is good to excellent, with the exception of an upper segment of Reach 1 where a former clear cut had encroached on the riparian zone. There is also an abundance of downed wood within the inner and outer riparian zones on all reaches of Dog River. This material is not typically inventoried during stream surveys. Only in-stream wood was tallied. Overall, it is believed that the abundance of woody debris throughout the system is mostly sufficient to provide structure and function, and that it continues to naturally accumulate unabated like it has for many decades.

Table 5. Number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams observed in the 2000 Dog River stream survey.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	16	52	19	30	10	56	22
2	15	95	24	40	7	44	11
3	22	199	27	108	15	40	7
4	50	99	54	70	49	26	17

Source: MHNF 2000a

There are three crossings where Dog River is diverted under a road. The first is where Highway 35 crosses over Dog River at RM 0.1. At this crossing the river flows perennially through a 60-foot long, double cement box culvert. The second crossing is at RM 5.5 marking the transition between Reach 2 and 3 where the river flows perennially under FS road 44 through 146-foot long, 36-inch diameter corrugated metal culvert. The third is up in the headwaters at the base of High Prairie, where the river is a small intermittent stream that flows under FS road 4420 through a 40-foot long, 18-inch diameter, corrugated metal culvert.

There are two other notable crossings in the subwatershed. One is where the channel of Brooks Meadow Creek flows perennially through a 36-inch diameter, 60-foot corrugated metal culvert under FS road 17. The other is downstream where Brooks Meadow Creek flows across the top of the 12-foot wide gravel service road that parallels the pipeline. The channel at this crossing has been heavily impacted, and flow is sometimes hindered, ponding in wheel ruts before passing across and back into the creek.

Channel types in the two primary tributaries of Dog River (Puppy Creek and Brooks Meadow Creek) are very different. Neither have been formally surveyed. Puppy Creek is mostly very confined and dominantly a very steep gradient. Most of the channel segments are step-pool sequences. There are an

estimated 16.9 miles of total channel length in Puppy Creek, of which 46 percent (7.7 miles) are perennial including several first order tributaries. The uppermost reaches of Puppy Creek however, are different, being moderately confined, with much less of a channel gradient. Here the stream is small, and mostly flows intermittently.

In contrast, Brooks Meadow Creek originates and flows perennially through an unconfined wet meadow with a low stream gradient. It is a short stream with about 1.9 miles of channel length. Below the meadow, the channel becomes steeper and moderately confined until it flows through a small forested wetland and then into Dog River.

South Fork Mill Creek

There are approximately 70.2 total miles of stream channel mapped in the South Fork Mill Creek subwatershed above the Wicks municipal treatment plant. About 35 percent (24.6) of those total miles are characterized as flowing perennial. The total length of the main channel of South Fork Mill Creek is nearly 16.5 miles long. About 99 percent of that total length flows perennial. A small perennial spring at RM 15.9 delivers to the headwater channel. The larger-year around contribution to the South Fork of Mill Creek however, is the inflow from the Dog River pipeline, which flows into a headwater tributary channel before entering into the main stem at RM 15.7. Crow Creek Reservoir truncates the main channel between the lower and upper catchments of the South Fork of Mill Creek.

A stream survey of the segments of the South Fork of Mill Creek that flow through Federal lands was conducted in August of 2011. It differentiated the creek into three distinct reaches (Figure 5). Reach 1 begins at the Forest Boundary and extends upstream to Crow Creek Reservoir. It makes up the lower catchment of the South Fork of Mill Creek. The gradient is moderately steep, averaging overall about 4 percent (Table 6). It is very confined by steep-sided ridges that form a narrow canyon. Bankfull width of Reach 1 averaged about 23.2 feet. It was characterized as having many long fast segments with some undercut and unstable banks.

In the upper segment of Reach 1, the channel begins at the outflow at the base of Crow Creek dam. There is leakage at the base of the dam, where several small braids taper off downstream before intersecting with the main channel. The valley here is wider and less confined with less of a gradient, and there are some well-developed floodplain features that interconnect with several forested wetlands. A single 120-foot long, 9-foot wide side channel was observed in one of the forested wetlands. The spillway for Crow Creek Reservoir dumps into the base of an intermittent tributary coming off the hillside and flows into South Fork Mill approximately a quarter-mile below the dam.

About another mile further downstream, the gradient begins to increase and the valley becomes more confined. Most floodplain features become less developed and are more narrow and alternating, except for several small forested wetlands. The downstream terminus of Reach 1 ends at the Forest boundary at RM 11.4. Forest Service crews did not survey downstream of the boundary, but the gradient continues to increase and the canyon narrows as the channel becomes very confined for the next 4 miles until the 60-foot high, channel spanning Mill Creek falls at a chasm feature labeled on maps as Indian Hollow.

Reaches 2 and 3 identified in the survey make up the main channel in the upper catchment above Crow Creek Reservoir. The gradient of Reach 2 is moderately steep, but it increases upstream into Reach 3 where the main channel becomes steep in the upper mountain ravine in Mill Creek Buttes. Both reaches are confined in mountainous terrain. Floodplain features are small and usually alternating. Bankfull width in Reach 2 is about 9.7 feet, narrowing down to 3 feet in Reach 3. There were some unstable stream banks observed in Reach 2, and it was characterized as having many long fast segments.

There were no perennial tributary channels observed in Reach 1, and none are known to be present in the reaches downstream from the Forest boundary. There are several mapped springs high on the slopes above these reaches, but their flow is intermittent and goes subsurface. Evidence of annual scour and

deposition in the steep hillside channels below the springs was discontinuous or limited. There were 3 perennial tributaries in the upper catchment that were observed during the August survey. Two originated from springs, one mapped (Stroud Springs) and one unmapped. These two tributaries were estimated to contribute as much as 15 percent of the flow when surveyed. The third and uppermost one was the tributary that receives flow from the pipeline, and was noted as contributing nearly all of the flow at its confluence with the main channel.

Table 6. Select Channel Characteristics of the South Fork Mill Creek Subwatershed.

Reach	Channel Type	Confinement	Avg. Gradient (%)	Avg. Bankfull Width (ft.)	Number of Perennial Tributaries, Springs, or Seeps	Dominant Substrate	Total Pools	Primary Pools
1	pool-riffle	very confined	4	23.2	1	coarse gravel	23	4
2	pool-riffle	confined	3	9.7	1	sand and coarse gravel	27	2
3	pool-riffle	confined	6	3.0	1	medium and coarse gravel	0	0

Source: MHNF 2011

Reach 1 is a pool-riffle channel type, and Reaches 2 and 3 are primarily pool-riffle channel types, although Reach 3 also resembled a somewhat step-pool type. Pools were not abundant in any of the reaches, and wholly lacking in Reach 3. The abundance of primary pools was very low throughout all the reaches, and the average residual pool depth in Reach 1 and 2 was 1.7 and 1.4 feet respectively. Overall, in-channel pool abundance was well below standards used for indicating naturally functioning channel forming processes. Wood created the majority of the pools. Entrenchment ratios decreased measurably between the survey in 1999 and 2011, indicating that some incision has occurred (MHNF 1999, 2011).

Owing to the altered flow regime in the South Fork of Mill Creek as a result of the pipeline and reservoir operations, and the management of the municipal water supply, the channel forming processes that factor into pool creation have been altered. The supplemental streamflow from the pipeline has likely increased channel and stream bank scour in Reach 2, potentially increasing the channel gradient (MHNF 1999). Similarly, spillway releases after reservoir fill is achieved along with the heavy drawdown during summer peak use, has altered the flow regime of South Fork Mill Creek below Crow Creek dam. Channel forming processes such as bedload movement and scour no longer favor the formation and development of pools.

Data from the 2011 stream survey of South Fork Mill Creek indicated that the overall abundance and density of large woody debris in all reaches was low. The stream survey found that the majority of woody debris in the system is small and the density of LWD in all reaches was below LRMP or NMFS standards for woody debris density (Table 7).

Table 7. Existing Number of In-channel Woody Debris and Woody Debris Density (total of both medium and large size classes) observed in the 2011 South Fork Mill Creek stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	77	17	3	97	5.8	1.0	6.8	106	20
2	134	37	32	203	8.7	7.5	16.2	106	20
3	10	2	1	13	5.4	2.7	8.1	106	20

Source: MHNF 2011

Most of the woody debris observed was in jams (Table 8). Reach 1 had 32 debris jams, all of which was small sized wood. Reach 2 had 90 jams, 97 percent was small sized wood. In Reach 3 there were 7 debris jams counted, all of which were also small sized wood. All of the debris jams observed are thought to have formed after stream clean-out practices were mostly halted in the early 1980s. Prior to that, stream clean-out practices that removed woody debris from the channel are likely to have contributed to the low abundance observed during the stream survey.

Table 8. Existing number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	32	45	32	17	0	3	0
2	90	47	87	34	3	32	0
3	7	3	7	2	0	1	0

Source: MHNF 2011

Since the 2011 survey, there have been additional inputs of in-stream woody debris. Large woody debris recruitment along all the reaches of the Upper catchment are good to excellent in the inner riparian zones. There is also an abundance of downed wood within the inner and outer riparian zones that was not inventoried for the stream survey. Overall, it is believed that the abundance of woody debris throughout the system is mostly sufficient to provide structure and function, and that it continues to naturally accumulate unabated like it has for many decades.

In the Lower catchment, potential recruitment is good along the main corridor of South Fork Mill Creek, but fair to poor in the outer riparian zones where the 1967 School Marm fire and the 2013 Government Flats fire burned over the forest. Further down, the vegetation type changes to more scrub-oak and the main riparian corridor is comprised of willows and cottonwood.

Data from the stream survey indicated that very coarse gravel was the dominant substrate size in Reach 1. The amount of fine sediment that was sampled was considered to be low, possibly as a result of Crow Creek Reservoir capturing and retaining it. In Reach 2, substrate was dominated by coarse gravel and small cobbles, but a notable amount of sand was collected in samples. In Reach 3 medium gravel was the dominant size and type of substrate. Overall, the amount of fine sediment detected was low.

There are 5 road crossings in the subwatershed over perennial streams, of which four are on Federal lands. One is the road segment that crosses across the top of Crow Creek dam. The second and third ones are where FS road 1721 crosses over the South Fork Mill and Alder Creeks. The fourth is a bridge where FS road 1720-190 crosses the South Fork Mill Creek about ¾ mile below the dam. The fifth crossing is a low-water ford downstream from the dam about 3.5 miles on non-Federal land. Because the watershed is closed to the public, none of these crossings are used very often.

Crow Creek was the major perennial tributary to the South Fork of Mill Creek. It no longer ties directly into the South Fork of Mill, but instead flows directly into Crow Creek reservoir, which flooded their confluence after the dam was constructed. Alder Creek is the main contributing perennial channel to Crow Creek. Neither has been formally surveyed intensively. Channel types are considered to be dominantly pool-rifle sequences that are confined and exhibit moderate to steep gradients. Both are considered to be small channels, but the total stream length in their contributing area is estimated to be about 20 miles, of which about half is deemed to be perennial in most years. There are several mapped and unmapped springs that contribute flow. One is Shellrock Springs that feeds into Crow Creek from up near the ridgetop, the other feeds into Alder Creek near its headwaters up on Mill Creek Buttes.

3.3.1.2 Water Quantity and Streamflow

Dog River

Hydrologic data for Dog River is limited. While there is a fair amount of streamflow data at the City's pipeline diversion at RM 6.0, there are very few records of flow data at the mouth. This implies that the effects that have been occurring to the amount of flow in the lower reaches of Dog River as a result of diversion may not be readily discernible. For this analysis, data that were used to characterize stream flow in upper Dog River were recorded just upstream of the pipeline diversion at RM 6.0 in the years 1960 to 1971 and 2011 to 2019. Data collected at the mouth of Dog River at RM 0.0 are less robust, and include a single year between the fall of 2016 and 2017, several isolated spot measurements, and data collected in the spring and early summer of 2019.

Mean annual natural discharge (no diverted water) of Dog River has been estimated to be about 19.7 cfs. Monthly estimates by OWRD of natural streamflow at the mouth indicate that Dog River is fed by a combination of seasonal snowmelt, groundwater, and precipitation. Winter precipitation and spring snowmelt are likely to generate the greatest average streamflow, while base flows would typically occur in late summer to mid-fall (Table 9).

Table 9. Estimated mean monthly natural streamflow (cfs) of Dog River at the mouth (50% exceedance level).

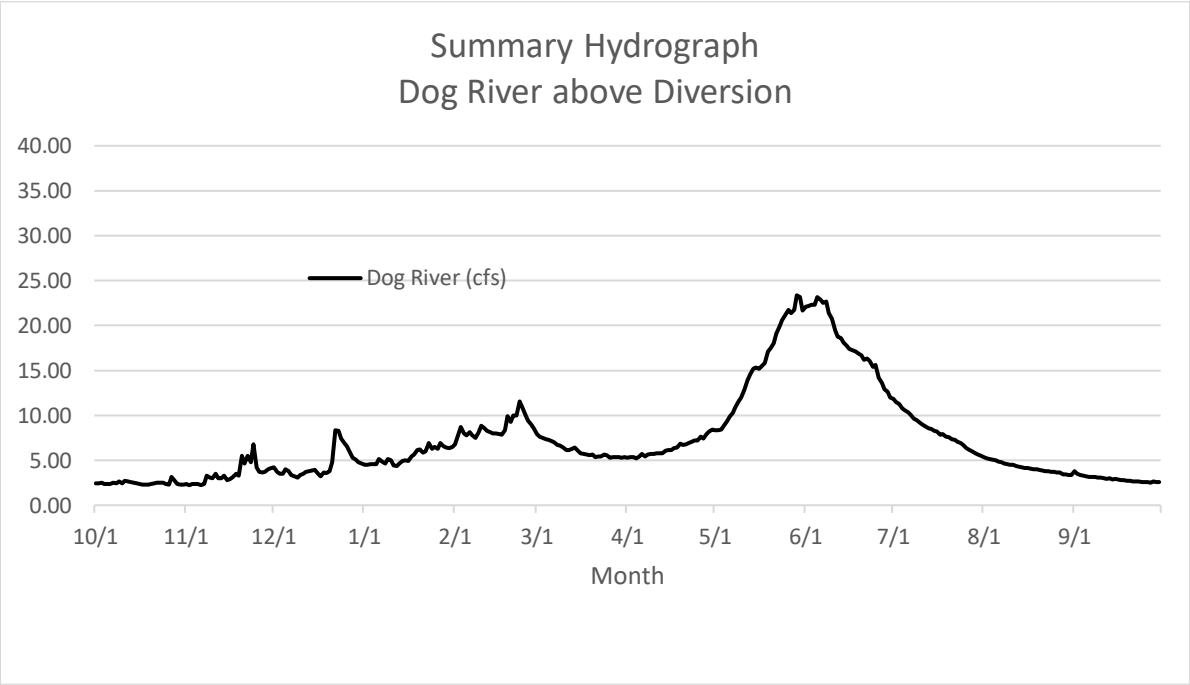
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
27.9	32.5	32.2	33.6	27.0	21.5	12	7.8	5.9	5.5	9.0	21.0

Source: OWRD 2015

According to USGS data from the gage site above the diversion between 1960 and 1971, peak flows are driven by precipitation events or snowmelt, or a combination of both, and have historically occurred between November and June. Average monthly streamflows at the diversion ranged from 2.5 cfs in the fall (October) to 23 cfs in the spring (June). The majority of the summer baseflows are maintained by groundwater from perennial springs and small wet meadows from August through October (Figure 6).

Most of the streamflow volume comes from snowmelt, typically between May and July. Approximately 40 percent of the peak discharge events measured above the diversion occurred in the winter (November through February) and at least three were likely the result of a rain-on-snow episode. Approximately 60 percent of the peak flow records above the diversion occurred in the spring (May through June). Peak daily mean discharge magnitude exceeded 40 cfs during four of the eleven years with a maximum discharge of 72 cfs recorded on May 30th, 1969. These data indicate that Dog River has often undergone two distinct peak flow periods.

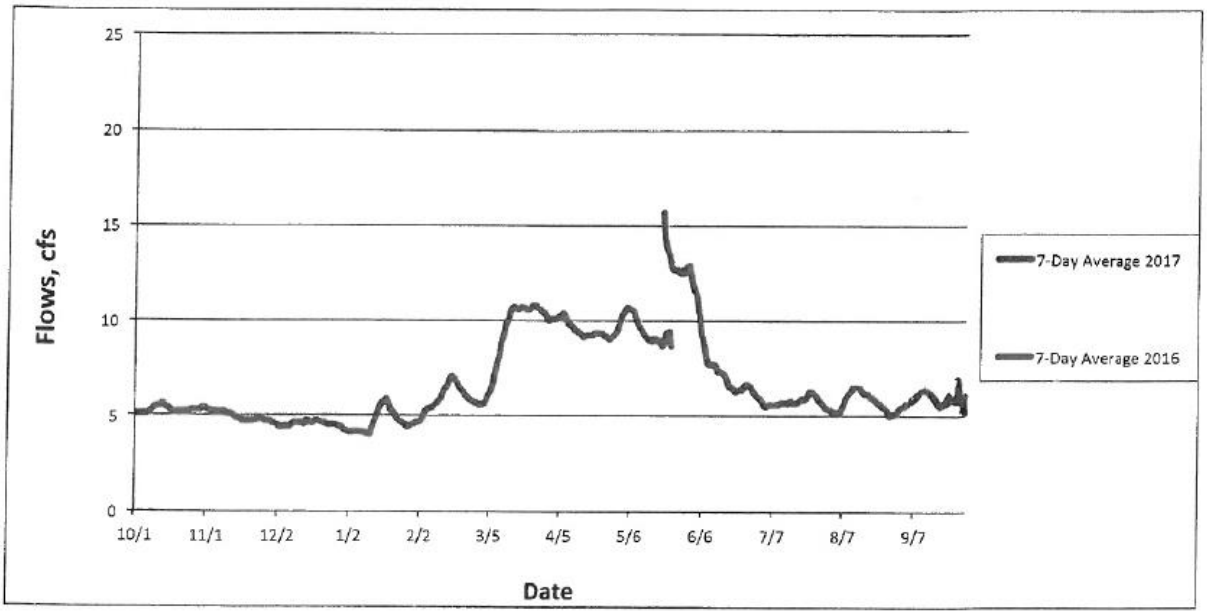
Figure 6. Mean daily discharge (cfs) for Dog River from water years 1961 to 1967 at RM 6.0, upstream of the Dog River pipeline diversion



Source: USGS 2016

Data collected by the CTWS near the mouth of Dog River between the fall of 2016 and fall of 2017 indicate a similar trend occurred for that period (Figure 7). The data show that there was a small peak period in the winter of that year, followed by a notably larger peak flow period in late spring. As would be expected, base flow periods between the two sites was also similar. Although the data collected by CTWS only represents a single year, the hydrograph generated from it suggests that streamflow trends of the Upper and Lower catchments are similar. It is apparent that there is perennial flow at the mouth of Dog River, even in low flow periods when 100 percent of the streamflow is being diverted to the pipeline upstream at RM 6.0.

Figure 7. Mean daily discharge (cfs) for Dog River near RM 0, just upstream of the confluence with East Fork Hood River.



Credit: modified screenshot of graph, CTWS 2017. Note – streamflow in a small side channel at the monitoring site was not fully captured in the data.

The contributing area of the Upper catchment of Dog River, which produces flow available for diversion to the pipeline, comprises 38 percent of the entire subwatershed. Sixty-two percent of the subwatershed is comprised of the Lower catchment, which generates enough of its own flow so that lower Dog River is perennial for nearly its entire length.

When the entire flow of the stream is being diverted to the pipeline in the summer and early fall, the river at the mouth flows perennially. During this low flow period, the only reach that is partially dewatered is an eighth of a mile segment just below the pipeline diversion. Instream flows are restored not far below by springs and hyporheic flow. Despite the diversion of all the summer low flow that is produced from the Upper catchment of Dog River, there has been as much as 40 percent or more gain of available daily flow recorded at the mouth that has been delivered from the Lower catchment (Table 10). But overall, full capture of flows during the summer and late fall above the diversion, has reduced mean monthly base flows at the mouth of Dog River by an estimated 30 to 40 percent.

Table 10. Comparison of Discharge (cfs) in Dog River Measured Above and Below the Diversion on Select Dates.

Location	July 20, 1972	July 27, 2000	July 27, 2016	May 1, 2019
RM 6.0 Above Diversion (fully diverted flow)	6.2[1]	4.0[2]	3.2[3]	14.91[5]
RM 0.0 Near Mouth	NA	8.3[3]	5.3[4]	30.1[5]
RM 3.0 in Reach 2	9.0[1]			

Sources: [1]HRWG 1999, [2]MHF 2000b stream survey, [3]CTD 2017b, [4]CTWS 2017, [5]OWRD 2019

Stream temperature monitoring may serve as a proxy that corroborates data indicating perennial flow in lower Dog River. The MHNF monitored summertime stream temperatures in the lower reach from 1994 through 2002, and again from 2016 through present. In each of these years sufficient flow was available for monitoring stream temperature just upstream from the confluence with East Fork Hood River.

Perennial tributary waters that feed lower Dog River include Puppy Creek, Brooks Meadow Creek, in-channel springs and groundwater, and wet meadows. There are few to no empirical flow data for these sources. There have been several spot flow measurements taken at the mouth of Puppy Creek, including one noted on July 20, 1972 that was 0.1 cfs (HRWG 1999).

Based on estimates derived from the online USGS StreamStats tool (USGS 2017), which can be used for approximating peak and base flow contributions for ungaged streams, Puppy Creek can potentially contribute on average nearly 4 percent of the base flow to lower Dog River. The same tool estimated that Brooks Meadow Creek can potentially contribute nearly 12 percent of the base. Peak flow projections for the two tributaries suggest a reverse trend, and that Puppy Creek can potentially contribute on average about 19 percent of peak flow in lower Dog River, while Brooks Meadow Creek's contribution would only average about 4 percent of the peak. The approximations highlight the seasonality of inputs of each of these catchments to Dog River below the diversion.

Groundwater contributions to Dog River are also believed to be substantial. The proportion of contribution is not known to have been quantified. But there are many mapped springs in the general area, and prominent ones in the Upper catchment that are known to be perennial. There also have been observed quite a few unmapped streamside springs (MHNF 2011).

Of the 33 tributaries observed in the July 2000 stream survey, 27 were near-bank springs or seeps. Seven of them were observed in the Lower Catchment. All 33 of the tributaries observed had enough flow on July 27th to be able to measure their water temperature. These are notable year-round contributions to the water supply of both upper and lower Dog River, and suggest that re-charge of the local aquifer is stored for a period of time before steadily being released as surface flow. In lower Dog River, observers estimated that groundwater contributions amounted to as much as 25 percent of the streamflow when surveyed, and in upper Dog River they concluded that groundwater was the major source of surface flow.

The effects of forest management on water quantity and streamflow in the subwatershed are considered to be slight. Two measures often used as indices of the potential effect of forest management on streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2015 to be below thresholds of concern (Table 11). Since then, there has been no new road construction, and only a minor extent of past thinning. Effects of forest management on stream flow are considered to be negligible. There remain however, 5 crossings over perennial streams where segments of road periodically divert intercepted runoff toward streams, a portion of which likely enters the stream during

high runoff events. But the amount of contributing area is a very small percentage. Overall, the Dog River subwatershed is considered to be hydrologically recovered from any past long-lasting effects to streamflow from forest management.

Table 11. Road Density and Watershed Impact Areas in the Dog River Subwatershed in 2015.

Indicator	2015	Threshold of Concern
Road Density (mi/sq mi)	2.4	3.0
Watershed Impact Area (%)	2	25

Source: MHNF 2015

It has been estimated that under natural flow conditions, Dog River contributed about 6 percent of the mean annual discharge of the East Fork Hood River (HRWG 1999), above the confluence with Middle Fork Hood River). Since diversion, Dog River is now estimated to contribute approximately 4 percent of the mean annual flow to the East Fork Hood River.

South Fork Mill Creek

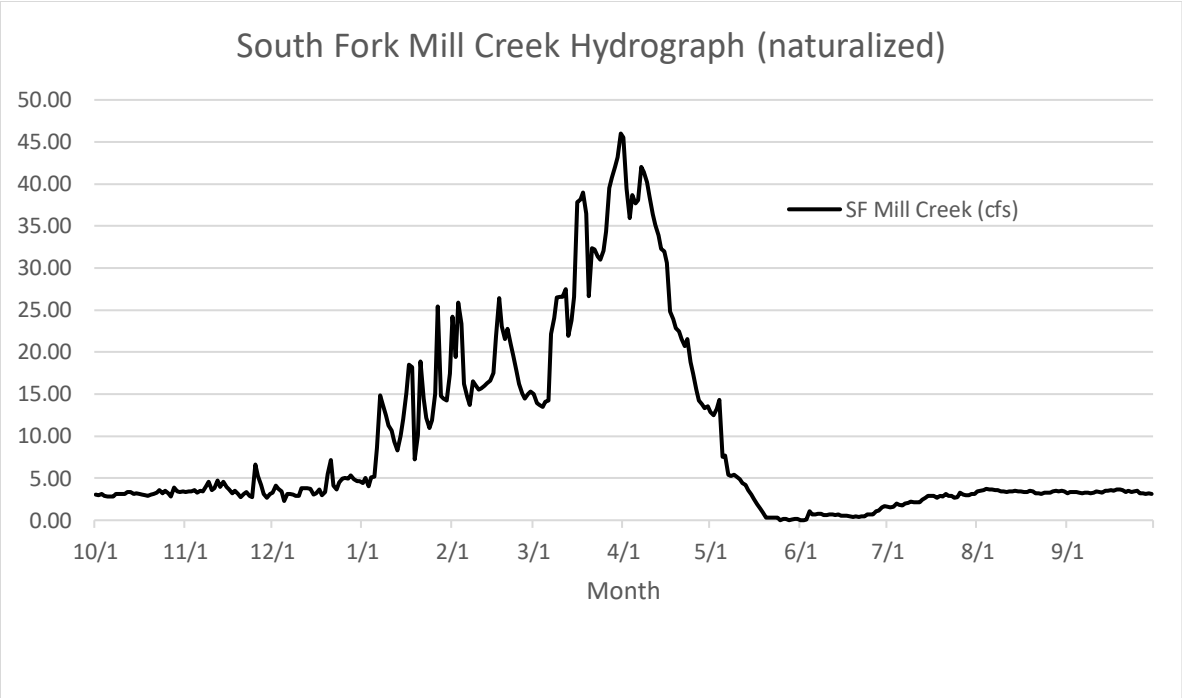
Several data sets are available for characterizing streamflow in the South Fork of Mill Creek. Continuous daily streamflow measurements were collected from October 1960 through September 1975 by the USGS, and from September 2011 to May 2019 by the City of The Dalles at a gage site 0.2 miles upstream from Wicks Reservoir at about RM 1.0 (USGS 2019, CTD 2019). Another set of data was collected between October 1962 and September 1970 from an old gage site at the outlet of the Dog River pipeline where it discharges into a headwater tributary to South Fork Mill (SWCD 2003).

South Fork Mill Creek streamflows are fed primarily by snowmelt, groundwater, and seasonal precipitation. A hydrograph of the natural flow of South Fork Mill was generated by subtracting the flow input from Dog River (Figure 8). This time period is uniquely important because it provides insight into the flow regime of SF Mill Creek prior to the construction of Crow Creek Dam.

Natural mean daily streamflows ranged from 1.3 cfs in June to a little more than 45 cfs in April. The majority of annual streamflow volume for South Fork Mill Creek occurred during March and April. This also is the time when peak flows were most likely to occur due to seasonal snowmelt, although precipitation and rain-on-snow events could lead to peak flows occurring at other times of the year. The highest peak flow recorded was 700 cfs and occurred in 1964, and was a rain-on-snow event. Another rain-on-snow in 1996 is believed to have been greater, but all gaging sites were substantially overtopped so that stage could not be recorded. Base flows were lowest during May to late June, and were probably maintained by the headwater springs high up in the subwatershed. Later, natural base flows rebounded in July and August, presumably as a result of periodic convective thunderstorms.

Compared to the Dog River hydrograph, the majority of the annual peak runoff from South Fork Mill inherently occurred a month sooner. This is likely due to the lower elevation of the South Fork Mill subwatershed, and its position further east of the Cascade crest. Most of the stream flow is generated from the Upper catchment, which comprises 45 percent of the subwatershed and receives the greatest amount of annual precipitation. The Lower catchment generates far less streamflow despite its greater size due to the sharp decline in annual precipitation and elevation eastward. There are no perennial streams in the lower catchment besides South Fork Mill Creek. Nearly all of the perennial flow is produced from the Upper Catchment.

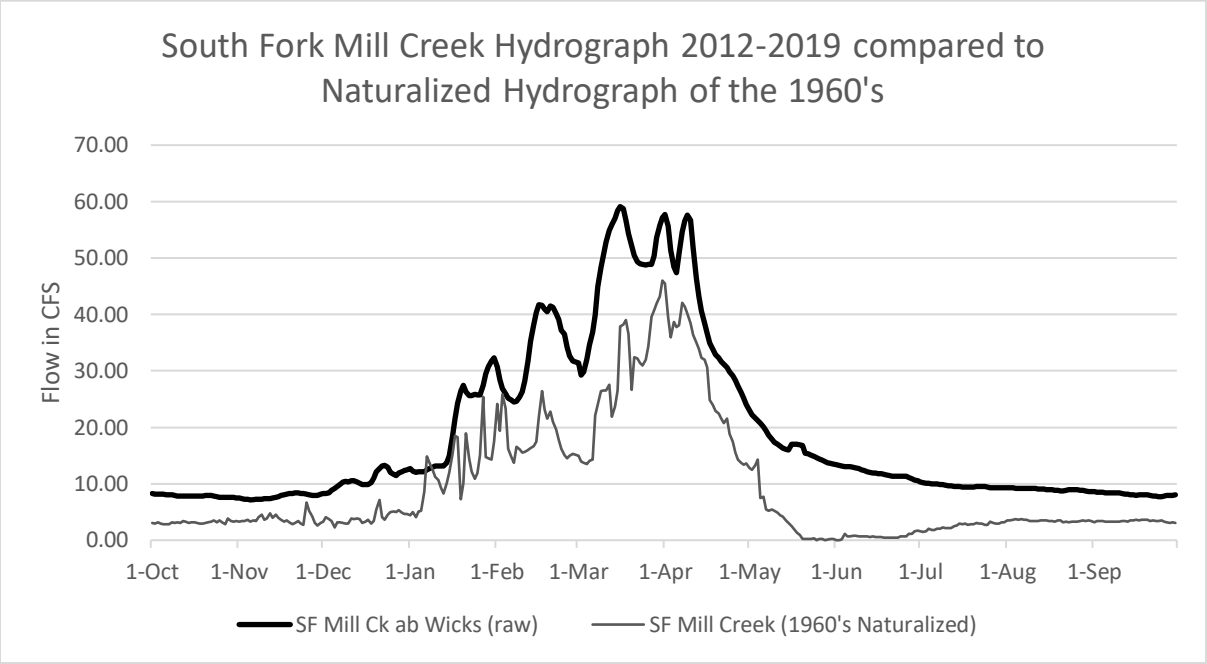
Figure 8. Estimated mean daily discharge (cfs) for South Fork Mill Creek for water years 1960 to 1967 upstream of Wicks Treatment Plant, naturalized by subtracting inputs of diverted water from Dog River.



Source: USGS 2019

Streamflow characteristics changed when the Dog River ditch began diverting water to South Fork Mill Creek in the 1860s, and again after the construction of Crow Creek dam in 1967 (Figure 9). Generally, management of the inflow and storage has resulted in an overall increase in base and mean annual streamflow. Also, the Special Use Permit that the City has with the Forest Service to operate the reservoir stipulates that at least 2 cfs be released below the dam year-around to provide for aesthetics and aquatic organisms (USFS 1967). Streamflow still varies seasonally as it would under natural conditions, but now there is more quantity. For example, a single observation during a stream survey on August 17th, 2011 measured discharge to be 8.6 cfs at the Forest boundary at about RM 8.4 below Crow Creek dam (MHNF 2011). Estimates of natural streamflow for that time of year would be expected to be below 5 cfs.

Figure 9. Hydrograph of South Fork Mill Creek above the Wicks water treatment plant intake.



Source: CTD 2019

Perennial tributaries in the Upper catchment that flow into the South Fork Mill Creek include Crow and Alder Creeks. Based on estimates derived from the online USGS StreamStats tool (USGS 2017), which can be used for approximating peak and base flow contributions for un-gaged streams, Crow Creek can potentially contribute on average about one-third of both the peak and base flow of the South Fork Mill above the reservoir. Estimates for Alder Creek indicate that it could potentially contribute about 40 percent of Crow Creek's peak flow and about 13 percent of its base flow. Together, their contributing area produces a notable perennial supply of streamflow from the Upper catchment that flows into Crow Creek Reservoir.

Several springs located high in the Upper catchment are groundwater sources that contribute perennial streamflow to two unnamed streams. One issues from Stroud spring and is tributary to South Fork Mill Creek, the other originates from Shellrock Springs and is tributary to Crow Creek. There is also a headwater spring that originates in the highest reach of the South Fork Mill Creek, marking the upper limit of its perennial flow. The amount of groundwater supply in the subwatershed has not been quantified, but their year-round contribution to the water supply of the South Fork Mill Creek suggest that they are similar to the many springs in the area, where recharge of the local aquifer is typically stored for a period of time before steadily being released as surface flow.

There have been about 3,829 (21%) acres of forest management activities over the last 15 years on Federal lands in and around the South Fork subwatershed. Treatments consisted of thinning, brushing, pruning, underburning, and pile burning to reduce hazardous fuels. They were intended to minimize the potential risks and impacts of wildfire. Best Management Practices were incorporated into treatment design so that watershed effects would be minimized. Existing effects of forest management on water quantity and streamflow in the subwatershed are considered to be slight.

Two measures often used as indices of the potential effect of forest management on streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2012 to be below

thresholds of concern (Table 12). Since then, there has been no new road construction, some roads have been closed and decommissioned, and the extent of ongoing fuel treatments (i.e. pile burning) is minor. Effects of forest management on stream flow are considered to be negligible.

There remain however, 4 crossings over perennial streams where segments of road periodically divert intercepted runoff toward streams, a portion of which likely enters the stream during high runoff events. But the amount of contributing area is a very small percentage. Overall, the South Fork Mill Creek subwatershed is considered to have minimal hydrologic disturbance from forest management, and any long-lasting effects to streamflow are considered to be negligible.

Table 12. Road Density and Watershed Impact Areas in the South Fork Mill Creek Subwatershed in 2012.

Indicator	2012	Threshold of Concern
Road Density (mi/sq mi)	2.6	3.0
Watershed Impact Area (%)	13*	25

Source: MHNF 2012, MHF 2000b *Prior to the Government Flats fire of 2013.

In 2013, the Government Flats fire burned over about 65 percent of the Lower catchment, the majority on non-federal lands. As a result, there was a reduction in the extent of connected forested canopy, which increased the percentage of watershed impact area in the lower subwatershed. There are no perennial tributaries to South Fork Mill Creek in this burned over area; therefore, increases to runoff would only have been realized following a precipitation or runoff event of sufficient magnitude to produce streamflow in intermittent streams and ephemeral draws. But for the first several years, there was likely an increase in peak flows after periodic heavy precipitation or runoff.

Immediately following the fire, actions were taken to re-establish vegetation by emergency aerial seeding on much of the non-federal acreage. Then, years of natural revegetation and manual reforestation followed and continued to establish. Now, an effective ground cover has mostly recovered. This, and the fact that the burned over area was mostly below the snow zone, in a band of lower annual precipitation, and partially where oak is the dominant vegetation type, peak flow trends are believed to have returned to a pre-fire flow regime and no longer elevated.

It has been estimated that under natural flow conditions, South Fork Mill Creek contributed about 69 percent of the mean annual discharge of Mill Creek (OWRD 2019a). Since diversion for the Wicks water treatment plant, the estimated contribution is approximately 40 percent of Mill Creek's mean annual flow (at 50% exceedance probability).

Dog River Diversion and Crow Creek Reservoir

Nearly 100 percent of the consumptive water use allocated for Dog River and South Fork Mill Creek is for municipal uses by the City of the Dalles (OWRD 2019a). Water is managed for this purpose by using the Dog River diversion and pipeline, and the Crow Creek reservoir facilities. Operations of the Dog River pipeline and Crow Creek reservoir can be generalized as capturing both naturalized streamflow from upper South Fork Mill Creek and the diverted flow from upper Dog River. Maximum storage (full-pool) in the reservoir is usually achieved by early- to mid-February. Once full, diversion of flow from upper Dog River is reduced so as to minimize spill out of the reservoir while maintaining its level at full-pool. Water operations are commonly adjusted throughout the year to try and balance the capture of natural available flow with the quantity of diversion needed to maximize storage, minimize spill, and manage release so that demand is met efficiently. Efficiently managing capture and release is also

intended to avoid over-drafting of the reservoir, so that re-filling it during the winter for the following year would be attainable.

The Dog River diversion headworks at RM 6.0 consists of a channel-spanning concrete control structure and spillway, along with a screw gate oriented perpendicular to the direction of flow into the pipeline inlet. The screw gate, which is manually operated, determines the size of the opening for streamflow to enter the pipeline. Water is transferred from Dog River 3.4 miles through the pipeline at a grade of about 1 percent until it discharges into a headwater tributary that flows into the South Fork of Mill Creek at RM 15.7. The outflow then flows downstream for approximately another 5 miles where it enters Crow Creek reservoir.

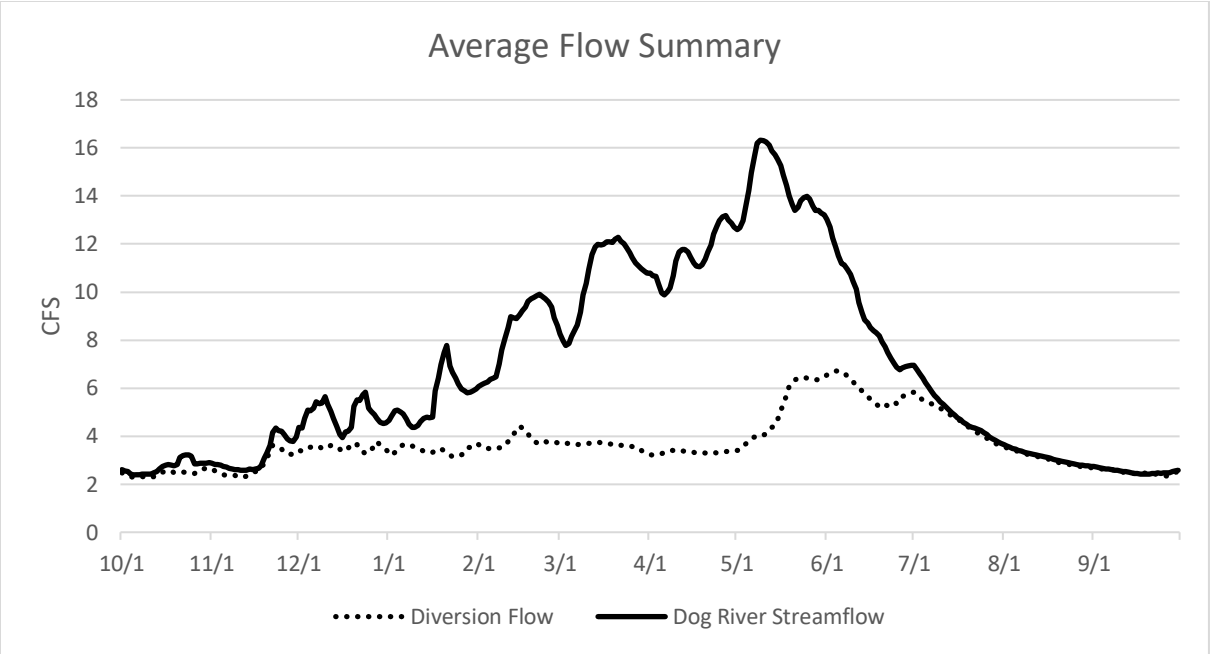
Crow Creek reservoir is supplied by two inlet streams, South Fork Mill Creek and Crow Creek, and their contributing area. The reservoir is a 28-acre earthen structure impoundment. At a pool elevation of nearly 2,600 feet, it has a maximum depth of 65 feet and a storage capacity of about 267 million gallons (~820 AF, MHF 2000b, Mill Ck WA).

A spillway around the north side of the dam overtops when the pool level rises above 2,564.5 feet elevation. There are no controls for the spillway, and no operational capability to manage its height. When water levels rise above its inlet, it simply diverts the flow gravitationally around the dam through an excavated channel and back into an intermittent tributary to the South Fork Mill Creek about 1,200 feet downstream.

Outflow (release) from the base of the dam is controlled manually using a screw valve that is activated from the top of the dam. It provides the operational capability to manage the rate of drawdown and release from the reservoir that discharges as outflow into the South Fork of Mill Creek, eventually to flow approximately 8 miles downstream to the diversion for the Wicks water treatment plant at about RM 1.0.

The timing and amount of diverted flow from upper Dog River is based generally on the City's demand, storage capacity, and abundance or scarcity of supply. On average, Dog River contributes about 58 percent of the City's total surface water contribution. Diversion to South Fork Mill Creek in the early summer averages about 7.0 cfs, and about 2.5 cfs during late summer. In most years, the headworks at the pipeline inlet are operated to increase diverted flow in the late fall and early winter to re-fill Crow Creek reservoir, by early or mid-February if possible. Once full, the amount of diversion is manually reduced to a maintenance flow of about 2-3 cfs until mid- to late-May (Figure 10). Then the rate of diversion is increased to capture the entire amount of upper Dog River's baseflow from July through September and early October (see Table 13).

Figure 10. Mean daily discharge (cfs) summary of an average water year that is diverted into the City of The Dalles pipeline during 2012 through 2018 compared to the mean daily discharge of Dog River above the diversion.



Source: CTD 2018

Table 13. Estimated Percent of Mean daily discharge (cfs) of Dog River Diverted May through October.

	May	June	July	August	September	October
Percent of Dog River diverted	52	99	100	100	100	99

Source: CTD 2018

The Dog River pipeline at capacity can potentially transfer a maximum flow of 12.3 cfs. Log records from the City of The Dalles indicate that since 2006, there were two occasions when the pipeline was filled to capacity in the period between October and January, and two other times during the month of May (pers. comm. Dave Anderson 2016).

- Jan 30, 2006: pipeline flow of 12.3 cfs for short duration (storm event, flow decreased from 12.3 to 2.5 cfs in less than 24 hours, and had only been flowing at 5.7 cfs on 12/29/2005),
- Dec 24, 2014: pipeline flow of 12.3 cfs for less than 1 week, re-filling Crow Creek reservoir
- May 2009 and 2010 pipeline flow of 12.3 cfs for about 1 week each to finish re-filling Crow Creek reservoir

The pipeline has had many leaks along its length throughout its 100 plus years of use. Currently the only quantification of water loss from the pipeline is a mathematical estimate based upon the volume of the pipe at full capacity. It is estimated by the City that as much as 1.9 cfs may be leaking from the pipeline when it is at full capacity. However, as has been noted prior, there have only been four instances since

2006 when the Dog River pipeline was filled to maximum capacity, and the amount of estimated water loss could have been that much.

Many repairs and patches to limit the leaks have been made over the years with a variety of methods and assorted materials. The locations and severity of leaks have also varied. Moreover, a given leak may only be present or visible during periods of elevated flow within the pipeline, when the range of pressure and velocity are near their highest. At lower flows some leaks may not be detectable, or become a slight trickle. Although leaks of varying size have been observed over the pipeline's lifespan at different times and locations along its length, no comprehensive empirical data have been collected to reliably inventory and characterize the quantity and flow paths of specific leaks.

In recent years there have been several endeavors to try and better understand and characterize the amount of water loss from leaks, but they have not been entirely conclusive. Using instrumentation to measure and track inflow and outflow proved infeasible. The City performed a single dye test in early October of 2016 in an attempt to find evidence that would indicate if leakage from the pipeline was contributing any detectable return flows to lower Dog River during critical low flow periods. The test did not uncover evidence of immediate and detectable return flow (pers. Comm. Dave Anderson 2016a).

During the 2000 summer stream survey, there were not any seeps or springs observed that flowed into lower Dog River from the right streambank (looking downstream) that would suggest that leaks were independently contributing directly to surface flow. All of the near-bank seeps and springs that were inventoried were on the left bank, on the west side of the stream.

Anecdotal observations in late summer of 2017 and again in mid-spring of 2019 provided some insight as to how a leak may behave under different flow rates, and potential fate pathways. It was observed that larger leaks tended to create overland routes during temporary high flow, that then find their way to an existing intermittent or perennial channel. One such leak observed in mid-spring created an overland flow route a short distance to Brooks Meadow Creek. Late summer observations indicated that a couple of larger leaks became trickles and were slowly infiltrating into the soil.

The amount and fate of pipeline leakage is not well known. There is likely a proportion of leakage that cannot be accounted for. A proportion of it is likely returned slowly to the local aquifers in the area to be stored and released steadily over time. During high flows, the larger leaks find overland flow paths to intermittent or perennial streams. Depending on the location of the leak some could return to Dog River, while some could contribute to the South Fork of Mill Creek. Some water loss is likely depleted by evapotranspiration, and some is probably stored in the soil profile. Given the geology of the area, there could be a proportion that drains to deeper aquifers for long-term storage and release elsewhere.

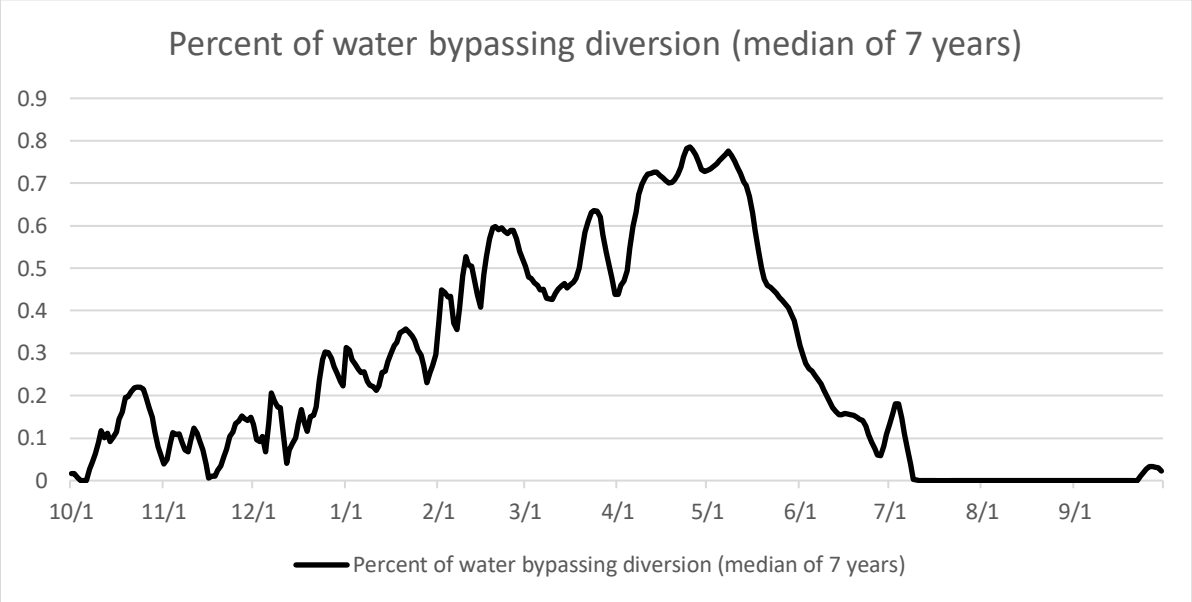
In practice, the total amount of water loss from leakage factors into the amount of water withdrawn from upper Dog River for municipal use. Loss from leakage decreases efficiency of use so that water is withdrawn until the operational demand is met. In effect the amount withdrawn is the quantity needed to meet demand plus leakage. This is one of the reasons the City is proposing to replace their pipeline, as a measure to reduce diversion needed to replace loss.

Water that is not diverted into the pipeline is considered bypass flow and contributes to the available flow downstream into lower Dog River. Usually only a portion of streamflow is diverted from upper Dog River from November to June. During some months bypass flows may be greater than diverted flows. Data show that the City of The Dalles diverts the maximum percentage of streamflow through the pipeline during the summer and early fall; bypass flows are often zero in July through September.

Since there is natural variability in the amount of streamflow available in Dog River, evaluating bypass flows as a percentage of the total available flow can help explain how much volume from the Upper catchment passes downstream to lower Dog River. Figure 11 displays the percentage of total streamflow that was not diverted, but rather flowed past the point of diversion and stayed in the main channel of Dog River during the 2012 to 2018 period of record. The maximum amount of bypass flow can be expected to

occur during late April and early May and has accounted for between 70 and 80 percent of the total available flow from upper Dog River.

Figure 11. The amount of mean daily streamflow that bypassed the pipeline diversion down Dog River (undiverted flow), expressed as a percentage of total available streamflow for water years 2012 to 2018.



Source: MHNF 2018

Streamflow data are not available for the portion of South Fork Mill Creek above Crow Creek Reservoir. Dam release and spillway flows associated with Crow Creek reservoir were provided by the City of The Dalles from 2006 to 2015 (Table 14). These data provide insight into the management of Crow Creek Reservoir, and can be used in conjunction with available diversion data, to estimate "naturalized" reservoir inflow. The naturalized reservoir inflow represents the combined flow from Crow Creek, Alder Creek, and South Fork Mill Creek, not including the water delivered through the Dog River diversion. The highest naturalized inflow between 2006 and 2015 was nearly 100 cfs, recorded on March 31st, 2011 (note: data are typically recorded once per week so some peak flows may have been missed).

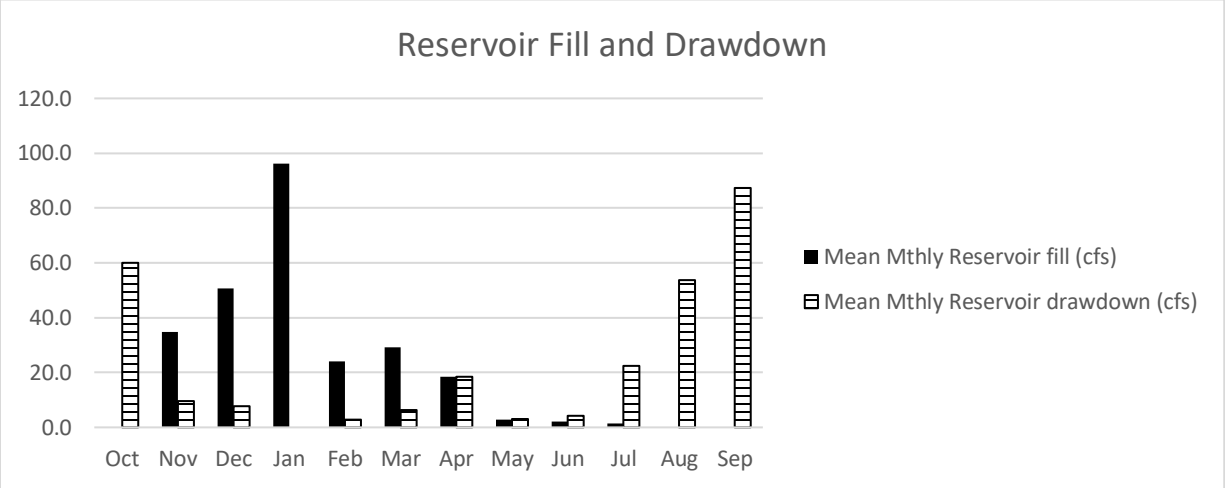
Table 14. Estimated maximum naturalized inflow into Crow Creek Reservoir not including diverted flows from Dog River.

Maximum Naturalized Inflow to Crow Creek Reservoir (cfs)									
2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
78.4	10.5	12.8	29.3	5.0	98.4	80.5	20.1	21.9	9.5
3-Feb	22-May	27-Jun	20-May	28-Apr	31-Mar	26-Apr	21-Mar	21-Feb	6-Jan

Release from the reservoir occurs year-round primarily for: 1) treatment to meet municipal demand, and 2) to provide at least 2.0 cfs to South Fork Mill Creek as stipulated by the reservoir Special Use Permit. Dam releases are commonly 6 cfs or higher. Releases that are 6 cfs or higher would be generated naturally by South Fork Mill Creek approximately 50% of the time (USGS 2017). The quantity needed

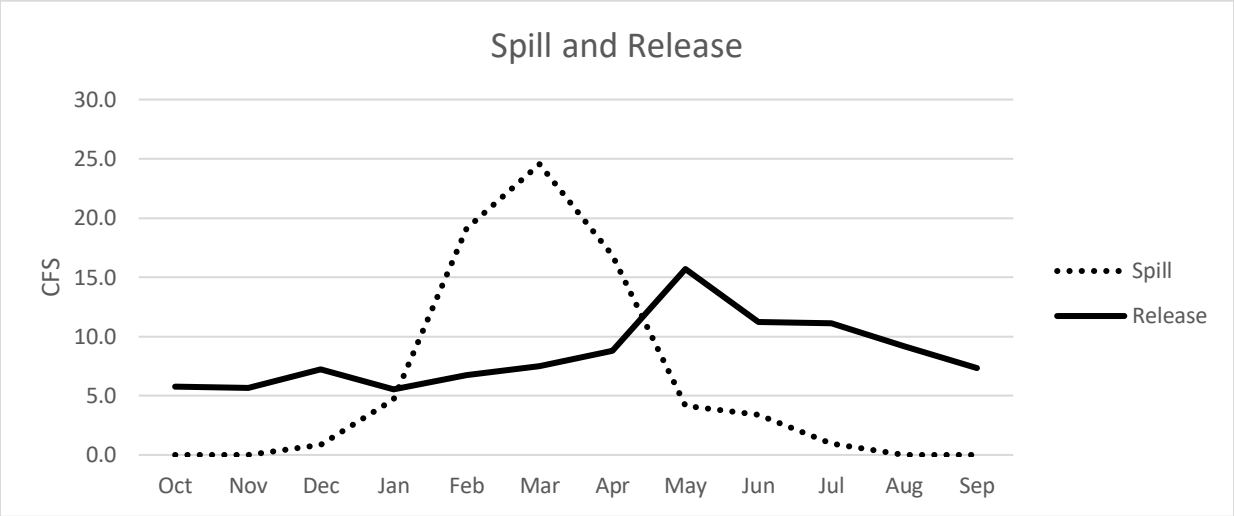
for release typically fluctuates on a seasonal trend, but may also occur weekly or daily. The greatest demand and drawdown usually occurs during the summer months when precipitation is low and air temperature is high. As inflow into the reservoir begins to subside, drawdown begins to occur and the water level of the reservoir drops. The City normally begins drawdown in early July and it is often November before any refilling begins (Figure 12). Reliable late summer flows from these surface water sources, including available live flows and stored water releases, are currently estimated to be 5.4 cfs (CTD 2014). Sometimes there are needs for special releases such as when one of the supplemental wells is taken off-line.

Figure 12. Mean monthly fill and drawdown trends during the period 2005 to 2015.



When the level of the water in the reservoir is higher than the elevation of the spillway inlet, it will flow out the spillway channel. Spill is greatest during the winter and spring, and usually occurs in response to heavy precipitation or runoff (Figure 13). Spill can be greater than release during these occurrences, and excess to municipal use. This flow is bypass to the intake at the Wicks water treatment plant, and contributes to Mill Creek discharge. Spill typically does not occur during the early summer to late fall months, when demand and drawdown are highest. If spill is occurring, then less is needed for release.

Figure 13. Comparison of mean monthly spill and release during the period 2005 to 2015.



Source: CTD 2017c. Note: Spill is not recorded continuously, so missing data has been interpreted by the graphed line.

Besides Crow Creek reservoir, the City has 5 additional drinking water storage facilities in town. They store finished drinking water for the community. The use of surface water from South Fork Mill Creek is supplemented by three City groundwater wells, which are used to augment and bolster total municipal supply, typically during peak demand in the summer months, or for emergencies. In the year 2012, approximately 87 percent of municipal water supply came from the City's surface water sources and 13 percent came from groundwater (CTD 2014).

The Wicks water treatment plant intake from South Fork Mill Creek diverts on averages about 5.0 cfs annually, but it has a maximum capacity to treat up to about 8.7 cfs. The City's average annual water use was estimated in 2015 to be 4.7 cfs. Estimated average use per month ranged from 2.6 cfs in October to 8.5 cfs in June (BOR 2015). The City's Water Master Plan of 2006 describes their municipal water system, its operations, maintenance, projected needs, customer base, budget, etc.

The City also prepared a Water Management and Conservation Plan in 2014 that was required by OWRD as a condition of their surface water rights. In that plan are projections for future growth and demand, and plans for meeting them. It includes conservation measures to be implemented to improve efficiency of water use and minimize losses.

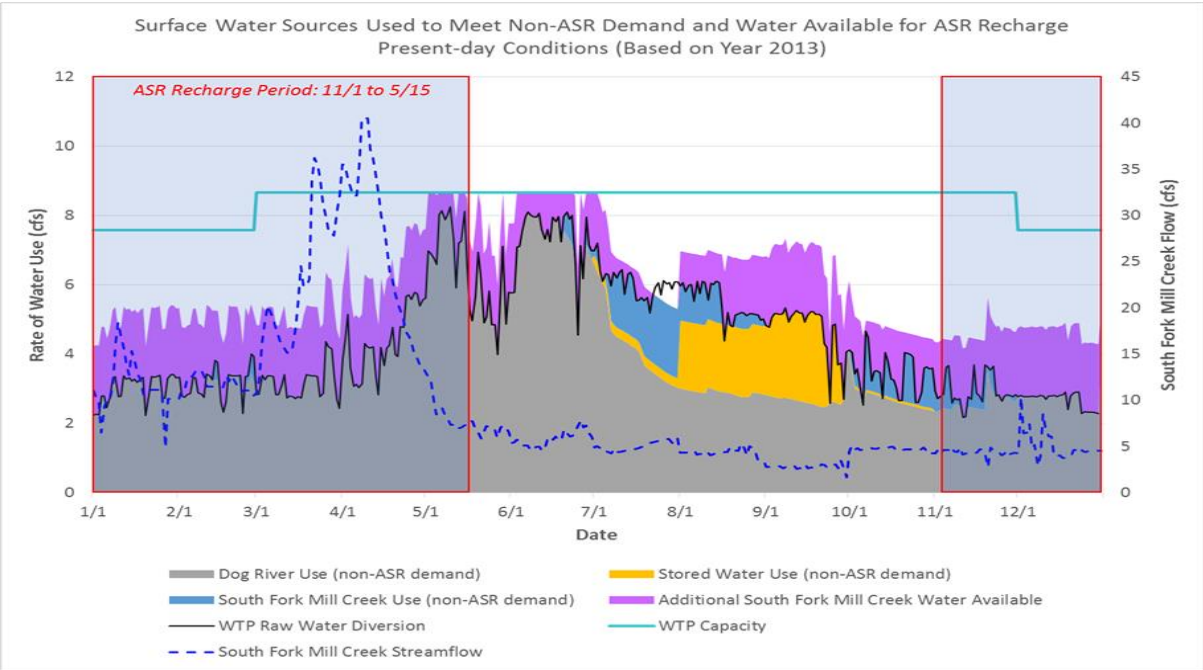
Future projects addressed by the City's 2006 Water System Master Plan include expansions of Crow Creek Reservoir on Forest Service lands and the Wicks water treatment plant downstream, which are anticipated to increase the reliable summer flows from the municipal watershed to 15.5 cfs, for a total increase of 6.8 cfs. To date, however, only preliminary plans have been drafted, and there has not been any formal proposal submitted to the Forest Service from the City to proceed with the expansion of the reservoir. More recently, the City has received a limited license from OWRD to explore the feasibility of an Aquifer Storage and Recovery (ASR) system on their property. The permit allows for 16.7 cfs to be used for exploration of the ASR, using water from the Wicks treatment plant. If feasibility is proven, then it is possible that the City would not need to pursue expanding Crow Creek Reservoir (pers. Comm. Dave Anderson 2019).

Testing for ASR would not be reliant on replacement of the Dog River pipeline, and will begin whether or not the Proposed Action proceeds. Water to be used for the ASR testing would be supplied by the surface

water rights in the municipal watershed, which include Dog River, South Fork Mill Creek, and Crow Creek reservoir as stipulated by the limited license. The water treatment plant's average intake would be expected to increase too, capitalizing on existing flow that has not been utilized for municipal use prior. In the issuance of the City's limited license, OWRD has estimated that existing surface flow and storage is available for the City's ASR project (OWRD 2018).

It is estimated that demand for ASR testing will be 244 million gallons per year (equates approximately to 1.03 cfs). The increase in demand to test the ASR is expected to be supplied from a proportion of the total annual contribution of South Fork Mill Creek. There has been enough average available spill and runoff in winter and spring from the South Fork Mill Creek subwatershed, that when coupled with a percentage of the storage in the reservoir, there would not be a need for additional water diverted from Dog River to meet the increase in demand (Figure 14).

Figure 14. Comparison of the proportion of the different source water supply with current and projected ASR demand.



Source: CTD 2019a Note: different scale for S. Fk. Mill Creek on right-hand axis). Values above the solid black line (i.e., WTP Raw Water Diversion) represent the volume of unused water currently available for ASR testing.

3.3.1.3 Water Quality

Dog River

The Oregon Department of Environmental Quality (ODEQ) designates beneficial uses for river basins in the state for which water quality standards are established. Beneficial uses designated by ODEQ for the Hood Basin, which the waters of Dog River contribute to, are numerous (Table 15). The beneficial uses designated for Dog River are fish and aquatic life and public domestic water supply. In the lower catchment of the Dog River subwatershed, from the mouth up to about RM 5.5 the use is specifically designated for trout and salmon habitat, and salmon and steelhead spawning between October 15 and May 15. In the upper catchment above RM 5.5 the designated beneficial use is specifically for the Dalles Municipal Watershed and as core cold water habitat.

Table 15. Beneficial Use Designations for the Hood Basin (includes Mill Creek) from ODEQ.

Beneficial Use	Hood River Basin Streams
Public domestic water supply*	X
Private domestic water supply*	X
Industrial water supply	X
Irrigation	X
Livestock watering	X
Fish and aquatic life	X
Wildlife and hunting	X
Fishing	X
Boating	X
Water contact recreation	X
Aesthetic quality	X
Hydropower	X
Commercial navigation and transportation	X

* With adequate pre-treatment (filtration and disinfection) and natural quality to meet drinking water standards.
Source: Table adapted from ODEQ (ODEQ 2017b)

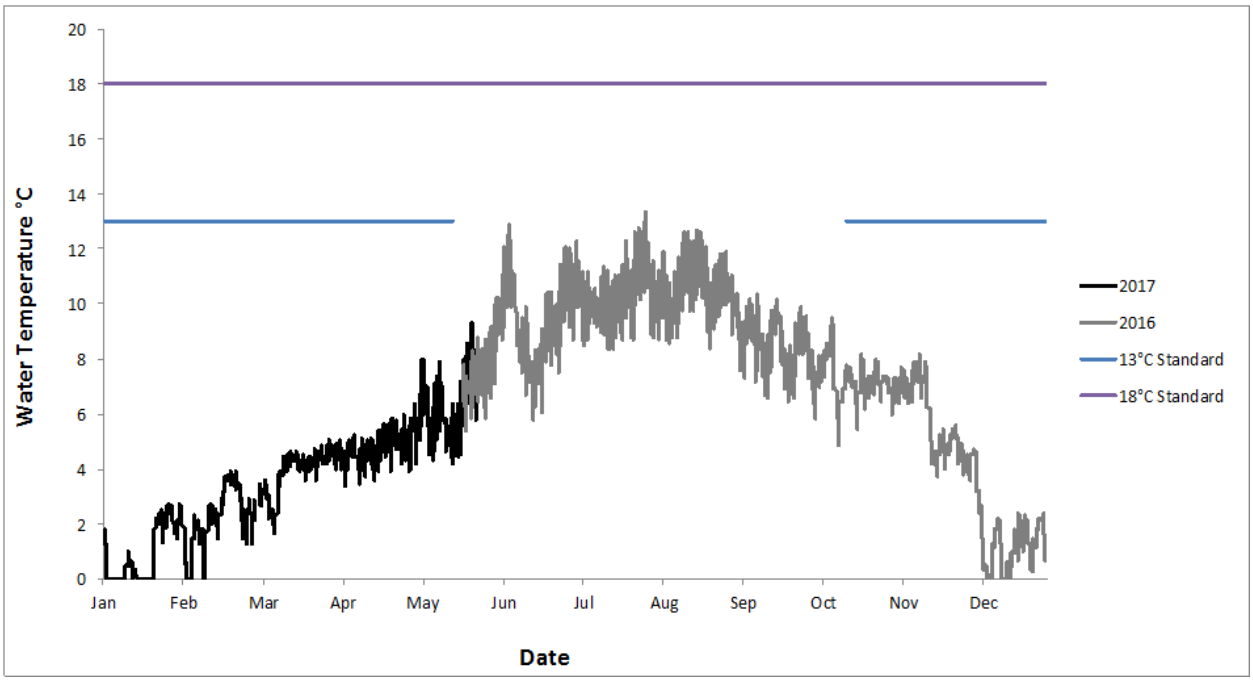
For the designated Dog River beneficial uses, only one water quality standard has been identified as impaired, and is included on the ODEQ's 303(d) list of Category 5 waters in their 2012 Integrated Report. Testing of water samples taken from Dog River detected that the amount of iron in the water exceeds the standard for that constituent. It is considered to be a non-point source contaminant because the cause for its presence and the amounts detected are not known. In fact, iron is listed as a constituent of impairment in the entire Hood River basin including the West Fork, Middle Fork, and East Fork. It has been surmised that iron may be naturally occurring, and its presence could be due to the geologic formations that underlie the area (ODEQ 2017c). No other impairments are listed by ODEQ for Dog River; no other point source or non-point source pollutants, contaminants, or water quality exceedances have been identified.

Due to the presence and use by salmon and steelhead of the lowest 2.5 miles of Dog River, and because of the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature has been an ongoing effort by the MHNF. Temperature data collected above the pipeline diversion indicated that temperatures within upper Dog River are cold and vary seasonally from close to 0°C in the winter (December to February) to approximately 13°C in late July (MHNF 1996, 2017). At the mouth of Dog River, temperature monitoring between July and October of 2000 (MHNF 2000a) found that the 7-day maximum temperature remained below 13°C, which is the ODFW standard for salmon and steelhead spawning, during that time period (Figure 15).

A June 2017 technical memorandum from the CTWS described Dog River as potential cold-water thermal refuge for salmon species in the East Fork Hood River because of the groundwater inputs from springs and wet meadows (CTWS 2017). Results from their stream temperature monitoring near the

mouth between May 2016 and May 2017 are displayed in Figure 15. That data corroborates the 7-day maximum temperature findings of the MHNF, and verifies further the cold water contribution of Dog River to the East Fork Hood River, particularly during inherent low flow periods in late summer and early fall.

Figure 15. Daily average temperature data for Dog River upstream of the confluence of the East Fork Hood River.



Source: CTWS 2017

Stream temperature monitoring was also conducted by the MHNF in Puppy Creek near its mouth during a 2001 stream survey. The seven-day maximum average temperature did not exceed 14.5°C, indicating its contribution of cold water to lower Dog River at RM 0.1. Further upstream at about RM 5.4, the inflow of Brooks Meadow Creek is also thought to be a source of cold water. While long-term stream temperature monitoring has not been conducted there, its high elevation (approximately 4,500 feet), groundwater source, short stream length, effective shading, and moderate late-summer flow (estim. avg. 2 cfs) suggests it is likely another cold water source to Dog River (MHNF 2017). Dog River has been identified as a cold water source for the East Fork Hood River. It is known to contribute cold water in the summer, including when full diversion into the pipeline occurs upstream at RM 6.0.

Residual effects to riparian shading from past forest management are considered to be negligible in the Dog River subwatershed. The solar radiation measurements taken during the 2000 stream survey averaged overall about 32 percent, indicating that the majority of the length of Dog River had effective shade. Segments of reaches where shade was lacking included two older clearcut plantations along approximately 0.4 miles of lower Dog River where riparian vegetation had been encroached upon during the original harvest in the 1970s, and where several small patches of streamside blowdown occur in both the lower and upper reaches.

As indicated by the 2000 stream survey conducted by the MHNF, fine sediment does not appear to have been impacting the water quality of Dog River. Also, the ODEQ 303(d) list does not identify any impairments for Dog River for turbidity or sediment. There are however, anthropogenic sources of fine sediment in the subwatershed. The principle sources are where certain segments of road connect to the channel network at specific perennial stream crossings. There are four perennial stream crossings where the potential for fine sediment to enter the stream network is greatest.

The first is where Highway 35 crosses over Dog River at RM 0.1. Highway 35 is a major thoroughfare, and is subject to year-round traffic that at times can be heavy, particularly during the winter ski season. Grime and grit from the highway can be washed into streams where it crosses over them. In wintertime driving conditions are often slick, so it is common practice that the highway is sanded to enhance traction. Sanding materials typically buildup along the roadside over the course of the season. Road crews make an effort to recover much of this roadside buildup, but a notable proportion of it cannot be recovered. At stream crossings, such as the one over Dog River near its mouth, these sanding materials remain poised where they can be washed into stream waters periodically when it rains.

Two of the other crossings are where FS road 44 crosses over Dog River and where FS road 17 crosses over Brooks Meadow Creek. Both are paved crossings where use is seasonal, sporadic, and relatively low. The amount of road grit and fine sediment generated at these crossings that can enter stream water is comparatively low.

The fourth crossing is where Brooks Meadow Creek flows across the top of the 12-foot wide gravel service road that parallels the pipeline. The channel at this crossing has been heavily impacted, and flow is sometimes hindered, ponding in wheel ruts before passing across and back into the creek. Although this road is used very little, water flows across it persistently. When not frozen, this site is always ponded and muddy, it is a potential chronic source of fine sediment. But the area is small, and the stream velocity low, so the amount of sediment that actually gets mobilized into the water column is relatively low too, except when a vehicle or OHV occasionally runs through the 10 x 12 foot puddle.

South Fork Mill Creek

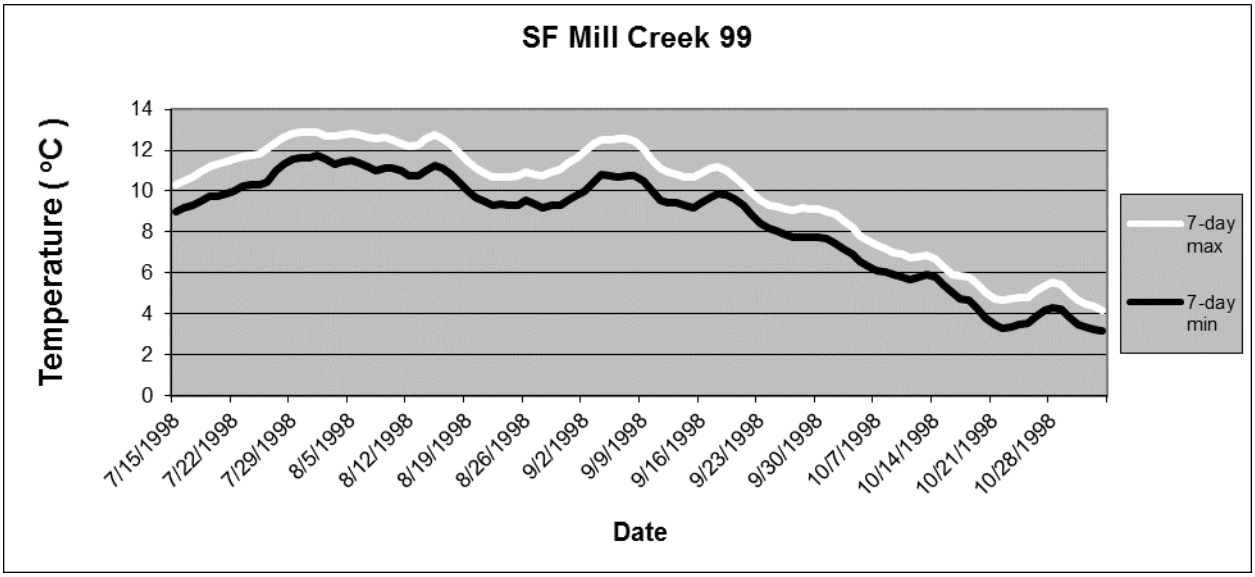
Beneficial uses designated by ODEQ for the Hood Basin, which the waters of South Fork Mill Creek contribute to, are also numerous (Table 15). The beneficial uses designated expressly for South Fork Mill Creek are entirely public domestic water supply, but also for fish and aquatic life below Crow Creek Reservoir. In the lower catchment of the South Fork Mill subwatershed, from the mouth up to Crow Creek Reservoir the designation is specifically for trout and salmon habitat, while only the reach segment between the mouth and the waterfall at about RM 2.5 is designated specifically for salmon and steelhead spawning between October 15 and May 15. In the upper catchment above Crow Creek Reservoir, the designated beneficial use for fish and aquatic life is specifically core cold water habitat.

For the designated beneficial uses for South Fork Mill Creek, there are no water quality standards identified as impaired on the ODEQ's 303(d) list of Category 5 waters in their 2012 Integrated Report. The City of the Dalles performs regular water quality testing on the South Fork Mill Creek just upstream of their municipal water treatment plant. Other than seasonal or storm variation in temperature, turbidity, pH, and hardness, their monitoring indicates that the quality of the stream water in the creek is very good. Occasionally they detect high concentrations of coliform, believed to originate from wildlife fecal contamination. In the past, they have also detected slightly elevated concentrations of phosphorus, possibly from accumulated sediments in the reservoir. However, the dilution provided by the inflow of water from Dog River has abated any effect that could necessitate special treatment (MHNF 2000b).

Due to the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature has been a contributing effort by the MHNF to provide data to ODEQ. Stream temperature data were monitored in South Fork Mill Creek at the USFS boundary between July 9, 1999 and November 3, 1999 (MHNF 1999). The seven-day average maximum water temperatures did not exceed

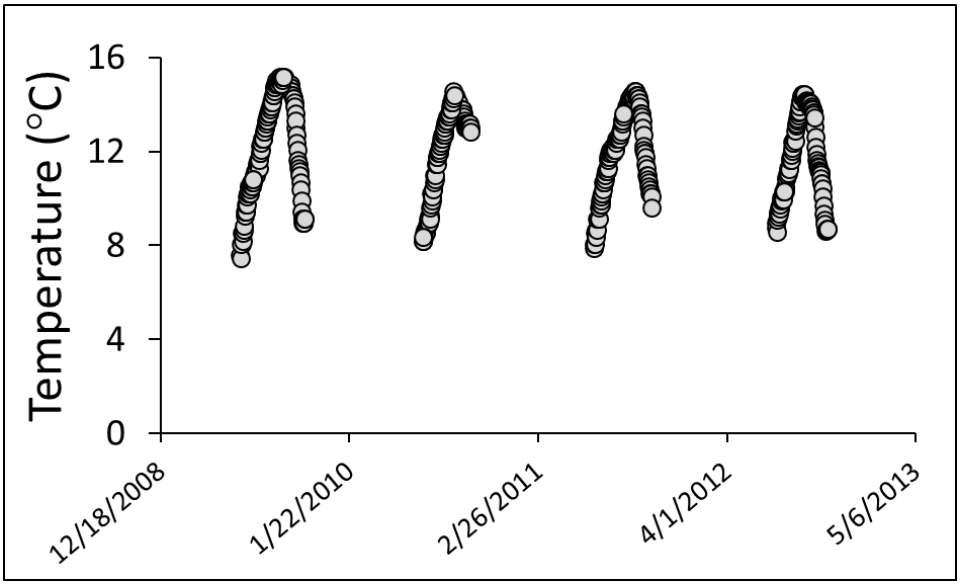
13ºC, which is the ODFW standard for salmon and steelhead spawning, during that time (Figure 16). Additional monitoring of summer stream temperatures at a different location just downstream of Crow Creek Reservoir between 2009 and 2012 (Figure 17) indicated that the seven-day maximum temperature commonly increased slightly above the 13ºC standard from early August to early October.

Figure 16. Seven-day-minimum and maximum temperatures in South Fork Mill Creek (elevation of 2,000 feet) at the USFS boundary (MHNF 1999) 4 miles below Crow Creek Reservoir.



Explanation for the differences in maximum stream temperatures observed at the two different locations is not readily discernible. The 1999 data were acquired from a site 250 feet lower in elevation and about 4 miles downstream from the other monitoring site. Additional data would be needed to reliably determine the cause for the difference, but one factor that may be at the upper monitoring site is the reservoir. Drawdown during peak use would have lowered reservoir levels, resulting in the potential increase of temperature in the stored water that issued from the dam where the monitoring occurred. Regardless, stream temperature is not considered by ODEQ to be degrading water quality in the South Fork Mill Creek.

Figure 17. Summer average daily temperature for South Fork Mill Creek (elevation of 2,500 feet), just below Crow Creek Reservoir.



Source: MHNF 2017

Residual effects to riparian shading from past forest management are also considered to be negligible in the South Fork Mill Creek subwatershed. Solar radiation measurements taken during the 2011 stream survey averaged overall about 12 percent for the month of July, indicating that the majority of the length of the surveyed reaches had effective shade. Impacts to riparian vegetation from the Government Flats fire in 2013 were not extensive nor long-lasting in the South Fork Mill Creek subwatershed, and regrowth of streamside shade that was affected has mostly recovered.

As indicated by the 2011 stream survey conducted by the MHNF, fine sediment was not observed to be impacting the water quality of South Fork Mill Creek. The ODEQ 303(d) list also does not identify any impairments for South Fork Mill Creek for turbidity or sediment. There are however, some anthropogenic sources of fine sediment in the subwatershed. The primary sources on Forest Service lands are where certain segments of road connect to the channel network at specific perennial stream crossings, and presumably where several segments of the lower reach exhibited some evidence of unstable stream banks.

Three of the crossings are associated with FS road 1721 where it crosses over Stroud Springs and the South Fork of Mill Creek, and also at Alder Creek. The relative amount of sediment potentially delivered from roads to these crossings is considered to be low. First, there is very little traffic because it is within the Municipal Watershed which is closed to public use. Also, all three crossings are upstream of Crow Creek Reservoir, where road sediment would be expected to settle and accumulate. Lastly, the drainage structures on this road are in good condition, and have been purposefully constructed to minimize the length of road connected to the stream network.

A fourth crossing is currently a bridge where FS road 1720-190 crosses the South Fork of Mill Creek about ¾ of a mile below the dam. It has blown out due to storm flow events on several occasions (MHNF 2000b). It is also within the Municipal Watershed, and seldom used. There has not been a great deal of sediment observed from the use of this road, but there probably had been for a short period at the time it was blown out.

Another crossing is a low-water ford about 3.5 miles downstream of the dam on non-Federal land. It is also seldom used, and it is not always passable. Periodically, it could get used during low flow periods when it would be safe to cross over. When crossed by a motorized vehicle, it is likely that a measure of sediment is stirred and mobilized. The duration of the disturbance would be brief, so conceivably the amount of sediment generated would be minor and short-lived.

The 2011 stream survey of South Fork Mill Creek noted some evidence of unstable streambanks in the lower reach not far upstream of the Forest boundary. It is presumed that they have developed as a result of an altered hydrologic regime. During peak demand in late summer and early fall, the streamflow is greater than what it would have been before the dam was constructed. Now it is likely that the creek flows higher, and so stream banks in certain places have undergone some adjustment and periodic erosion.

Sedimentation has likely increased periodically due to wildfires that have occurred in the subwatershed. In 2013, the Government Flats fire burned over about 65 percent of the Lower catchment of the South Fork subwatershed, mostly on non-federal lands. As a result, there was a reduction in the extent of effective ground cover for several years. For the first wet season following the fire, turbidity levels detected by the Wicks water treatment plant were elevated, particularly after periodic rains. Ash had also been detected, and the plant had to modify measures to treat it. Fortunately, there were no large storms of above normal peak intensity that year, so the increased turbidity and ash contaminants remained treatable, and the treatment plant was able to remain online and in operation (pers. comm. Dave Anderson 2014).

Immediately following the fire, actions were taken to reestablish vegetation by emergency aerial seeding on much of the non-federal acreage. Then, years of natural revegetation and manual reforestation followed and continued to establish. Now, an effective ground cover has mostly recovered. This, and the fact that the burned over area was mostly below the snow zone and in a band of lower annual precipitation, sedimentation trends are believed to have returned to a pre-fire regime and no longer elevated.

3.3.1.4 Water Rights

Water rights are under the purview of the Oregon Water Resources Department (OWRD), the state authority that regulates and oversees their use. OWRD monitors the City of the Dalles to ensure compliance with Oregon Water Law that pertains to municipal use. The City of The Dalles reports to OWRD their usage, proposed upgrades or changes, and provides planning documents for review consistent with the requirements of Oregon Revised Statutes (ORS) and Administrative Rules (OAR).

The Mt. Hood National Forest does not administer or enforce water rights. However, the Forest's Special Use Permits, which authorize the City to operate and maintain the Dog River pipeline and Crow Creek Reservoir facilities located on National Forest System lands, require that all permitted activities comply with State laws. The Mt. Hood National Forest relies on the OWRD's oversight of the City's use of its water rights for compliance with the applicable State water laws.

There are four certificated water rights on National Forest System lands in the Dog River and South Fork of Mill Creek subwatersheds that are designated for municipal use (Table 16). They include: 1.) a decreed surface water right that authorizes the use of up to 2 cfs from South Fork Mill Creek; 2.) a decreed surface water right that authorizes the use of all the water in Dog River; 3.) a storage right for 955 acre-feet (AF) of water in Crow Creek Reservoir; and 4.) a secondary right for the use of the stored water in the reservoir.
The City also holds two permitted applications for the storage and use of up to an additional 2,100 AF of water from South Fork Mill Creek, Dog River, and Crow Creek Reservoir.

Table 16. Surface Water Rights in the Dog River and South Fork of Mill Creek subwatersheds that are designated for municipal use by the Oregon Water Resources Department.

City of The Dalles

	Application	Permit	Certificate	Claim, Decree, or Transfer	Priority date	Type of Beneficial Use	Authorized Rate or Annual Volume
Dog River			14954	Hood River decree	8/1/1870	Municipal	"All the water in stream at point of diversion"
South Fork Mill Creek			5691	Mill Creek decree	1862	Municipal	2 cfs
Crow Creek reservoir	S-43668	S-32479	60410		5/29/1967	Municipal	955 AF
Crow Creek Reservoir	S-84050	S-53930	NA		1/21/1999	Municipal	2,100 AF
South Fork Mill Creek, Dog River	R-43667	R-4988	44917		5/29/1967	Storage for Municipal	955 AF
South Fork Mill Creek, Dog River	R-84049	R-13105	NA		1/21/1999	Storage for Municipal	2,100 AF

Source: OWRDb 2019 Note: Definitions: *Permit* – Applicant has been approved to develop a water source for its designated beneficial use. *Certificate* – Applicant has "perfected" and developed the water right as per the conditions of the permit. The water right has become certified to the holder. *Decree* – Court issued water right to a holder.

Both of the certified, decreed municipal water rights that the City holds (cert #s 14954 and 5691) have priority dates that precede all other water rights in the Dog River and South Fork Mill Creek subwatersheds. Based on the principle of prior appropriation of Oregon's water laws, they are senior to all other water rights with later priority dates. Moreover, because they are municipal rights, they are not subject to standard forfeiture statutes for non-use (ORS 540.610), and are protected from future appropriations that would impair the municipal water supply (ORS 538.410).

The City of The Dalles also holds a variety of long-standing groundwater rights. Nine wells provide a total of about 22.3 cfs for municipal uses. All of the points of diversion and use are on City or county lands, and are permitted or certified by the OWRD. There is also a water right permit (S-49653) for withdrawing 40 cfs from the Columbia River, but that has not been developed to date, and it appears unlikely that it will be put into use soon because of the City's uncertainty about its feasibility. None of these sources fall within the purview of the Mt. Hood National Forest because they are not located on National Forest System lands.

The two permitted water rights (S-53930 and R-13105) authorize the City to increase the storage capacity of the Crow Creek Reservoir for municipal use. Both have priority dates from January of 1999. The completion dates of both have been extended to 2021. But to date, the City has not proven up on either permit, and they have yet to proceed with formalizing any plans for expansion. They are expected to file for another extension so that they can maintain the rights, but it is uncertain when, or if they will move forward pending the feasibility of other storage options being explored. If they decide to proceed with

storage expansion, then NEPA would have to be initiated because the action would partially be located on National Forest System Lands.

In October of 2018, OWRD issued a final order and limited license approving the City to conduct testing for the feasibility of an Aquifer Storage and Recovery (ASR) system. ASR is the direct injection of surface water supplies into an aquifer for later recovery and use. This license allows the City to divert up to 16.7 cfs using their certificated water rights for Dog River, the South Fork of Mill Creek, and Crow Creek Reservoir for testing ASR. OWRD determined that at this rate, the proposed testing would not impair or be detrimental to the public interest. The license also stipulates that testing would produce information to describe effects of the ASR to the water quality and quantity in the aquifer and nearby wells and springs. The license would not expand the use under an existing water right (OWRD 2018).

There are two other surface water rights in the Dog River and South Fork Mill Creek subwatersheds (Table 17). Both rights are held in-trust by OWRD on behalf of the Oregon Dept. of Fish and Wildlife (ODFW) to provide stream flow for the migration, spawning, egg incubation, fry emergence, and juvenile rearing for Coho salmon, summer and winter steelhead, rainbow trout and cutthroat trout. The priority date for both instream water rights is 1991.

The flow rates allocated to them apply to the reaches of each below the point of diversion for the Dog River pipeline and Crow Creek dam. They do not apply to the reaches upstream of those points of diversion. These rates were determined by OWRD so that any remaining water available for allocation as a water right in the watershed would be designated for the in-stream purpose, and is the remainder of the estimated natural average flow not being used for other senior users. They are not defined in the certificates to be minimum flow requirements. These two water rights do not guarantee actual flow availability at those rates, but rather reflect the maximum allocation protected for the instream beneficial use by the water right. As a condition of the certificate, they do not have priority over human consumption. They are considered by OWRD to be junior to the City of The Dalles municipal water rights in Dog River and South Fork Mill Creek.

Table 17. In-stream surface water rights in the Dog River and South Fork Mill Creek subwatersheds and the maximum monthly allocation protected by OWRD for instream use.

Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dog River below diversion Certificate IS76267A	12.0	12.0	12.0	20.0	20.0	20.0	12.0	7.01	6.05	7.79	14.7	12.0
S Fk Mill Creek below dam Certificate IS72078A	7.0	7.0	10.0	17.0	17.0	7.8	4.8	5.4	6.1	4.8	5.5	7.0

Source: OWRD 2019b

In some instances, the Forest Service can lay claim to water rights on lands they administer. When the United States reserves public land for certain uses such as Indian reservations, military reservations, national parks, national forests, or monuments, it also implicitly reserves sufficient water to satisfy the purposes for which the reservations were created. Reservations made by either presidential executive order, or by an act of Congress, have implied reserved water rights. These are defined as federal reserved

water rights. The date of priority of a federal reserved water right is the date the reservation was established (DOJ 2019).

In 1893, lands along each side of the crest of the Cascade mountain range were incorporated into, and federally designated as the Cascade Range Forest Reserve. When the Cascade Range Forest Reserve was dismantled into smaller, individual national forests in the early 1900s, the Oregon National Forest was officially established on July 1, 1908. It included lands containing what is now the Mount Hood National Forest, and was renamed such in 1924 (MHNF 2019). Included in those lands was the then Bull Run Timberland Reserve, and the Dalles Municipal Watershed. The priority date for federal reserved water rights on the Mt. Hood National Forest would relay back to the initial year of origin of the federal Forest Reserve in 1893.

The priority dates for the City of The Dalles' water rights for Dog River and the South Fork of Mill Creek pre-date the establishment of the Mt. Hood National Forest. Accordingly, these rights have priority over the federal reserved water rights on the Forest (OWRD 2002). Additionally, any claims by the Forest Service to such rights would be subject to the state's adjudication process. To-date, the Forest Service has not submitted any claims for federal reserved water rights in the Dog River and South Fork Mill subwatersheds.

3.3.2 Effects Analysis

The hydrologic analysis was conducted to determine the effects to water quantity, water quality, channel and riparian features, and water rights that could be expected as a consequence of no action; or as a result of implementing the proposed action. The Proposed Action is the replacement of the existing pipeline with a new pipeline, allowing the City of The Dalles to utilize more efficiently the water being diverted from Dog River. The existing 3.4 mile pipeline would be replaced with a 24-inch-diameter pipe. It would be located parallel and next to the existing alignment as much as possible.

In addition to pipeline replacement, the project will repair and improve the diversion structure and install fish screens and passage structure, install a new culvert under the access road crossing Brooks Meadows Creek, and improve summer low flows by adding 0.5 cfs into Dog River below the point of diversion during August, September, and October. Implementation of the proposed action would include the use of BMPs and PDCs identified to minimize effects to natural and cultural resources.

Methodology

Analysis of the effects to hydrologic resources discerns the cause and effect relationship of constructing and then operating and maintaining the new diversion and pipeline. Key to the analysis of effects is the location and proximity of activities in relation to water resources, the extent and connectivity of disturbances to the stream and riparian network, and any alterations in the amount and timing of diverted streamflow. Potential effects that could result from each of the alternatives is addressed relative to the existing condition. Since the pipeline transfers water from one subwatershed to another, the effects to Dog River and the South Fork of Mill Creek are considered.

Effects from construction activities would presumably occur until work is completed. Construction activities to consider include excavation of the trench, staging and transport of equipment and materials, pipeline assembly, and back-fill. Effects due to operations and maintenance could be expected to occur as long as the pipeline is in use. Future operations of the pipeline diversion could change. Demand is expected to increase with a rise in future population. Effects from future climate change could necessitate that the City adaptively manage their water use in the face of a shifting available supply. Future changes to operations are based on inferred projections.

Much of the analysis relies on existing information. Hydrologic data were used for basic computations and quantitative comparisons, including for use in a modeled environment as input variables. Spatial and topographic data were used in a GIS environment to evaluate proximal relations and links. Research and academic studies were used to rationalize local application of conventional theory. Watershed and landscape assessments that have been conducted for the area provided local observations and conditions for context. Lastly, several key assumptions were used to constrain the hydrologic analysis.

Key assumption(s) applied to the analysis of hydrologic effects included:

- Dog River diversion operations would not change for either alternative for a minimum of at least 10 years, and would remain the same from November through July.
- For the Proposed Action, the City of The Dalles would contribute 0.5 cfs bypass flow down Dog River below the point of diversion from August through October.
- The primary fill period for Crow Creek Reservoir would typically be early November to early- or mid-February for both alternatives. Flow to the reservoir would usually be managed from mid-February to late June to maintain pool elevation and supplement storage for meeting peak demand in summer and early fall.
- Increasing the capacity of the Crow Creek Reservoir within the next 10 years is not foreseeable, and may not occur at all depending on the outcome of ASR testing. Should a proposal from the City be submitted to the Mt Hood Nat. Forest to increase the reservoir's capacity, then NEPA would have to be initiated.
- Testing for the City's ASR project will not necessitate that additional flow be diverted from Dog River. There is already enough available flow and storage to suffice testing. The OWRD is the authority that administers the City's limited license to test the ASR and enforces the conditions therein.

3.3.2.1 No Action Alternative

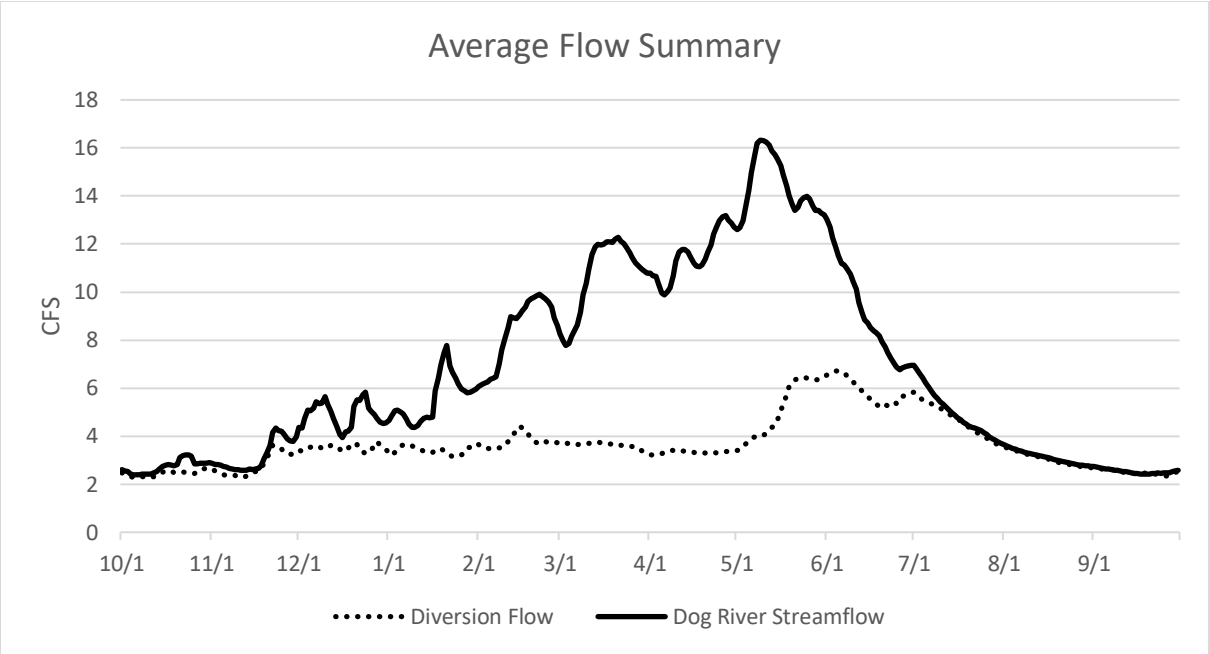
The No Action Alternative would continue the status quo. The pipeline and diversion structure would not be replaced or upgraded. Operations of the existing Dog River diversion and pipeline would not change. Water loss from leakage would continue unabated. A new culvert to route Brooks Meadow Creek under the pipeline access road would not be constructed.

Water Quantity and Streamflow

Dog River

Under the No Action Alternative, the quantity of water diverted from upper Dog River and its tributaries would remain unchanged from current conditions. On average, Dog River would continue to provide for about 58 percent of the City's total surface water contribution. Diversion to South Fork Mill Creek in the early summer would be expected to average about 7.0 cfs, and about 2.5 cfs during late summer. In most years, the headworks at the pipeline inlet would be operated to increase diverted flow in the late fall and early winter to re-fill Crow Creek reservoir, by early or mid-February if possible. Once full, the amount of diversion would be reduced manually to a maintenance flow of about 2-3 cfs until mid- to late-May (Figure 18). Then the rate of diversion would be increased to capture the entire amount of upper Dog River's base flow from July through September and early October to meet peak demand.

Figure 18. Mean daily discharge (cfs) summary of an average water year that was diverted into the City of The Dalles pipeline during 2012 through 2018 compared to the mean daily discharge of Dog River above the diversion



Source: CTD 2018

Effects to streamflow from pipeline diversion would continue to be greatest during the late summer and early fall when flows are lowest, and 100 percent of upper Dog River is diverted into the pipeline (see Table 18). During this time, the lowest eighth of a mile segment of Reach 3 below the pipeline diversion would become partially dewatered. Instream flows to this segment would be restored naturally just downstream by springs, seeps, and hyporheic flow. Lower Dog River would remain a perennial stream type (Figure 19).

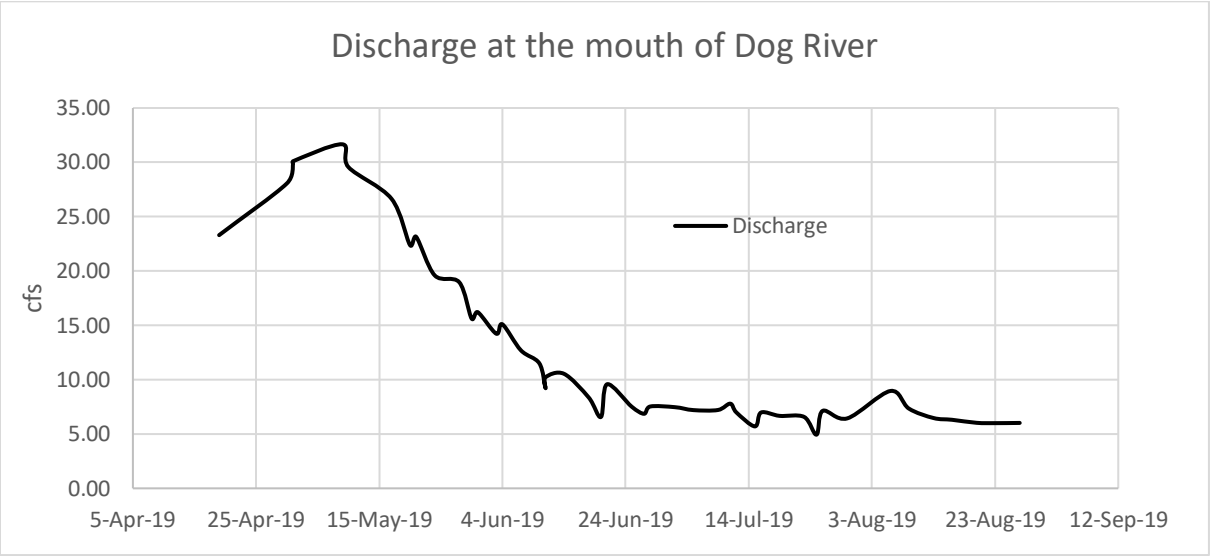
Table 18. Estimated Percent of Mean daily discharge (cfs) of Upper Dog River Diverted May through October.

	May	June	July	August	September	October
Percent of Dog River diverted	39	99	100	100	100	99

Source: CTD 2018

It is estimated that Puppy Creek would continue to potentially contribute on average nearly 4 percent of the base flow to lower Dog River, and Brooks Meadow Creek could potentially contribute nearly 12 percent of its base (USGS 2017). Ground water contributions to lower Dog River would also continue to supplement base flows. The perennial sources of near-bank springs and seeps along the lower reaches below the diversion would continue to provide unceasing flow during summer months.

Figure 19. Instantaneous Discharge measured near the mouth of Dog River spring through late-summer of 2019



When the entire flow of upper Dog River is being diverted to the pipeline in the summer and early fall, the river at the mouth would continue to flow perennially. Despite the diversion of all the summer low flow that's produced from the Upper catchment, as much as 40 percent or more gain of available daily flow could be expected at the mouth of Dog River (Table 19). But overall, full capture of flows during the summer and late fall would continue to reduce natural mean monthly base flows at the mouth of Dog River by an estimated 30 to 40 percent.

Table 19. Comparison of Discharge (cfs) in Dog River Measured Above and Below the Diversion on Select Dates.

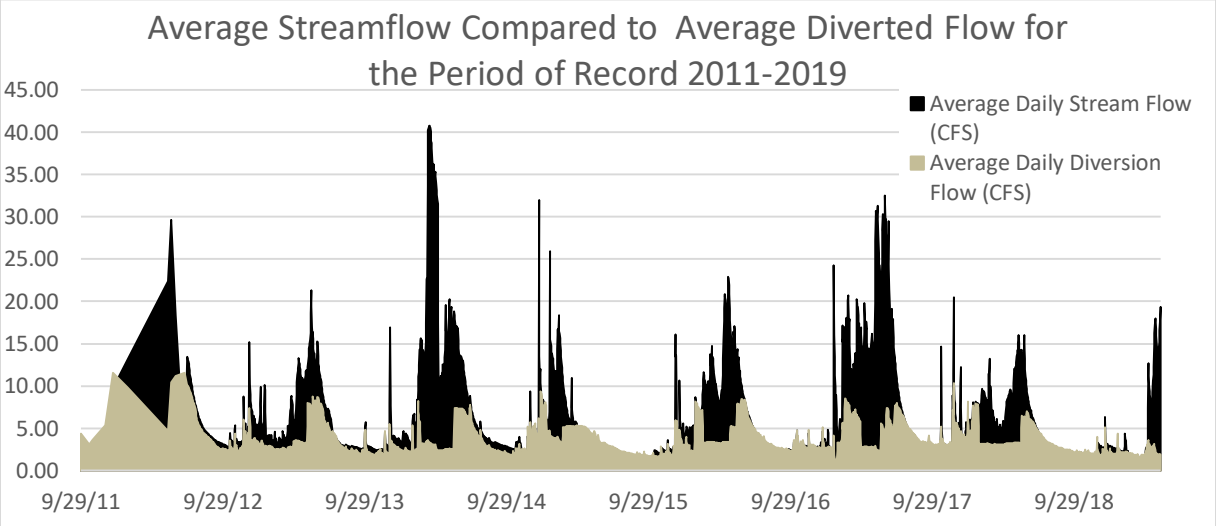
Location	July 20, 1972	July 27, 2000	July 27, 2016	May 1, 2019
RM 6.0 Above Diversion (fully diverted flow)	6.2[1]	4.0[2]	3.2[3]	14.91[5]
RM 0.0 Near Mouth	NA	8.3[3]	5.3[4]	30.1[5]
RM 3.0 in Reach 2	9.0[1]			

Sources: [1]HRWG 1999, [2]MHF 2000b stream survey, [3]CTD 2017b, [4]CTWS 2017, [5]OWRD 2019

The effects of diversion on peak flows would continue to be greatest during the late fall and early winter months when Crow Creek Reservoir is filling. Diversion will decrease the overall magnitude of mean daily peak flows in Dog River during that time. Data indicates it could be by as much as 70 percent in a year when total fall/winter precipitation is below normal. The majority of peak runoff however, which occurs in the spring, would not be expected to be attenuated nearly to that degree. This is because in most

years, Crow Creek Reservoir would be filled by early to mid-February. Typically, the majority of the spring freshet would not be diverted, and would pass downstream to lower Dog River (see Figure 20).

Figure 20. A comparison of average streamflow and diverted flow from 2011 through 2018 above the Dog River diversion to illustrate the amount of spring peak flows that would bypass to lower Dog River.

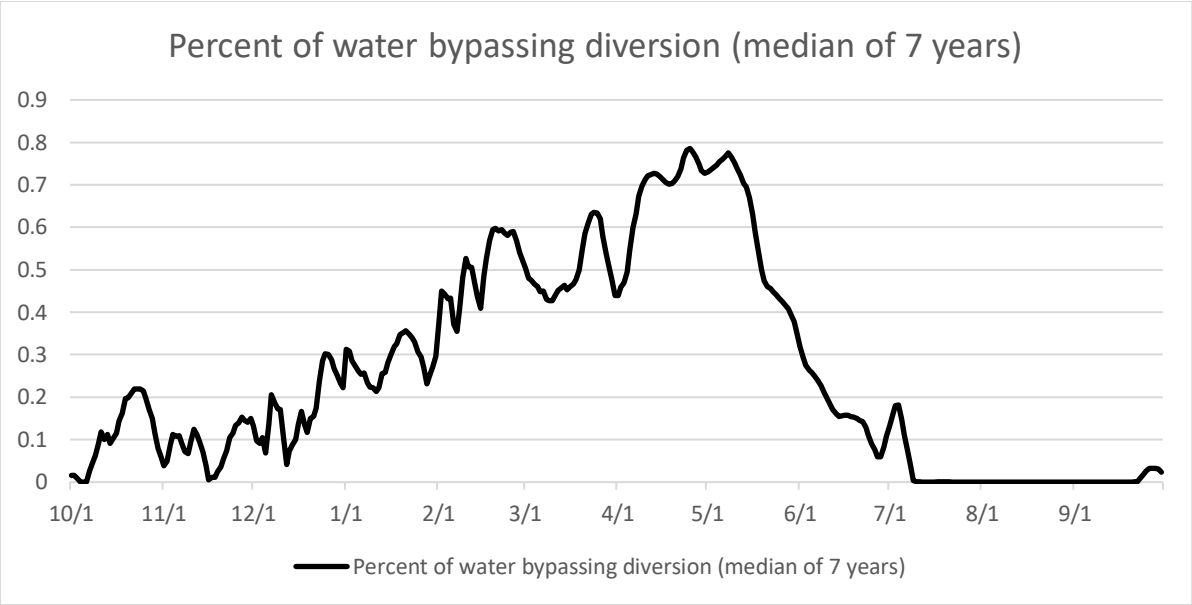


Source: CTD 2018

In lower Dog River, the attenuation of winter peak flows would be less of an effect than the upper river because of the contributions from perennial and intermittent streams in the Lower catchment. Puppy Creek for example would continue to potentially contribute on average about 19 percent of peak flow in lower Dog River, while Brooks Meadow Creek's contribution could average about 4 percent of the peak (USGS 2017).

Annually, there would continue to be an amount of bypass streamflow available to lower Dog River. Only a portion of streamflow would be diverted from upper Dog River from November to June. During some months bypass flows would likely be greater than diverted flows. Based on past records, the percentage of total streamflow that would not be diverted, and flow past the point of diversion and stay in the main stem of Dog River can be displayed as a percentage of total streamflow (Figure 21). The maximum amount of bypass flow would be expected to continue during late April and early May and would account for between 70 and 80 percent of the total available flow from upper Dog River.

Figure 21. The amount of mean daily streamflow that bypassed (undiverted flow) the pipeline diversion down Dog River, expressed as a percentage of total available streamflow for water years 2012 to 2018.



Source: MHNF 2018

Because the existing aging pipeline would not be replaced under the No Action alternative, it would continue to leak from a number of places. At full pipe capacity, leakage could be as much as 1.9 cfs. But there have only been four instances since 2006 when the Dog River pipeline was filled to maximum capacity, so that quantity of water loss would not be expected to occur very often. The location and severity of leaks would likely continue to vary. Some leaks would only be present or visible during periods of elevated flow within the pipeline, when the range of pressure and velocity are near their highest. At lower flows some leaks would not be detectable, or become a slight trickle.

The amount and fate of pipeline leakage would remain uncertain. It's likely that a proportion of leakage could not be accounted for. A proportion of it would probably return slowly to the local aquifers to be stored and released steadily over time. During peak runoff, the larger leaks would follow overland flow routes to an existing intermittent or perennial channel. Depending on the location of the leak some could return to Dog River, while some could contribute to the South Fork of Mill Creek. Some water loss would likely be depleted by evapotranspiration, and some would probably be stored in the soil profile. Given the geology of the area, there could be a proportion that drains to deeper aquifers for long-term storage and release elsewhere.

The amount of water loss from the leaking pipeline would be expected to continue, although repairs and patches to limit known leaks could be made under the authority of the Special Use Permit. Repairing leaks in water conveyance infrastructure has been a strategy identified in the City's Water Management and Conservation Plan (CTD 2014).

In practice, the total amount of water loss from leakage would continue to factor into the amount of water withdrawn from upper Dog River. Loss from leakage would continue to decrease efficiency of use so that water would be withdrawn to meet operational demand. The quantity of water diverted from upper Dog River will continue to include the amount of leakage plus what's needed to meet demand.

The effects of forest management on water quantity and streamflow in the subwatershed would continue to be slight. Two measures often used as indices of the potential effect of forest management on

streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2015 to be below thresholds of concern (Table 20).

Since then, there has been no new road construction, and only a minor extent of past thinning. Effects of forest management on stream flow would remain negligible. There would remain however, 5 crossings over perennial streams where segments of road would periodically divert intercepted runoff toward streams, a portion of which would likely enter the stream during high runoff events. Under the No Action alternative, the one crossing where the pipeline access road intersects with Brooks Meadow Creek would not be improved. Nonetheless, the amount of contributing area to those crossings would remain a very small percentage overall. Hydrologic recovery from any past activities would continue to improve.

Table 20. Road Density and Watershed Impact Areas in the Dog River Subwatershed in 2015. No changes are expected in these indicators under the No Action alternative.

Indicator	2015	Threshold of Concern
Road Density (mi/sq mi)	2.4	3.0
Watershed Impact Area (%)	3	25

Source: MHNF 2015

It is estimated that Dog River would continue to contribute about 4 percent of the mean annual discharge to the East Fork Hood River (HRWG 1999), above the confluence with Middle Fork Hood River. Diversion from Dog River would decrease its mean annual contribution to the East Fork Hood River by an estimated 2 percent.

Despite the No Action alternative, the City would continue to move forward with testing of an ASR system on their property under a limited license issued to them in 2018 by OWRD. Testing is not reliant on replacement of the pipeline. Water to be used for the ASR would be supplied by the surface water rights in the municipal watershed, which include Dog River, South Fork Mill Creek, and Crow Creek reservoir. In the issuance of the license OWRD estimated that existing surface flow and storage is available for the City's ASR project (OWRD 2018). OWRD would be the authority that administers the limited license agreement and enforces its terms and conditions.

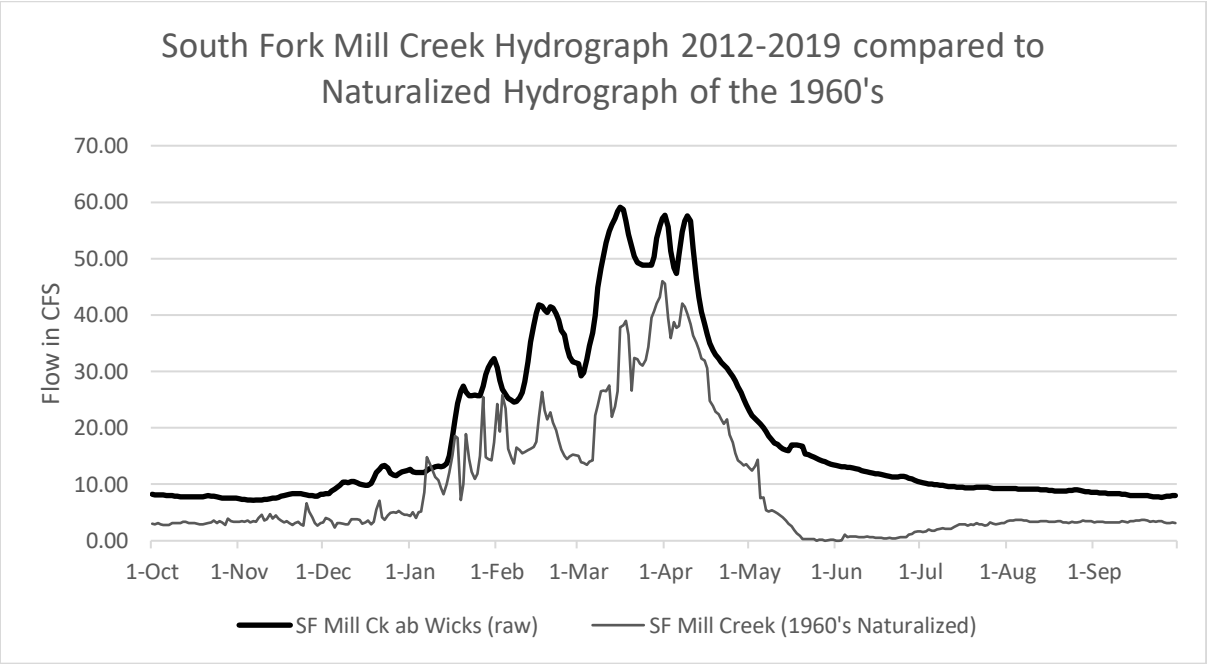
At peak demand it is estimated that ASR testing would use approximately 1.03 cfs (244 million gallons per year). This increase in demand could be expected to be supplied from a proportion of the total annual contribution of South Fork Mill Creek. There has been enough average runoff in winter and spring from the South Fork Mill Creek subwatershed, that when coupled with a percentage of the storage in the reservoir, there would not be a need for additional water diverted from Dog River to meet the increase in demand for ASR in most years (CTD 2019a).

South Fork Mill Creek

Under the No Action alternative, the amount and timing of flow diverted from Dog River to South Fork Mill Creek would continue to be managed to meet municipal demand. Operations of the Dog River pipeline and Crow Creek reservoir would capture both the naturalized streamflow from upper South Fork Mill Creek, and the diverted flow from upper Dog River until maximum storage (full-pool) would be achieved in mid- to late winter. Diverted flow would be dialed back after the reservoir becomes full so as to minimize spill while maintaining its surface elevation at full-pool. Water operations would be adjusted through the year to try and balance the capture of available flow, the quantity of diversion, storage, spill, and release with annual variation in demand.

Total streamflow in SF Mill Creek would continue to be artificially inflated above natural conditions (Figure 22). Inflow from Dog River and storage release from the reservoir would continue to increase base and mean annual streamflow. Streamflow would still vary seasonally as it would under natural conditions, but there would continue to be more available flow overall.

Figure 22. Mean daily flow in South Fork Mill Creek above the Wicks water treatment plant intake exhibiting the estimated increase in streamflow above the natural flow regime.



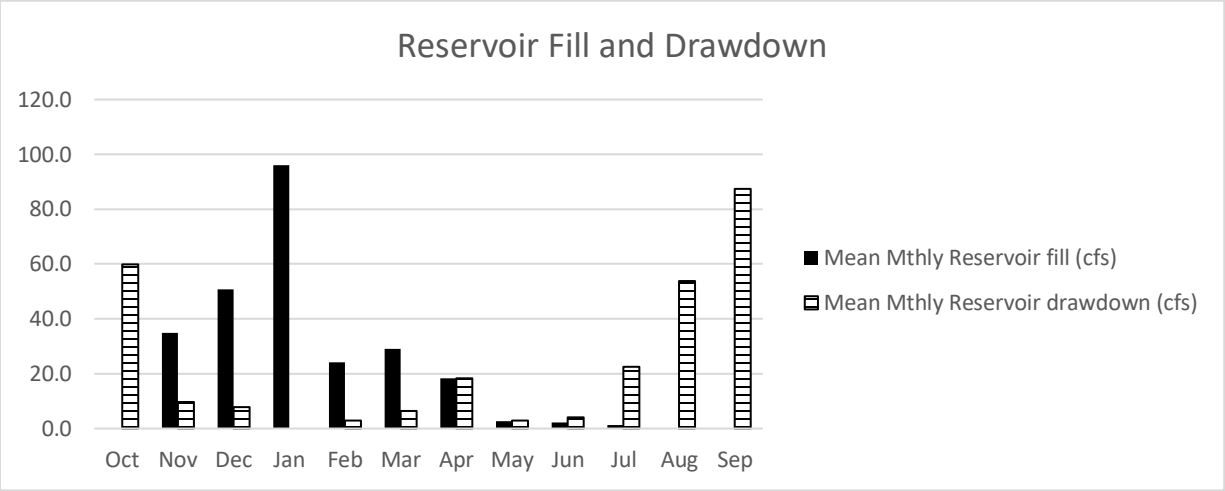
Source: CTD 2019

On average, Dog River would continue to contribute about 58 percent of the City's total surface water contribution. Diversion to South Fork Mill Creek in the early summer would average about 7.0 cfs, and about 2.5 cfs during late summer. In Reach 2 between the pipeline outlet and Crow Creek Reservoir this contribution would amount to about 5 times more streamflow than the natural base flow. In the late fall and early winter, the amount of diverted flow would be increased to try and re-fill Crow Creek reservoir by early or mid-February. Once full, the amount of diversion would be reduced to a maintenance flow of about 2-3 cfs until mid- to late-May. Then the rate of diversion would be increased to capture the entire amount of upper Dog River's base flow from July through September and early October.

Dam releases and diverted flow from Dog River would continue to be managed to meet peak demand during the summer months. Base flows just above the Wicks water treatment plant near the mouth of the South Fork Mill would remain elevated by more than double that of estimated natural discharge. Reliable late summer flows from these surface water sources, including available live flows and stored water releases, would remain an average estimate of 5.4 cfs (CTD 2014).

Release from the reservoir would occur year around primarily to meet municipal demand and provide at least 2.0 cfs to South Fork Mill Creek as stipulated by the reservoir Special Use Permit. Releases of 6 cfs or higher would be common. The quantity needed for release typically fluctuates on a seasonal trend, but may occur weekly or daily too. Inflow into the reservoir would begin to subside in summer, when drawdown of the reservoir would be expected to occur. Typically the City would begin drawdown in early July and then begin refilling in November (Figure 23). Sometimes there would be a need for special releases such as when one of the supplemental wells might be taken off-line.

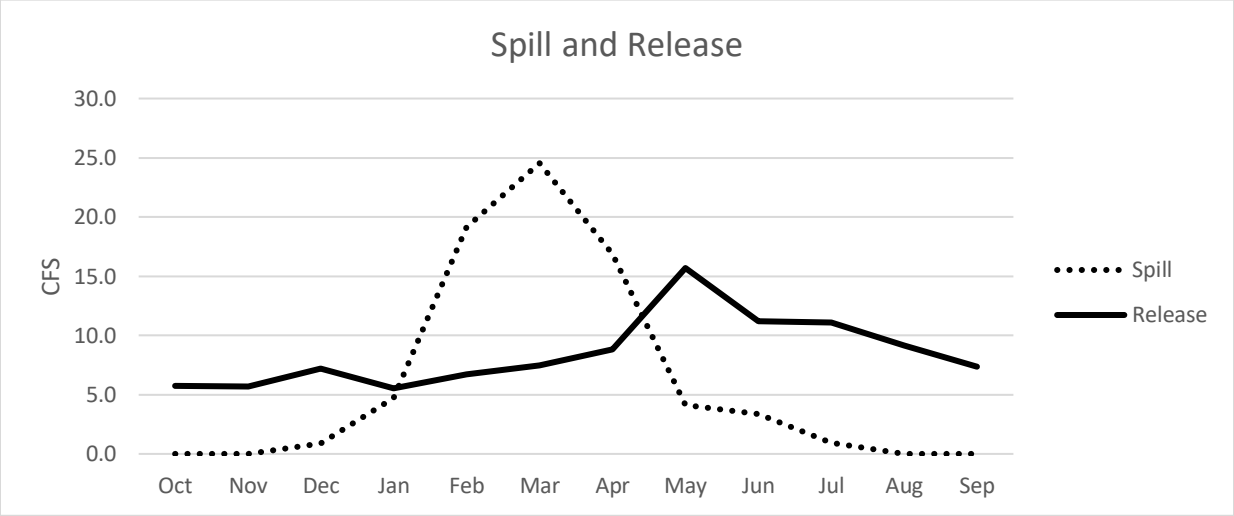
Figure 23. Mean monthly fill and drawdown trends during the period 2005 to 2015.



Source: CTD 2017c

Peak flows would continue to be attenuated to a degree below the Crow Creek dam as a result of storage in the reservoir. Spill over the reservoir however, would still occur during early spring when full-pool is exceeded because diverted flow from Dog River and natural inflow from the Upper catchment will have already filled the reservoir. Spill would continue to be greatest during the winter and spring in response to heavy runoff and precipitation (Figure 24).

Figure 24. Comparison of mean monthly spill and release during the period 2005 to 2015 (CTD 2017c). Note: Spill is not recorded continuously, so missing data has been interpreted by the graphed line.



Source: CTD 2017c Note: Spill is not recorded continuously, so missing data has been interpreted by the graphed line.

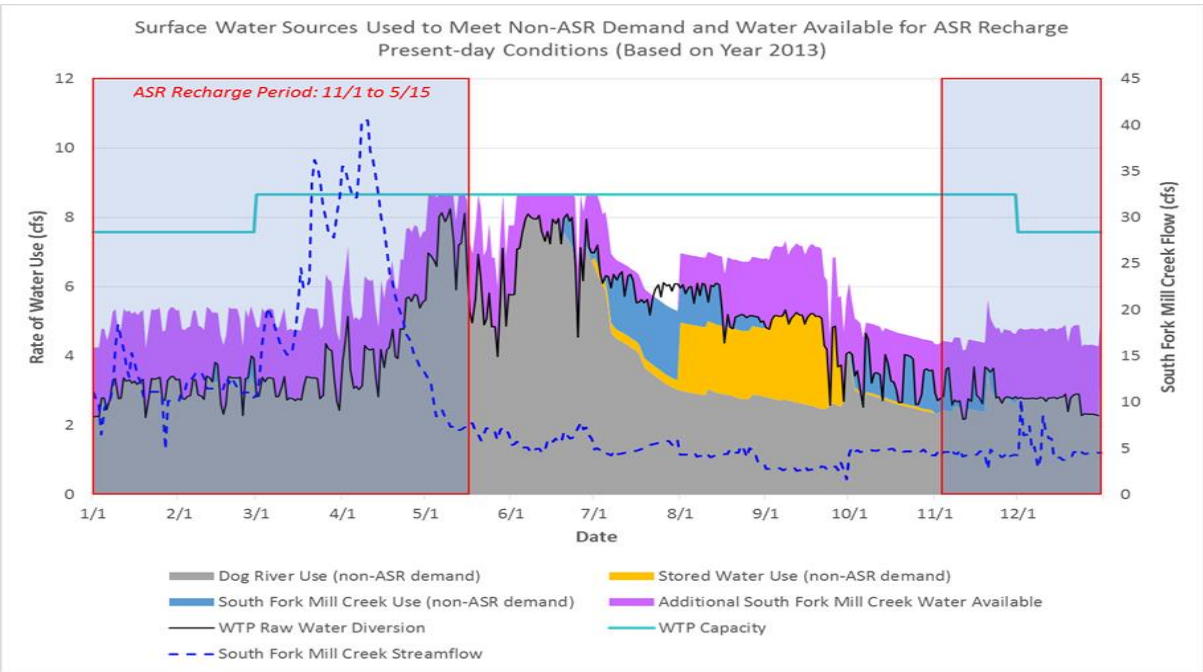
If spill occurs, then less would be needed for release. Spill would not be expected to occur during the early summer to late fall months, when demand and drawdown is highest. Spill would usually be greater than release during winter and spring, and excess to municipal use. Most of this would bypass the Wicks treatment plant intake and flow downstream to Mill Creek, elevating its average natural peak discharge.

Testing for the City's ASR system under their limited license with OWRD could be expected to utilize the spill that typically occurs during the winter and spring (Figure 25). Testing for the ASR would not be reliant on replacement of the Dog River pipeline. The increase in demand to test the ASR would be supplied from a proportion of the total annual contribution of South Fork Mill Creek. There has been enough average available spill and runoff in winter and spring from the South Fork Mill Creek subwatershed, that when coupled with a percentage of the storage in the reservoir, there would be available water sufficient for ASR testing (OWRD 2018). OWRD would be the authority that administers the City's limited license and enforces the terms and conditions in the agreement.

The water treatment plant's average intake would be expected to increase during that time because only finished water can be used for ASR testing. This would decrease the amount of winter and spring flow that has typically bypassed the Wicks treatment plant intake and flowed to Mill Creek. This would lower the elevated average peak flow from South Fork Mill that would flow into Mill Creek by an estimated 6 percent.

Under natural flow conditions, South Fork Mill Creek is estimated to have contributed about 69 percent of the mean annual discharge of Mill Creek. Average annual diversion for the Wicks water treatment plant would continue to operate to meet demand, which has traditionally reduced the annual contribution to Mill Creek by an estimated 40 percent (OWRD 2019a). Demand for ASR testing could decrease the mean annual contribution by about another 13 percent.

Figure 25. Comparison of the proportion of the different source water supply with current and projected ASR demand.



Source: CTD 2019a Note: different scale for S. Fk. Mill Creek on right-hand axis. Values above the solid black line (i.e., WTP Raw Water Diversion) represent the volume of unused water currently available for ASR testing.

The effects of forest management on water quantity and streamflow in the subwatershed would continue to be slight. Two measures often used as indices of the potential effect of forest management on streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2012 to be below thresholds of concern (Table 21).

Since then, there has not been any new road construction on Forest Service lands. Some roads have been closed and decommissioned. The extent of ongoing fuel treatments (i.e. pile burning) would be minor. Effects of forest management on stream flow would not be expected to change under the No Action alternative, and remain negligible.

There would remain the 4 crossings over perennial streams where segments of road could periodically divert intercepted runoff toward streams, a portion of which likely enters the stream during high runoff events. But the amount of contributing area would be very small. Overall, the South Fork Mill Creek subwatershed would be considered to have minimal hydrologic disturbance from roads, and any long-lasting effects to streamflow would remain slight.

There have been about 3,829 (21%) acres of forest management activities over the last 15 years on Federal lands in and around the South Fork subwatershed. Treatments consisted of thinning, brushing, pruning, underburning, and pile burning to reduce hazardous fuels. They were intended to minimize the potential risks and impacts of wildfire. Best Management Practices were incorporated into treatment design so that watershed effects would be minimized. Existing effects of these past forest management activities, as well as past wildfire, on water quantity and streamflow in the subwatershed would remain slight and continue to diminish.

Table 21. Road Density and Watershed Impact Areas in the South Fork Mill Creek Subwatershed in 2012. No changes are expected in these indicators under the No Action alternative.

Indicator	2012	Threshold of Concern
Road Density (mi/sq mi)	2.6	3.0
Watershed Impact Area (%)	13*	25

Source: MHNF 2012, MHF 2000b *Prior to the Government Flats fire of 2013.

Channel Conditions

For the No Action Alternative, channel characteristics and features would continue to be affected as a result of diverted streamflow from upper Dog River. The timing and magnitude of diverted flow would continue to be managed to the status quo so that Crow Creek Reservoir would get filled by early February. Diversion would then be reduced to a flow that maintains the level of the reservoir through the spring. Then diversion would be increased to capture all of the base flow during the summer and early fall.

Dog River

In the Dog River subwatershed, channel forming processes would continue to be altered by the modified flow regime. Winter and summer flows would continue to be affected most. Early and mid-winter average peak flows would be attenuated to a moderate degree. But most of the streamflow volume comes from the spring snowmelt, so the majority of the spring peak flow would bypass the diversion. During June through October, virtually all of the streamflow from upper Dog River would be diverted to the South Fork Mill Creek.

For most of the length of Dog River, direct access to the channel would remain limited and human perturbation other than water management would be low. The stream banks and main channel could be expected to remain primarily stable, and the sediment supply would not be expected to undergo an aberrant change from previous trends. Substrate would continue to be dominated by gravels and cobbles. The average amount of fine sediment observed through-out all reaches would likely remain low to moderate on an area weighted basis.

Changes to channel forming processes related to modified streamflow would continue to mostly affect Reaches 1, 2, and the lower segment of 3. Effects would be greatest in the lower segment of Reach 3 immediately below the diversion because it would continue to be partially dewatered for a half-mile downstream to Cooks Meadow in the summer and early fall months. The overall reduction in average annual flow and the absence of base flows in this reach would continue to be the cause for the decline of pool depth and quality, a decrease of the width-to-depth ratio, and a reduced wetted perimeter.

Effects to the main channel in Reaches 1 and 2 that make up lower Dog River would continue to be low to moderate, primarily due to the overall reduction of mean base flows that affect the average depths of residual pools (Table 22). The average depth of the primary pools in both reaches could continue to be greater than 2 feet during summer low flows of July, even when 100 percent of the flow of upper Dog River would be diverted. Perennial streamflow from Brooks Meadow and Puppy creeks, as well as the many near-bank springs and seeps would continue to contribute to base flows and alleviate the effects of full diversion. But overall, it is estimated that summer and early fall pool depths at the mouth of Dog River would remain on average about 2 to 3 inches shallower because of diversion during the base flow period.

Pool frequencies in all four reaches would be expected to remain below the LRMP and NMFS standards that are often suggested as indicators of properly functioning channel processes. The attenuation of average peak winter flows resulting from diversion to fill Crow Creek Reservoir in the early- and mid-winter months would be a likely cause for lower pool frequencies below the diversion. The majority of pools that were observed in Reach 3 and 4 however were pocket pools, suggesting the small size of Dog River and its channel types, which have a low inherent potential for new deep pool formation because the stream power and discharge to scour deeper and mobilize larger quantities of bedload is low and infrequent.

Table 22. Observations of Select Channel Characteristics of Dog River from the 2000 Stream Survey Compared to LRMP and NMFS Standards and Guidelines.

Reach	Percent Fine Sediment Observed	LRMP Standard for Percent Fine Sediment	Total Pools per Mile	Primary Pools per Mile	LRMP Standard Primary Pools per Mile	NMFS Standard Primary Pools per Mile
1	8	20	18.8	5.2	96.7	70
2	14	20	16.6	5.1	105.2	70
3	12	20	19.5	0.6	130.5	96
4	6	20	36.5	0.0	190.1	96

Source: MHNF 2000a

Channel forming processes in Reach 4 and the remaining perennial and intermittent tributaries would remain largely unaffected. With the exception of Brooks Meadow Creek, where the pipeline access road crosses through its lower reach. It would continue to heavily impact about 12 feet, or 2 percent of the total channel length. This small short segment would remain in a poorly functioning condition, and an erosion

source. Flow would be hindered sometimes, ponding in wheel ruts before passing across and back into the creek.

As observed in the 2000 stream survey, the abundance and density of large woody debris in all reaches of Dog River were low to moderate compared to the LRMP standards (Table 23). But the density of LWD met the NMFS standards in all reaches. Since then, inputs of woody debris have continued to accumulate. Small wood pieces would likely continue to dominate the total percentage of wood in the stream. Some of the small wood will remain a component of debris jams, but the majority of it would likely continue to be individual pieces. The in-stream abundance and density of woody debris would be expected to continue to gradually increase for all size classes because the potential for future recruitment from the inner riparian zone is good to excellent along most of the main stem, and the inner riparian zone for all reaches is dominated by late- and mid-seral forest structure.

Table 23. In-channel woody debris and woody debris density amounts (total of both medium and large size classes) observed in the 2000 Dog River stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	71	40	78	189	16.7	26.7	43.4	106	20
2	119	47	55	221	18.6	21.7	40.3	106	20
3	226	123	47	396	39.2	15	54.2	106	20
4	153	119	43	315	64.8	23.4	88.2	106	20

Source: MHNF 2000a

Data from the 2000 stream survey are useful for interpreting the effects of the modified flow regime on the potential transport, distribution, and accumulation of in-stream woody debris under the No Action Alternative. There were 103 debris jams counted during the stream survey of Dog River in 2000 (Table 24). Twenty-four percent of the total wood inventoried was in these jams. Of the wood in debris jams, 47 percent was in the small size category, 31 percent in the medium size class, and 22 percent in the large size class.

Table 24. Existing number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	16	52	19	30	10	56	22
2	15	95	24	40	7	44	11
3	22	199	27	108	15	40	7
4	50	99	54	70	49	26	17

Source: MHNF 2000a

The total amount of in-stream debris jams inventoried suggests that the capability of the flows in Dog River in all reaches would continue to transport and distribute woody debris that could accumulate into jams. But intrinsically, the potential would remain fairly low because the flows and channel size are relatively small. The capability of the winter peak flows that have been attenuated by diversion to transport medium and larger pieces would remain somewhat diminished. Spring peak flows however, could be expected to retain most of their potential to transport larger pieces where the channel is wide and deep enough. Transport potential in the Lower catchment would remain higher than the Upper catchment

due to greater mean channel width and depth. In lower Dog River, the potential for maximum peak flows in both winter and spring to transport and re-distribute medium and large pieces of woody debris would remain functional.

South Fork Mill Creek

Under the No Action Alternative, diversion from Dog River and storage and release in Crow Creek Reservoir would continue to modify the flow regime in the South Fork Mill Creek subwatershed. Channel forming processes would remain altered as a result in the main channel. Mid- and early winter flows, spring flows, and summer flows would continue to be affected most. Direct access to the main channel of South Fork Mill Creek would remain limited and human perturbation other than water management would be low.

Above the reservoir, average peak flows in early and mid-winter would remain elevated above naturalized levels due to contributions from diversion. Below the dam, they would be attenuated and less than naturalized rates due to the filling of the reservoir and retention for storage. Average spring peak flows would remain higher than naturalized above and below the dam because of diversion contributions and spill combined with release. Base flows above and below the dam would also remain elevated above naturalized levels due to contributions from diversion and releases downstream.

Elevating average base and peak flows will continue to increase water velocity seasonally and gradually deepen entrenchment. Width-to-depth ratios could be expected to slowly decrease, and the wetted perimeter enlarge. The short segments of channel where unstable and undercut streambanks were observed in Reaches 1 and 2 could progressively expand. For these reasons, pool abundance and quality would remain low (Table 25). Most of the segments in each of these reaches would continue to be fast flowing, and not conducive to pool formation.

Table 25. Observations of Select Channel Characteristics of South Fork Mill Creek from the 2011 Stream Survey Compared to LRMP and NMFS Standards and Guidelines.

Reach	Percent Fine Sediment Observed	LRMP Standard for Percent Fine Sediment	Total Pools per Mile	Primary Pools per Mile	LRMP Standard Primary Pools per Mile	NMFS Standard Primary Pools per Mile
1	5	20	7.9	1.4	76	70
2	23	20	6.3	0.5	115.8	96
3	11	20	0.0	0.0	NA	184

Source: MHNF 2011

Substrate would be expected to remain dominated by coarse gravel. Fine sediment generated by streambank erosion and incision would essentially be routed through the system by the elevated water velocity. Although it could continue to accumulate in the few pools or short aggrading segments in Reaches 1 and 2. Above the dam, the majority of fine sediment generated would most likely continue to settle in the reservoir, while below the dam it could accumulate behind the Wicks intake structure.

The low overall abundance and density of large wood observed in the 2011 stream survey was low, and well below LRMP and NMFS standards (Table 26). Since then, woody debris has continued to accumulate. Small wood pieces would likely continue to dominate the total percentage of wood in the stream. Some of the small wood will remain a component of debris jams, but the majority of it would likely continue to be individual pieces.

The in-stream abundance and density of woody debris would be expected to continue to gradually increase for all size classes in the Upper catchment because the potential for future recruitment from the inner riparian zone is good to excellent along most of the main stem where the inner riparian zone is dominated by late-seral forest structure. In the Lower catchment, potential recruitment is good along the main corridor of South Fork Mill Creek, but fair to poor in the outer riparian zones where the 1967 School Marm and the 2013 Government Flats fire burned over the forest. Further down, the vegetation type changes to more scrub-oak and the main stem is comprised of willows and cottonwood.

Table 26. In-channel woody debris and woody debris density amounts (total of both medium and large size classes) observed in the 2011 stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	77	17	3	97	5.8	1.0	6.8	106	20
2	134	37	32	203	8.7	7.5	16.2	106	20
3	10	2	1	13	5.4	2.7	8.1	106	20

Source: MHNF 2011

Data from the 2011 stream survey are useful for interpreting the effects of the modified flow regime on the potential transport, distribution, and accumulation of in-stream woody debris under the No Action Alternative. There were 129 debris jams counted during the stream survey of South Fork Mill Creek in 2011 (Table 27). Debris jams in Reaches 1 and 3 were all comprised of small wood, and 97 percent of the wood in jams in Reach 2 included small wood.

Table 27. Existing number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	32	45	32	17	0	3	0
2	90	47	87	34	3	32	0
3	7	3	7	2	0	1	0

Source: MHNF 2011

The total amount of in-stream debris jams inventoried suggests that the capability of the flows in South Fork Mill Creek in all reaches would continue to transport and distribute woody debris that could accumulate into jams. But intrinsically, the potential would remain fairly low above the dam because the channel sizes are relatively small.

The capability of the attenuated winter peak flows below the dam, as well as the reservoir itself would continue to be diminished. The enhanced spring peak flows however would continue to be capable of transporting and re-distributing medium and larger pieces where the channel is wide and deep enough. Transport potential in the Lower catchment would remain higher than the Upper catchment due to greater mean channel width and depth.

Water Quality

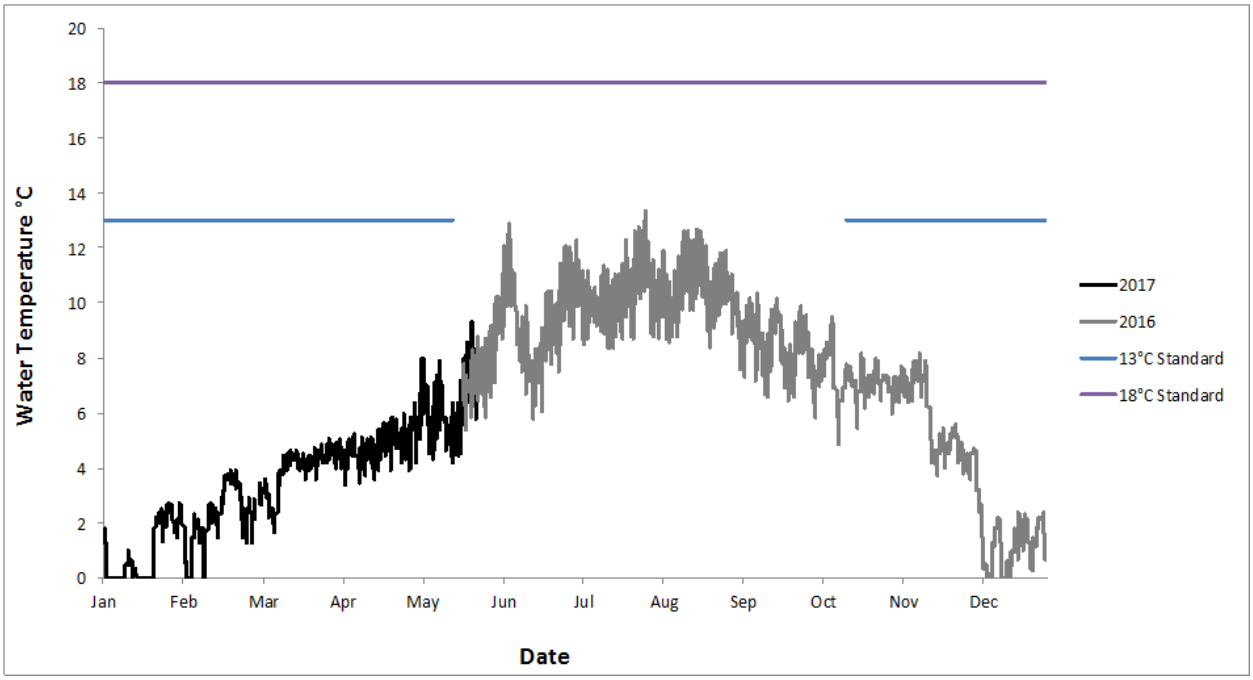
For the No Action Alternative, water quality would continue to be affected by diverted streamflow from upper Dog River. The timing and magnitude of diverted flow would continue to be managed to the status quo so that Crow Creek Reservoir would get filled by early February. Diversion would then be reduced to a flow that maintains the level of the reservoir through the spring. Then diversion would be increased to capture all of the base flow during the summer and early fall.

Dog River

Under the No Action Alternative, only one water quality standard for the designated beneficial uses of Dog River would remain impaired. Iron would continue to exceed the standard for that constituent, keeping Dog River on ODEQ's 303(d) list of Category 5 waters identified in their 2012 Integrated Report. It would remain a non-point contaminant because the source of the quantities detected would still be unknown. It has been surmised that iron may be naturally occurring, and its presence could be due to the geologic formations that underlie the area (ODEQ 2017c). Other impairments would not be expected to result from the Proposed Action, and no other point source or non-point source pollutants, contaminants, or water quality exceedances would be anticipated.

The seasonal trends in stream temperature observed at the mouth of Dog River would be expected to continue (Figure 26). Stream temperature would not be affected under the No Action Alternative. Dog River stream temperatures would remain cold both above and below the diversion year-round, rarely exceeding water quality standards for temperature, and meeting the ODEQ requirements for fish and aquatic life beneficial uses. Due to the presence and use by salmon and steelhead of the lowest 2.5 miles of Dog River, and because of the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature would continue to be ongoing by the MHNF.

Figure 26. Daily average temperature data observed in Dog River upstream of the confluence of the East Fork Hood River.



Source: CTWS 2017

The potential for Dog River to provide cold-water thermal refuge for aquatic species would remain high because of the groundwater inputs from springs and wet meadows. Cold water contributions to lower Dog River from Puppy and Brooks Meadow Creeks would also continue. Dog River would remain a cold water source for the East Fork Hood River in the low flow periods of late summer and early fall, including when full diversion into the pipeline would occur upstream at RM 6.0. Lower Dog River could be expected to remain a likely location as a core cold water habitat.

Residual effects to riparian shading from past forest management would continue to be negligible in the Dog River subwatershed. Average solar radiation to the main stem and its tributaries would remain low overall, and the majority of the length of Dog River would continue to be effectively shaded. Segments of reaches where shade was lacking would remain, and include two older clearcut plantations along approximately 0.4 miles of lower Dog River where riparian vegetation had been encroached upon during the original harvest in the 1970s, and where several small patches of streamside blowdown occur in both the lower and upper reaches. Natural recovery along these segments from growing streamside vegetation would be expected to continue.

The degree of fine sediment that can potentially enter stream waters in the subwatershed would be generated from the same sources. The greatest potential would continue to come from roads at four crossings over perennial streams. The largest source would continue to be where Highway 35 crosses over lower Dog River. The potential for road grime and grit, as well as winter sanding materials to wash into the stream waters there would remain very high.

Two other crossings, where FS road 44 crosses over Dog River and where FS road 17 crosses over Brooks Meadow Creek would also remain sources of potential fine sediment. Both however, are paved crossings where use is seasonal, sporadic, and relatively low. So the amount of road grit and fine sediment potentially generated at these crossings that could enter stream water would remain relatively low.

The fourth crossing where the potential for fine sediment to enter stream waters would remain high is where Brooks Meadow Creek flows across the top of the 12-foot wide gravel service road that parallels the pipeline. The channel at this crossing has been heavily impacted, and flow is sometimes hindered, ponding in wheel ruts before passing across and back into the creek. Although this road is used very little, water flows across it persistently. When not frozen, this site is always ponded and muddy, it is a potential chronic source of fine sediment. But the area is small, and the stream velocity low, so the amount of sediment that actually gets mobilized into the water column would be relatively low too, except temporarily when a vehicle or OHV occasionally runs through the 10 x 12 foot puddle.

Leakage from the pipeline would continue to occur under the No Action Alternative, and new ones could develop. During high flows, when flow velocities generate high pressure, the larger of these leaks would continue to erode flow paths to existing intermittent or perennial channels, potentially delivering fine sediment to stream waters that could temporarily increase turbidity.

Additionally, given the age and current condition of the existing pipeline, there would remain a risk of catastrophic failure. If catastrophic failure of the pipeline were to occur, particularly on a steep slope, gully erosion could be expected. Deposition of fine sediment and elevated turbidity would be expected as a result, and would continue until the diversion could be shut down.

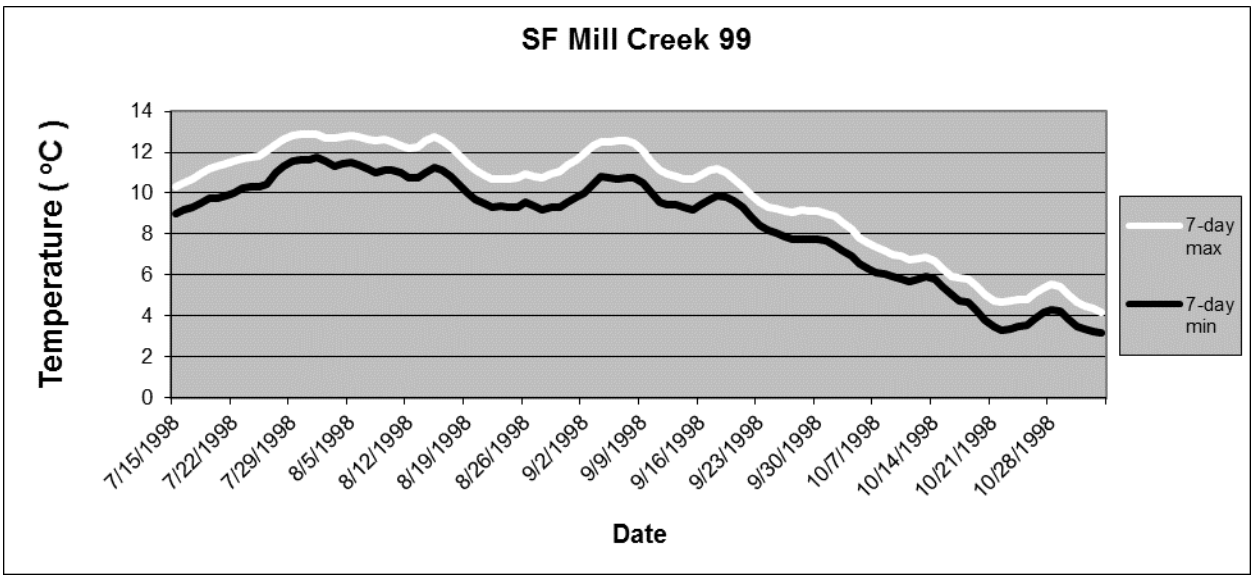
South Fork Mill Creek

Under the No Action Alternative, existing effects to the water quality of South Fork Mill Creek would remain unchanged. There would continue to be no impairments to the designated beneficial uses. Other than seasonal or storm variation the quality of the stream water in the creek would be expected to remain very good. Occasionally, high concentrations of coliform could be expected to be detected by the City at the Wicks Water Treatment plant, probably originating from wildlife fecal contamination. In the past, they have also detected slightly elevated concentrations of phosphorus, possibly from accumulated

sediments in the reservoir. But the dilution provided by the inflow of water from Dog River would continue to abate any effect that could necessitate special treatment.

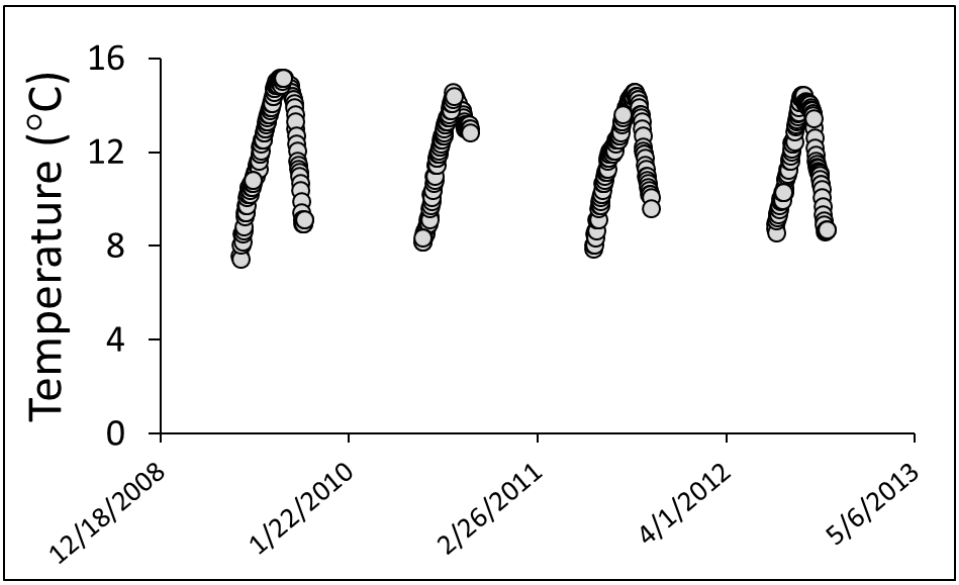
The seasonal trends in stream temperature observed below the Crow Creek Reservoir would be expected to continue (Figure 27). Stream temperature would not be affected under the No Action Alternative. South Fork Mill Creek stream temperatures would remain cold year-round below the dam, rarely exceeding water quality standards for temperature, and meeting the ODEQ requirements for fish and aquatic life beneficial uses.

Figure 27. Seven-day-minimum and maximum temperatures in South Fork Mill Creek at the USFS boundary (MHNF 1999) below Crow Creek Reservoir.



Just below the dam however, the seven-day summer maximum temperature would continue to commonly be slightly increased above the 13°C standard (Figure 28). This is thought to result when drawdown during peak use in the summer would lower reservoir levels, resulting in the potential increase of temperature in the stored water that would be released into the creek. Regardless, stream temperature would not be considered to be degrading water quality in the South Fork Mill Creek. Due to the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature by the MHNF would continue.

Figure 28. Summer average daily temperature for South Fork Mill Creek (elevation of 2,500 feet), downstream of Crow Creek Reservoir near the Forest boundary.



Source: MHNF 2017

Residual effects to riparian shading from past forest management would continue to be negligible in the South Fork Mill Creek subwatershed. Average solar radiation to the main stem and its tributaries would remain low overall, and the majority of the length of South Fork Mill Creek would continue to be effectively shaded. Segments of reaches where riparian shade had been impacted by the Government Flats wildfire would continue to recover from growing streamside vegetation.

Fine sediment and turbidity would not be expected to become an impairment to the water quality of South Fork Mill Creek under the No Action Alternative. There would remain however, existing anthropogenic sources of fine sediment in the subwatershed. The primary sources on Forest Service lands are where certain segments of road connect to the channel network at specific perennial stream crossings, and where several segments of the upper reach have become slightly more incised, and in the lower reach where there is some evidence of unstable stream banks.

Three crossings associated with FS road 1721 where it crosses over Stroud Springs, the South Fork of Mill Creek, and at Alder Creek would continue to have the potential to deliver fine sediment to stream waters. The relative amount of sediment potentially delivered from these crossings would be low because these crossings are within the Municipal Watershed, which is closed to public use and gets very little traffic. The drainage structures on this road are in good condition, and have been purposefully constructed to minimize the length of road connected to the stream network. Also, all three crossings are upstream of Crow Creek Reservoir, where road sediment would be expected to settle and accumulate

A fourth crossing is currently a bridge where FS road 1720-190 crosses the South Fork of Mill Creek about ¾ of a mile below the dam. It too is within the Municipal Watershed, and seldom used. The amount of fine sediment that it could potentially generate and deliver to the creek would also be expected to remain low.

A low-water ford located about 3.5 miles downstream of the dam on non-Federal land has the potential to generate and deliver fine sediment to the creek. But it too is seldom used. It is not always passable. Periodically, it could get used during low flow periods when it would be safe to cross over. When crossed by a motorized vehicle, it could be expected that a small measure of sediment is stirred and mobilized.

The duration of the disturbance would be brief, so the amount of sediment generated would be minor and short-lived.

The hydrologic regime of the South Fork Mill Creek would continue to be altered due to the diverted flows from Dog River, the seasonal spill around Crow Creek dam, and the timed releases from the reservoir. Average peak and base flows will continue to be elevated, increasing water velocity and stream turbulence. The channel and streambanks would continue to slowly adjust incrementally. Increases in sedimentation and turbidity could be expected as a result, particularly during the spring spill and late summer releases. But since the degree of channel incision and bank erosion is not widely extensive after many decades of an altered hydrologic regime, the amount of fine sediment generated as a result would continue to remain only a slight increase.

Leakage from the pipeline would continue to occur under the No Action Alternative, and new ones could develop. During high flows, when flow velocities generate high pressure, the larger of these leaks would continue to erode flow paths to existing intermittent or perennial channels, potentially delivering fine sediment to stream waters that could temporarily increase turbidity.

Additionally, given the age and current condition of the existing pipeline, there would remain a risk of catastrophic failure. If catastrophic failure of the pipeline were to occur, particularly on a steep slope, gully erosion could be expected. Deposition of fine sediment and elevated turbidity would be expected as a result, and would continue until the diversion could be shut down.

Water Rights

The City of The Dalles would continue to use surface waters certificated by the OWRD for municipal use from Dog River and the South Fork of Mill Creek, which include the four water rights currently in their name (Table 28). The amount and designated purpose of use authorized under these existing water rights would not be expanded or transferred. The City would continue to have the decreed right to use all of the water in upper Dog River above the point of the pipeline diversion, and 2 cfs from South Fork Mill Creek above the Wicks water treatment plant. The priority dates for these two surface water sources precede all other claims, so they would remain senior to all other water rights from those streams. Because they are decreed and certificated municipal water rights, they will not be subject to standard forfeiture statutes, and will be protected against injurious claims (ORS 540.610 and 538.410 respectively).

Table 28. Surface Water Right Certificates for Dog River and South Fork of Mill Creek that are designated for municipal use.

City of the Dalles

Source	Application	Permit	Certificate	Claim, Decree, or Transfer	Priority date	Type of Beneficial Use	Authorized Rate or Annual Volume
Dog River			14954	Hood River decree	8/1/1870	Municipal	"All the water in stream at point of diversion"
South Fork Mill Creek			5691	Mill Creek decree	1862	Municipal	2 cfs
Crow Creek reservoir	S-43668	S-32479	60410		5/29/1967	Municipal	955 AF
South Fork Mill Creek, Dog River	R-43667	R-4988	44917		5/29/1967	Storage for Municipal	955 AF

Source: OWRDb 2019. Note: Definitions: *Permit* – Applicant has been approved to develop a water source for its designated beneficial use. *Certificate* – Applicant has "perfected" and developed the water right as per the conditions of the permit. The water right has become certified to the holder. *Decree* – Court issued water right to a holder.

These water rights would remain the purview of the OWRD, the state authority that regulates and administers their use and insures consistency with the requirements of Oregon Revised Statutes and Administrative Rules. OWRD would continue to monitor the City of the Dalles to ensure compliance with Oregon Water Law pertaining to municipal use. The City of The Dalles would continue to report to OWRD their usage, proposed upgrades or changes, and provide planning documents for review consistent with the requirements and statutes for municipal water providers.

The Mt. Hood National Forest does not administer or enforce water rights. The Forest's Special Use Permits however, which authorize the City to operate and maintain the Dog River pipeline and Crow Creek Reservoir facilities located on National Forest System lands, would require that all permitted activities comply with State laws. The Mt. Hood National Forest would continue to rely on the OWRD's oversight of the City's use of water rights for compliance with the applicable State water laws.

The City would be expected to apply for an extension for their two permitted water rights slated to expire in 2021 that would provide them authorization to expand Crow Creek Reservoir, which is identified in the City's 2006 Water System Master Development Plan (permits S-53930 and R-13105). This would keep the water rights for additional storage and increased municipal use in the name of the City. It's anticipated that OWRD would grant them a 10-year extension. If granted, it would be the second extension on each of the permits.

Priority dates for the permits are both January of 1999. Since then, only preliminary plans for raising the height of the dam have been drafted. The City has not submitted any formalized plans or filed for any other requisite approvals to prove-up on the permits so that their water rights could be certificated. Since OWRD would be expected to extend the water right permits however, reservoir expansion would remain

an option if needed for the City to meet future demand. But it would remain uncertain when, or if the City intends to proceed because they would continue their search for other storage options. If they were to proceed with reservoir expansion, then NEPA would have to be initiated because the action would partially be located on National Forest System lands.

Under the No Action Alternative, the City would be expected to exercise their limited license to conduct testing to determine the feasibility of an ASR system. The final order for the license was granted to the City by OWRD in October of 2018. The City would be authorized to divert up to 16.7 cfs using their existing water right certificates for Dog River, the South Fork of Mill Creek, and Crow Creek Reservoir. Additional diversion flow from Dog River would not be expected to meet ASR demand. OWRD would administer the City's use of the limited license, and be responsible for the enforcement of the final order's conditions.

Two other surface water rights in the Dog River and South Fork Mill Creek subwatersheds would remain held in-trust by OWRD on behalf of the ODFW (Table 29). These water rights would be administered to provide stream flow for the migration, spawning, egg incubation, fry emergence, and juvenile rearing for Coho salmon, summer and winter steelhead, rainbow trout and cutthroat trout. The flow rates allocated to them would remain applicable to the reaches of each stream below the point of diversion for the Dog River pipeline and Crow Creek dam respectively. The priority date for both instream water rights is 1991.

Table 29. In-stream surface water rights in the Dog River and South Fork Mill Creek subwatersheds and the maximum monthly allocation protected by OWRD for instream use.

Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dog River below diversion Certificate IS76267A	12.0	12.0	12.0	20.0	20.0	20.0	12.0	7.01	6.05	7.79	14.7	12.0
S Fk Mill Creek below dam Certificate IS72078A	7.0	7.0	10.0	17.0	17.0	7.8	4.8	5.4	6.1	4.8	5.5	7.0

Source: OWRD 2019b

OWRD would continue to administer these instream water rights so that any remaining water available for allocation as a water right in the watershed would be designated for the in-stream purpose. These flow allocations would be the remainder of the estimated natural average flow not being used for other senior users. As described in each of the respective certificates, they would not be expected to represent minimum flow requirements. They would not guarantee actual flow availability at those rates, but rather reflect the maximum allocation protected for the instream beneficial use by the water right. As a condition of the certificate, they would not have priority over human consumption. They would be considered by OWRD to be junior to the City of The Dalles municipal water rights in Dog River and South Fork Mill Creek.

The City of The Dalles' water rights for Dog River and the South Fork of Mill Creek would remain senior to any federal reserved water rights because their priority pre-dates that of the establishment of the Mt. Hood National Forest (OWRD 2002). Any claims by the Forest Service to such rights would be subject to the state's adjudication process. The Forest Service would not be expected to submit any claims or assertion for federal reserved water rights in the Dog River and South Fork Mill subwatersheds.

3.3.2.2 Proposed Action Alternative

The Proposed Action is the replacement of the existing pipeline with a new pipeline, allowing the City of The Dalles to utilize more efficiently the water being diverted from Dog River. The existing 3.4 mile pipeline would be replaced with a seam-sealed 24-inch-diameter pipe. It would be located parallel and next to the existing alignment as much as possible. Decades-old leakage would be rectified.

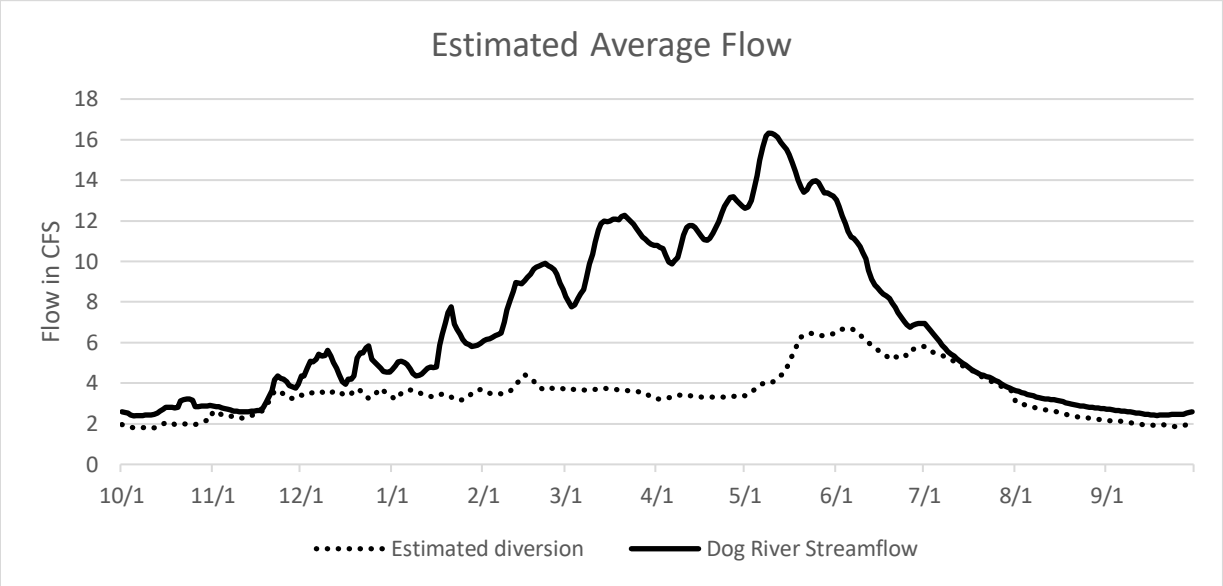
In addition to pipeline replacement, the project will repair and improve the diversion structure and install fish screens and passage structure, install a new culvert under the service road crossing Brooks Meadows Creek that would provide passage for aquatic organisms, and improve summer low flows by adding 0.5 cfs into Dog River below the point of diversion during August, September, and October. Implementation of the proposed action would include the use of BMPs and PDC identified to minimize effects to natural and cultural resources.

Water Quantity and Streamflow

Dog River

Under the Proposed Action Alternative, the quantity of water diverted from upper Dog River and its tributaries would remain unchanged from current conditions between early November and Late July. On average, Dog River would continue to provide for about 58 percent of the City's total surface water contribution. Diversion to South Fork Mill Creek in the early summer would be expected to average about 7.0 cfs, and about 2.0 cfs during late summer. In most years, the headworks at the pipeline inlet would be operated to increase diverted flow in the late fall and early winter to re-fill Crow Creek reservoir, by early or mid-February if possible. Once full, the amount of diversion would be reduced manually to a maintenance flow of about 2-3 cfs until mid- to late May. Then the rate of diversion would be increased to capture the entire amount of upper Dog River's base flow through July. The City would then reduce the amount of flow diverted between August 1 and October 31 to allow a proportion (0.5 cfs) of the base flow to bypass downstream to lower Dog River (Figure 29).

Figure 29. Mean daily discharge summary of an average water year that was diverted into the City's pipeline during 2012 through 2018, minus 0.5 cfs bypass flow to be offered 8/1 through 10/31, compared to mean daily discharge of Dog River above diversion



Source: CTD 2018

Effects to streamflow from pipeline diversion would continue to be greatest during the summer and early fall when flows are lowest, and an average of 80 to 100 percent of upper Dog River is diverted into the pipeline (see Table 30). During this time, the lowest eighth of a mile segment of Reach 3 below the pipeline diversion would likely be partially dewatered mid-June through late July. Instream flows to this segment would be restored naturally just downstream by springs, seeps, and hyporheic flow. Lower Dog River would continue to be a perennial stream type during this time (Figure 30). Then during late summer and early fall, streamflow would be partially restored with 0.5 cfs of bypass flow from Aug. 1 to Oct. 31.

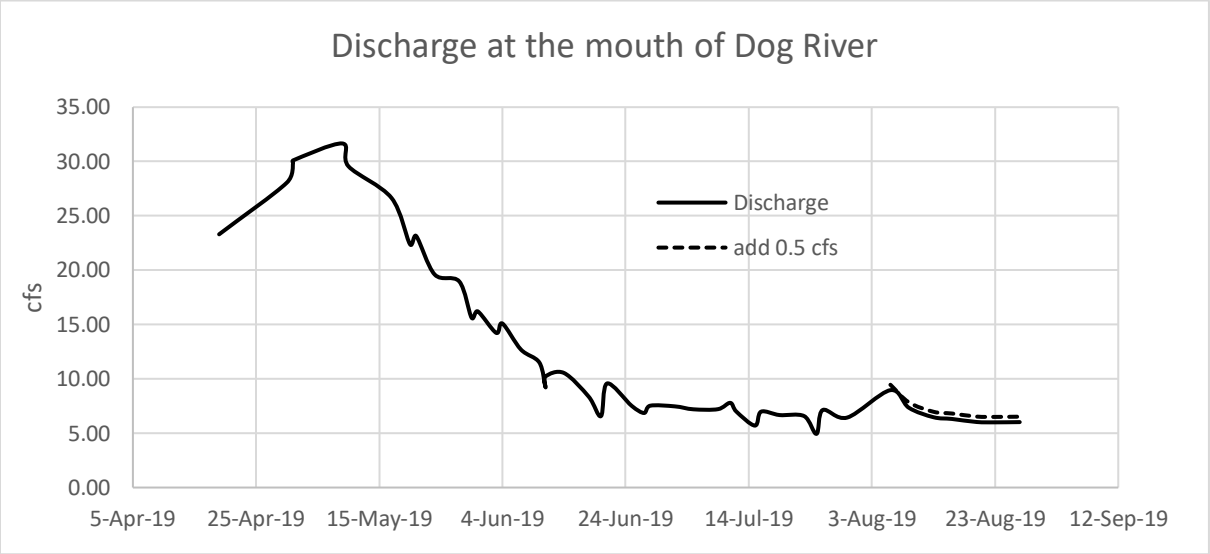
Table 30. Estimated Percent of Mean daily discharge (cfs) of Upper Dog River Diverted May through October under the Proposed Action.

	May	June	July	August	September	October
Percent of Dog River diverted	39	99	100	80	80	79

Source: CTD 2018

It is estimated that Puppy Creek would continue to potentially contribute on average nearly 4 percent of the base flow to lower Dog River, and Brooks Meadow Creek could potentially contribute nearly 12 percent of its base (USGS 2017). Ground water contributions to lower Dog River would also continue to supplement base flows. The perennial sources of near-bank springs and seeps along the lower reaches below the diversion would continue to provide unceasing flow during summer months.

Figure 30. Instantaneous Discharge measured near the mouth of Dog River spring through late-summer of 2019, with additional proposed bypass flow of 0.5 cfs exhibited.



When the majority of flow of upper Dog River is being diverted to the pipeline in the summer and early fall, the river at the mouth would continue to flow perennially. Despite the diversion of most of the summer low flow that's produced from the Upper catchment, as much as 40 percent or more gain of available daily flow could be expected at the mouth of Dog River (Table 31). But overall, capturing the majority of flows during summer and late fall would continue to reduce natural mean monthly base flows at the mouth of Dog River by an estimated 25 to 35 percent.

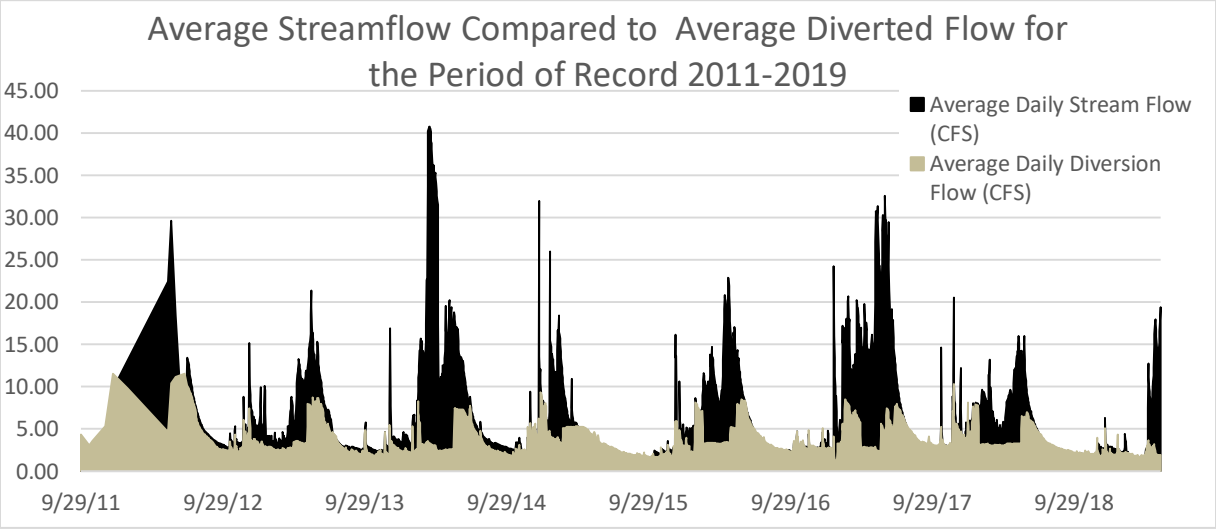
Table 31. Comparison of Discharge (cfs) in Dog River Measured Above and Below the Diversion on Select Dates.

Location	July 20, 1972	July 27, 2000	July 27, 2016	May 1, 2019
RM 6.0 Above Diversion (fully diverted flow)	6.2[1]	4.0[2]	3.2[3]	14.91[5]
RM 0.0 Near Mouth	NA	8.3[3]	5.3[4]	30.1[5]
RM 3.0 in Reach 2	9.0[1]			

Sources: [1]HRWG 1999, [2]MHF 2000b stream survey, [3]CTD 2017b, [4]CTWS 2017, [5]OWRD 2019:

The effects of diversion on peak flows would continue to be greatest during the late fall and early winter months when Crow Creek Reservoir is filling. Diversion will decrease the overall magnitude of mean daily peak flows in Dog River during that time. Data indicates it could be by as much as 70 percent in a year when total fall/winter precipitation is below normal. The majority of peak runoff however, which occurs in the spring, would not be expected to be attenuated nearly to that degree. This is because in most years, Crow Creek Reservoir would be filled by early to mid-February. Typically, the majority of the spring freshet would not be diverted, and would pass downstream to lower Dog River (Figure 31).

Figure 31. A comparison of average streamflow and diverted flow from 2011 through 2018 above the Dog River diversion to illustrate the amount of spring peak flows that would bypass to lower Dog River.

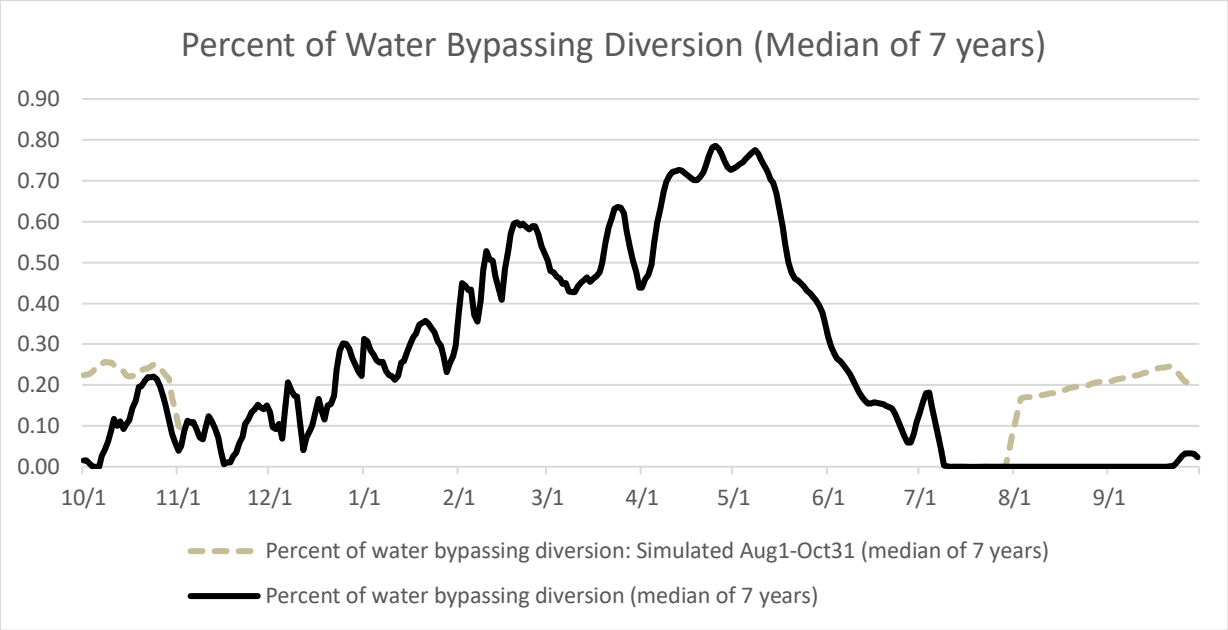


Source: CTD 2018

In lower Dog River, the attenuation of winter peak flows would be less of an effect than the upper river because of the contributions from perennial and intermittent streams in the Lower catchment. Puppy Creek for example would continue to potentially contribute on average about 19 percent of peak flow in lower Dog River, while Brooks Meadow Creek's contribution could average about 4 percent of the peak (USGS 2017).

Annually, there would continue to be an amount of bypass streamflow available to lower Dog River. Only a portion of streamflow would be diverted from upper Dog River most months. During some months bypass flows would likely be greater than diverted flows. During June and July the entire, or nearly entire amount of the flow from upper Dog River would be diverted. Bypass flows of 0.5 cfs downstream to Dog River would be maintained during the late summer and early fall only under the Proposed Action. Based on past records, the percentage of total streamflow that would not be diverted, and flow past the point of diversion and stay in the main stem of Dog River can be displayed as a percentage of total streamflow (Figure 32). The maximum amount of bypass flow would be expected to continue during late April and early May and would account for between 70 and 80 percent of the total available flow from upper Dog River.

Figure 32. The amount of mean daily streamflow that bypassed (undiverted flow) the pipeline diversion down Dog River, expressed as a percentage of total available streamflow for water years 2012 to 2018*



Source: MHNF 2018 *Includes simulated 0.5 cfs bypass flow to be offered by the City August 1 through October 31.

Installation of a new pipeline would eradicate the water loss that has persisted for many decades from the old conveyance line. The total amount of water loss would no longer factor into the amount of water diverted from Dog River to meet demand. Conveyance of water using the new pipeline would become more efficient, so that only the water needed to meet demand would be withdrawn. The amount of unused water diverted from Dog River could be minimized. Since operations that manage the timing and amount of water diverted from Dog River would change little under the Proposed Action, the amount of water loss due to leakage could become available as bypass flow downstream, or to fill Crow Creek Reservoir earlier in the winter and maintain its surface elevation longer into the spring. The water that was lost to leakage during base flows, would be available for maintaining at least 0.5 cfs bypass flow downstream to lower Dog River from August 1 to October 31.

The effects of forest management on water quantity and streamflow in the subwatershed would continue to be slight. Two measures often used as indices of the potential effect of forest management on streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2015 to be below thresholds of concern (Table 32).

Since then, there has been no new road construction, and only a minor extent of past thinning. Effects of forest management on stream flow would remain negligible. There would remain however, 5 crossings over perennial streams where segments of road would periodically divert intercepted runoff toward streams, a portion of which would likely enter the stream during high runoff events. Under the Proposed Action, the one crossing where the pipeline access road intersects with Brooks Meadow Creek would be improved by installing a culvert that would diminish interception and diversion of runoff to the stream. The amount of contributing area to all five crossings would remain a very small percentage overall. Hydrologic recovery from any past activities would continue to improve.

Table 32. Road Density and Watershed Impact Areas in the Dog River Subwatershed in 2015. No changes are expected in these indicators under the Proposed Action.

Indicator	2015	Threshold of Concern
Road Density (mi/sq mi)	2.4	3.0
Watershed Impact Area (%)	3	25

Source: MHNF 2015

The mean annual contribution to the East Fork Hood River (above the confluence with Middle Fork Hood River) from Dog River would likely increase slightly above the current estimate of about 4 percent because leakage would be eradicated with the new pipeline. But overall, diversion from Dog River would continue to decrease its mean annual contribution to the East Fork by an estimated 1.5 to 2 percent.

Similar to the No Action alternative, the City would continue to move forward with ASR testing under the Proposed Action. Testing would occur on non-Forest System property under a limited license issued to them in 2018 by OWRD. Testing is not reliant on replacement of the pipeline. Water to be used for the ASR would be supplied by the surface water rights in the municipal watershed, which include Dog River, South Fork Mill Creek, and Crow Creek reservoir. In the issuance of the license OWRD estimated that existing surface flow and storage is available for the City's ASR project (OWRD 2018). OWRD would be the authority that administers the limited license agreement and enforces its terms and conditions.

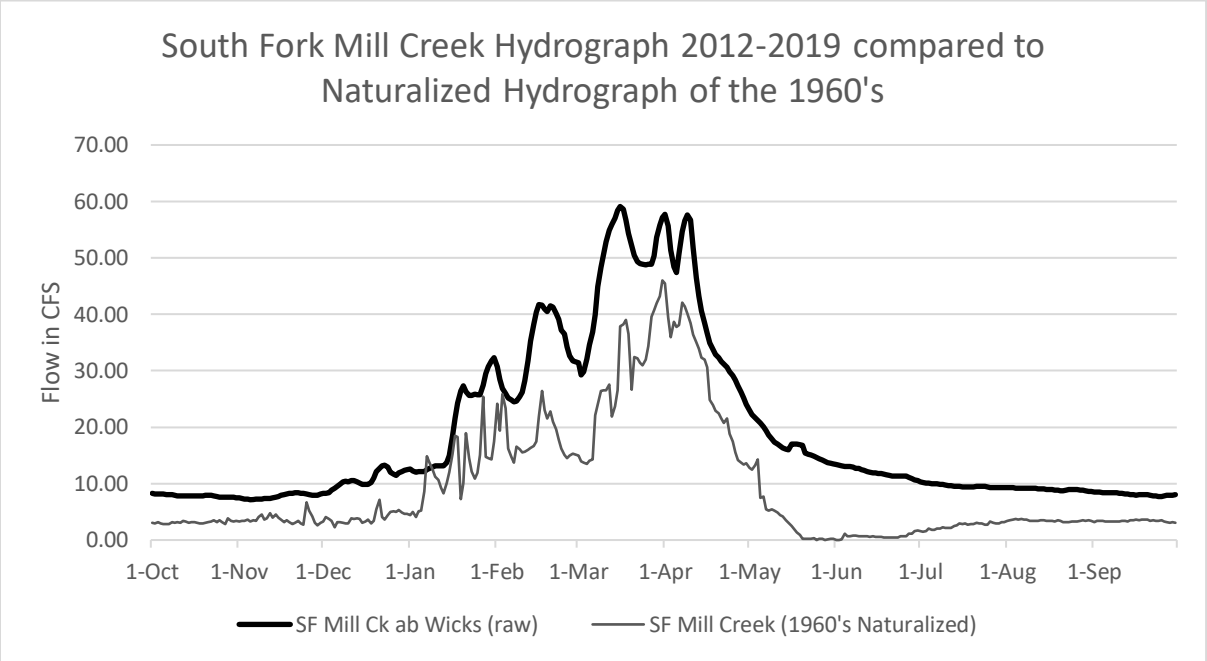
At peak demand it is estimated that ASR testing would use approximately 1.03 cfs (244 million gallons per year). This increase in demand could be expected to be supplied from a proportion of the total annual contribution of South Fork Mill Creek. There has been enough average runoff in winter and spring from the South Fork Mill Creek subwatershed, that when coupled with a percentage of the storage in the reservoir, there would not be a need for additional water diverted from Dog River to meet the increase in demand for ASR in most years (CTD 2019a). Due to the leakage that would be eradicated under the Proposed Action alternative, the amount of winter diversion from Dog River typically used to support storage could be available sooner, potentially filling the reservoir a week or two earlier than usual. If filled sooner, then that much more of the natural runoff from the South Fork of Mill Creek that ordinarily goes unused could be used for ASR testing.

South Fork Mill Creek

Under the Proposed Action, the amount and timing of flow diverted from Dog River to South Fork Mill Creek would continue to be managed to meet municipal demand. Operations of the Dog River pipeline and Crow Creek reservoir would capture both the naturalized streamflow from upper South Fork Mill Creek, and the diverted flow from upper Dog River until maximum storage (full-pool) would be achieved in mid- to late winter. Diverted flow would be dialed back after the reservoir becomes full so as to minimize spill while maintaining its surface elevation at full-pool. Water operations would be adjusted through the year to try and balance the capture of available flow, the quantity of diversion, storage, spill, and release with annual variation in demand.

Total streamflow in SF Mill Creek would continue to be artificially be inflated above natural conditions (Figure 33). Inflow from Dog River and storage release from the reservoir would continue to increase base and mean annual streamflow. Streamflow would still vary seasonally as it would under natural conditions, but there would continue to be more available flow overall.

Figure 33. Mean daily flow in South Fork Mill Creek above the Wicks water treatment plant intake exhibiting the estimated increase in streamflow above the natural flow regime.



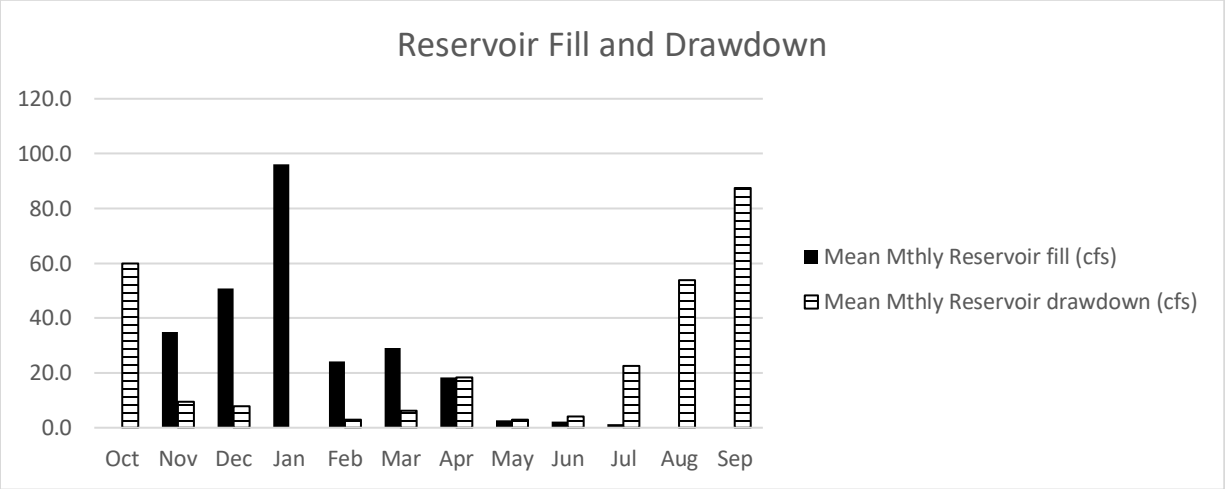
Source: CTD 2019

On average, Dog River would continue to contribute about 58 percent of the City's total surface water contribution. Diversion to South Fork Mill Creek in the early summer would average about 7.0 cfs, and about 2.0 cfs during late summer. In Reach 2 between the pipeline outlet and Crow Creek Reservoir this contribution would amount to about 4 times more streamflow than the natural base flow. In the late fall and early winter, the amount of diverted flow would be increased to try and re-fill Crow Creek reservoir by early or mid-February. Once full, the amount of diversion would be reduced to a maintenance flow of about 2-3 cfs until mid- to late-May. Then the rate of diversion would be increased to capture the entire amount of upper Dog River's base flow through July. From August 1 through October 31, the City would reduce the amount of diverted flow to South Fork by at least 0.5 cfs.

Dam releases and diverted flow from Dog River would continue to be managed to meet peak demand during the summer months. Base flows just above the Wicks water treatment plant near the mouth of the South Fork Mill would remain elevated by more than double that of estimated natural discharge. Reliable late summer flows from these surface water sources, including available live flows and stored water releases, would remain an average estimate of 5.4 cfs (CTD 2014).

Release from the reservoir would occur year around primarily to meet municipal demand and provide at least 2.0 cfs to South Fork Mill Creek as stipulated by the reservoir Special Use Permit. Releases of 6 cfs or higher would be common. The quantity needed for release typically fluctuates on a seasonal trend, but may occur weekly or daily too. Inflow into the reservoir would begin to subside in summer, when drawdown of the reservoir would be expected to occur. Typically the City would begin drawdown in early July and then begin refilling in November (Figure 34). Sometimes there would be a need for special releases such as when one of the supplemental wells might be taken off-line.

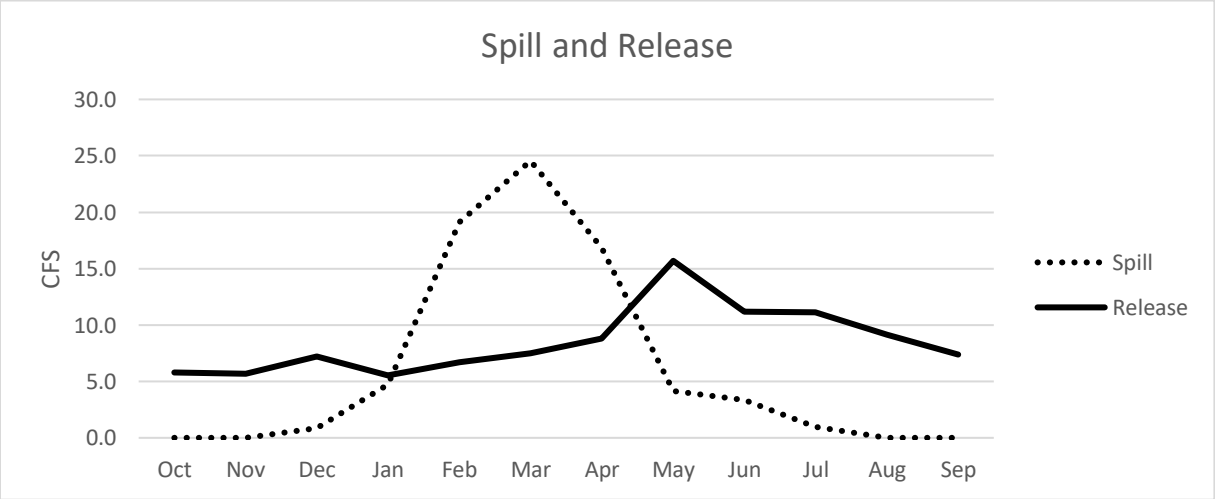
Figure 34. Mean monthly fill and drawdown trends during the period 2005 to 2015.



Source: CTD 2017c

Peak flows would continue to be attenuated to a degree below the Crow Creek dam as a result of storage in the reservoir. Spill over the reservoir however, would still occur during early spring when full-pool is exceeded because diverted flow from Dog River and natural inflow from the Upper catchment will have already filled the reservoir. Spill would continue to be greatest during the winter and spring in response to heavy runoff and precipitation (Figure 35).

Figure 35. Comparison of mean monthly spill and release during the period 2005 to 2015.



CTD 2017c. Note: Spill is not recorded continuously, so missing data has been interpreted by the graphed line.

If spill occurs, then less would be needed for release. Spill would not be expected to occur during the early summer to late fall months, when demand and drawdown is highest. Spill would usually be greater than release during winter and spring, and excess to municipal use. Most of this would bypass the Wicks treatment plant intake and flow downstream to Mill Creek, elevating its average natural peak discharge.

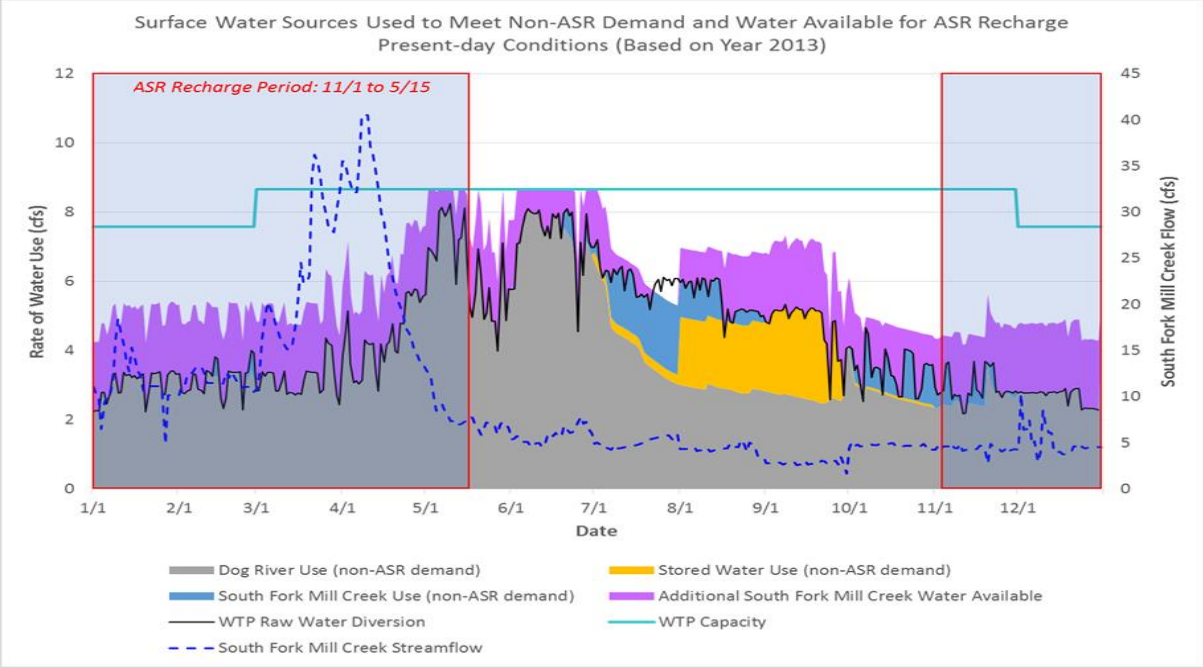
Testing for the City's ASR system under their limited license with OWRD could be expected to utilize the spill that typically occurs during the winter and spring (Figure 36). Testing for the ASR would not be

reliant on replacement of the Dog River pipeline. The increase in demand to test the ASR would be supplied from a proportion of the total annual contribution of South Fork Mill Creek. There has been enough average available spill and runoff in winter and spring from the South Fork Mill Creek subwatershed, that when coupled with a percentage of the storage in the reservoir, there would be available water sufficient for ASR testing (OWRD 2018). OWRD would be the authority that administers the City's limited license and enforces the terms and conditions in the agreement.

The water treatment plant's average intake would be expected to increase during that time because only finished water can be used for ASR testing. This would decrease the amount of winter and spring flow that has typically bypassed the Wicks treatment plant intake and flowed to Mill Creek. This would lower the elevated average peak flow from South Fork Mill that would flow into Mill Creek by an estimated 6 percent.

Under natural flow conditions, South Fork Mill Creek is estimated to have contributed about 69 percent of the mean annual discharge of Mill Creek. Average annual diversion for the Wicks water treatment plant would continue to operate to meet demand, which has traditionally reduced the annual contribution to Mill Creek by an estimated 40 percent (OWRD 2019a). Demand for ASR testing could decrease the mean annual contribution by about another 13 percent.

Figure 36. Comparison of the proportion of the different source water supply with current and projected ASR demand.



(Note: different scale for S. Fk. Mill Creek on right-hand axis). Values above the solid black line (i.e., WTP Raw Water Diversion) represent the volume of unused water currently available for ASR testing. Source: CTD 2019a

The effects of forest management on water quantity and streamflow in the subwatershed would continue to be slight. Two measures often used as indices of the potential effect of forest management on streamflow include road density and the extent of watershed impact areas. Both measures were calculated in 2012 to be below thresholds of concern (Table 33).

Since then, there has not been any new road construction on Forest Service lands. Some roads have been closed and decommissioned. The extent of ongoing fuel treatments (i.e. pile burning) would be minor. Effects of forest management on stream flow would not be expected to change under the Proposed Action, and remain negligible.

There would remain the 4 crossings over perennial streams where segments of road could periodically divert intercepted runoff toward streams, a portion of which likely enters the stream during high runoff events. But the amount of contributing area would be very small. Overall, the South Fork Mill Creek subwatershed would be considered to have minimal hydrologic disturbance from roads, and any long-lasting effects to streamflow would remain slight.

There have been about 3,829 (21%) acres of forest management activities over the last 15 years on Federal lands in and around the South Fork subwatershed. Treatments consisted of thinning, brushing, pruning, underburning, and pile burning to reduce hazardous fuels. They were intended to minimize the potential risks and impacts of wildfire. Best Management Practices were incorporated into treatment design so that watershed effects would be minimized. Existing effects of these past forest management activities, as well as past wildfire, on water quantity and streamflow in the subwatershed would remain slight and continue to diminish.

Table 33. Road Density and Watershed Impact Areas in the South Fork Mill Creek Subwatershed in 2012. No changes are expected in these indicators under the No Action alternative.

Indicator	2012	Threshold of Concern
Road Density (mi/sq mi)	2.6	3.0
Watershed Impact Area (%)	13*	25

Source: MHNF 2012, MHF 2000b *Prior to the Government Flats fire of 2013.

Channel Conditions

For the Proposed Action, channel characteristics and features would continue to be affected as a result of diverted streamflow from upper Dog River. The timing and magnitude of diverted flow would mostly continue to be managed to the status quo so that Crow Creek Reservoir would get filled by early February. Diversion would then be reduced to a flow that maintains the level of the reservoir through the spring. Then diversion would be increased to capture nearly all of the base flow through July. Then the City would maintain a bypass flow of 0.5 cfs downstream to lower Dog River from Aug 1 to October 31.

Dog River

In the Dog River subwatershed, channel forming processes would continue to be altered by the modified flow regime. Winter and summer flows would continue to be affected most. Early and mid-winter average peak flows would be attenuated to a moderate degree. But most of the streamflow volume comes from the spring snowmelt, so the majority of the spring peak flow would bypass the diversion. During June through October, the majority of the streamflow from upper Dog River would be diverted to the South Fork Mill Creek.

For most of the length of Dog River, direct access to the channel would remain limited and human perturbation other than water management would be low. The stream banks and main channel could be expected to remain primarily stable, and the sediment supply would not be expected to undergo an aberrant change from previous trends. Substrate would continue to be dominated by gravels and cobbles.

The average amount of fine sediment observed through-out all reaches would likely remain low to moderate on an area weighted basis.

Changes to channel forming processes related to modified streamflow would continue to mostly affect Reaches 1, 2, and the lower segment of 3. Effects would be greatest in the lower segment of Reach 3 immediately below the diversion because it would continue to be partially dewatered for an eighth of a mile downstream during the mid-summer (i.e., mid-June to late July). Bypass flows of 0.5 cfs that would be maintained by the City from August through October would be expected to re-water that segment of the reach, although flows in it would amount to about 20 percent of natural base flows. Overall, the reduction in average annual flow and the reduction of the majority of base flows in this reach would continue to be the cause for the diminished pool depth, width-to-depth ratio, and wetted perimeter.

Effects to the main channel in Reaches 1 and 2 that make up lower Dog River would continue to be low to moderate, primarily due to the overall reduction of mean base flows that affect the average depths of residual pools. The average depth of the primary pools in both reaches could continue to average about 2 feet during summer low flows of July, even when 100 percent of the flow of upper Dog River would be diverted. Perennial streamflow from Brooks Meadow and Puppy creeks, as well as the many near-bank springs and seeps would continue to contribute to base flows and alleviate the effects of full diversion.

The 0.5 cfs bypass flow that the City would maintain August through October would enhance somewhat base flows and pool depth. Pool depth compared to the No Action Alternative could be improved by a slightly measureable 1 to 2 inches. But overall, it is estimated that summer and early fall pool depths at the mouth of Dog River would remain on average about 2 to 3 inches more shallow than natural flow because of diversion during the base flow period.

Pool frequencies in all four reaches would be expected to remain below the LRMP and NMFS standards that are often suggested as indicators of properly functioning channel processes (Table 34). The attenuation of average peak winter flows resulting from diversion to fill Crow Creek Reservoir in the early- and mid-winter months would be a likely cause for lower pool frequencies below the diversion. The majority of pools that were observed in Reach 3 and 4 however were pocket pools, suggesting the small size of Dog River and its channel type, which have a low inherent potential for new deep pool formation because the stream power and discharge to scour deeper and mobilize larger quantities of bedload is low and infrequent.

Table 34. Observations of Select Channel Characteristics of Dog River from the 2000 Stream Survey Compared to LRMP and NMFS Standards and Guidelines.

Reach	Percent Fine Sediment Observed	LRMP Standard for Percent Fine Sediment	Total Pools per Mile	Primary Pools per Mile	LRMP Standard Primary Pools per Mile	NMFS Standard Primary Pools per Mile
1	8	20	18.8	5.2	96.7	70
2	14	20	16.6	5.1	105.2	70
3	12	20	19.5	0.6	130.5	96

4	6	20	36.5	0.0	190.1	96

Source: MHNF 2000a

Channel forming processes in Reach 4 and the remaining perennial and intermittent tributaries would remain largely unaffected. With the exception of Brooks Meadow Creek, where the pipeline access road crosses through its lower reach. It would be restored to flow through a culvert underneath the access road, providing passage for aquatic organisms and improving the functionality of this short segment. The streamflow would be free-flowing and no longer hindered.

As observed in the 2000 stream survey, the abundance and density of large woody debris in all reaches of Dog River would likely remain low to moderate compared to the LRMP standards (Table 35). But the density of LWD would continue to meet the NMFS standards in all reaches. Since then, inputs of woody debris have continued to accumulate. Small wood pieces would likely continue to dominate the total percentage of wood in the stream. Some of the small wood will remain a component of debris jams, but the majority of it would likely continue to be individual pieces. The in-stream abundance and density of woody debris would be expected to continue to gradually increase for all size classes because the potential for future recruitment from the inner riparian zone is good to excellent along most of the main stem, and the inner riparian zone for all reaches is dominated by late- and mid-seral forest structure.

Table 35. In-channel woody debris and woody debris density amounts (total of both medium and large size classes) observed in the 2000 Dog River stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	71	40	78	189	16.7	26.7	43.4	106	20
2	119	47	55	221	18.6	21.7	40.3	106	20
3	226	123	47	396	39.2	15	54.2	106	20
4	153	119	43	315	64.8	23.4	88.2	106	20

Source: MHNF 2000a

Construction along the route of the new pipeline would remove trees. The segment of the new route between the diversion and FSR 44 would be within, or on the edge of the out riparian zone. This would diminish the availability and potential recruitment of large wood taken from the construction corridor on the east side of that segment. But the inner riparian zones along both sides of the stream, and the outer zone of the west side would remain intact and undisturbed. Recruitment potential from those zones would remain high, so the overall impact of construction on recruitment of large woody debris along Reach 3 of upper Dog River would be minimal.

Data from the 2000 stream survey are useful for interpreting the effects of the modified flow regime on the potential transport, distribution, and accumulation of in-stream woody debris under the Proposed Action. There were 103 debris jams counted during the stream survey of Dog River in 2000 (Table 36). Twenty-four percent of the total wood inventoried was in these jams. Of the wood in debris jams, 47 percent was in the small size category, 31 percent in the medium size class, and 22 percent in the large size class.

Table 36. Existing number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	16	52	19	30	10	56	22
2	15	95	24	40	7	44	11
3	22	199	27	108	15	40	7
4	50	99	54	70	49	26	17

Source: MHNF 2000a

The total amount of in-stream debris jams inventoried suggests that the capability of the flows in Dog River in all reaches would continue to transport and distribute woody debris that could accumulate into jams. But intrinsically, the potential would remain fairly low because the flows and channel size are relatively small. The capability of the winter peak flows that have been attenuated by diversion to transport medium and larger pieces would remain somewhat diminished. Spring peak flows however, could be expected to retain most of their potential to transport larger pieces where the channel is wide and deep enough. Transport potential in the Lower catchment would remain higher than the Upper catchment due to greater mean channel width and depth. In lower Dog River, the potential for maximum peak flows in both winter and spring to transport and re-distribute medium and large pieces of woody debris would remain functional.

South Fork Mill Creek

Under the Proposed Action, diversion from Dog River and storage and release in Crow Creek Reservoir would continue to modify the flow regime in the South Fork Mill Creek subwatershed. Channel forming processes would remain altered as a result in the main channel. Early- and mid-winter flows, spring flows, and summer flows would continue to be affected most. Direct access to the main channel of South Fork Mill Creek would remain limited and human perturbation other than water management would be low.

Above the reservoir, average peak flows in early and mid-winter would remain elevated above naturalized levels due to contributions from diversion. Below the dam, they would be attenuated and less than naturalized rates due to the filling of the reservoir and retention for storage. Average spring peak flows would remain higher than naturalized above and below the dam because of diversion contributions and spill combined with release. Base flows above and below the dam would also remain elevated above naturalized levels due to contributions from diversion and releases downstream.

Elevating average base and peak flows will continue to increase water velocity seasonally and gradually deepen entrenchment. Width-to-depth ratios could be expected to slowly decrease, and the wetted perimeter enlarge. The short segments of channel where unstable and undercut streambanks were observed in Reaches 1 and 2 could progressively expand. For these reasons, pool abundance and quality would remain low (Table 37). Most of the segments in each of these reaches would continue to be fast flowing, and not conducive to pool formation.

Table 37. Observations of Select Channel Characteristics of South Fork Mill Creek from the 2011 Stream Survey Compared to LRMP and NMFS Standards and Guidelines.

Reach	Percent Fine Sediment Observed	LRMP Standard for Percent Fine Sediment	Total Pools per Mile	Primary Pools per Mile	LRMP Standard Primary Pools per Mile	NMFS Standard Primary Pools per Mile
1	5	20	7.9	1.4	76	70
2	23	20	6.3	0.5	115.8	96
3	11	20	0.0	0.0	NA	184

Source: MHNF 2011

Substrate would be expected to remain dominated by coarse gravel. Fine sediment generated by streambank erosion and incision would essentially be routed through the system by the elevated water velocity. Although it could continue to accumulate in the few pools or short aggrading segments in Reaches 1 and 2. Above the dam, the majority of fine sediment generated would most likely continue to settle in the reservoir, while below the dam it could accumulate behind the Wicks intake structure.

The low overall abundance and density of large wood observed in the 2011 stream survey was low, and well below LRMP and NMFS standards (Table 38). Since then, woody debris has continued to accumulate. Small wood pieces would likely continue to dominate the total percentage of wood in the stream. Some of the small wood will remain a component of debris jams, but the majority of it would likely continue to be individual pieces.

The in-stream abundance and density of woody debris would be expected to continue to gradually increase for all size classes in the Upper catchment because the potential for future recruitment from the inner riparian zone is good to excellent along most of the main stem where the inner riparian zone is dominated by late-seral forest structure. In the Lower catchment, potential recruitment is good along the main corridor of South Fork Mill Creek, but fair to poor in the outer riparian zones where the 1967 School Marm and the 2013 Government Flats fire burned over the forest. Further down, the vegetation type changes to more scrub-oak and the main stem is comprised of willows and cottonwood.

Table 38. In-channel woody debris and woody debris density amounts (total of both medium and large size classes) observed in the 2011 South Fork Mill Creek stream survey.

Reach	Number of Pieces In-Channel				Density per Mile			Density per Mile Standards	
	Small	Medium	Large	Total	Medium	Large	Total	LRMP	NMFS
1	77	17	3	97	5.8	1.0	6.8	106	20
2	134	37	32	203	8.7	7.5	16.2	106	20
3	10	2	1	13	5.4	2.7	8.1	106	20

Source: MHNF 2011

Data from the 2011 stream survey are useful for interpreting the effects of the modified flow regime on the potential transport, distribution, and accumulation of in-stream woody debris under the Proposed

Action. There were 129 debris jams counted during the stream survey of South Fork Mill Creek in 2011 (Table 39). Debris jams in Reaches 1 and 3 were all comprised of small wood, and 97 percent of the wood in jams in Reach 2 included small wood.

Table 39. Existing number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	32	45	32	17	0	3	0
2	90	47	87	34	3	32	0
3	7	3	7	2	0	1	0

Source: MHNF 2011

The total amount of in-stream debris jams inventoried suggests that the capability of the flows in South Fork Mill Creek in all reaches would continue to transport and distribute woody debris that could accumulate into jams. But intrinsically, the potential would remain fairly low above the dam because the channel sizes are relatively small.

The capability of the attenuated winter peak below the dam, and the capture of woody debris in the reservoir itself would continue to diminish the redistribute of woody debris through the system. The enhanced spring peak flows however would continue to be capable of transporting and re-distributing medium and larger pieces where the channel is wide and deep enough. Transport potential in the Lower catchment would remain higher than the Upper catchment due to greater mean channel width and depth.

Water Quality

For the Proposed Action, water quality would continue to be affected by diverted streamflow from upper Dog River. The timing and magnitude of diverted flow would continue to be managed close to the status quo so that Crow Creek Reservoir would get filled by early February. Diversion would then be reduced to a flow that maintains the level of the reservoir through the spring. Then diversion would be increased to capture all of the base flow through July. The City would maintain a bypass flow of 0.5 cfs from August 1 to October 31.

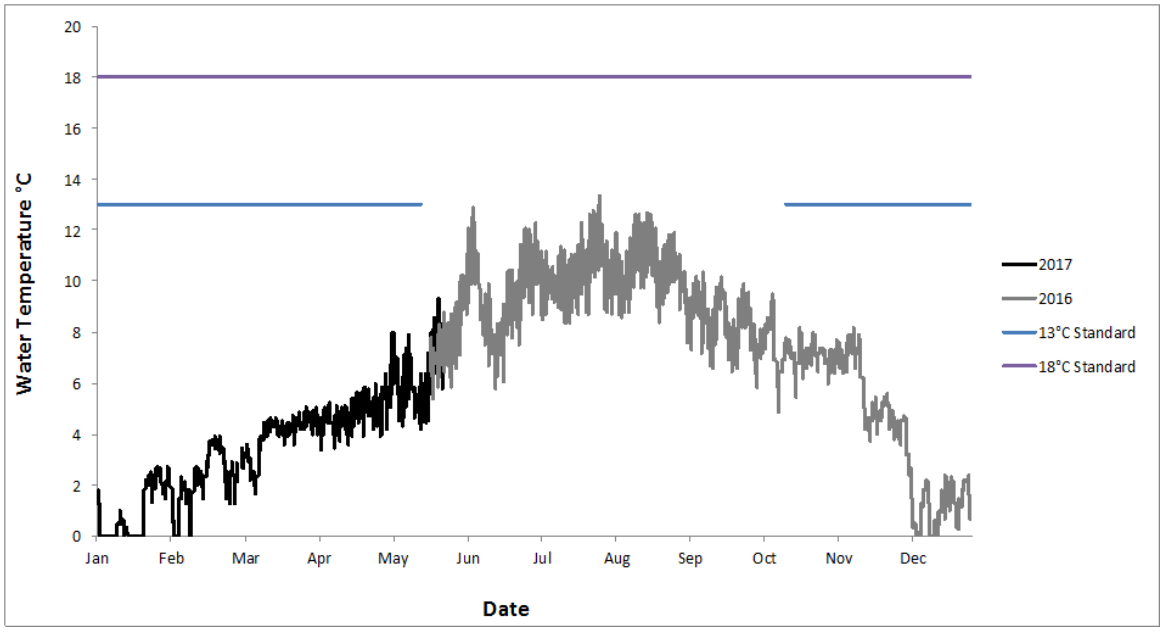
Dog River

Under the Proposed Action Alternative, only one water quality standard for the designated beneficial uses of Dog River would remain impaired. Iron would continue to exceed the standard for that constituent, keeping Dog River on ODEQ's 303(d) list of Category 5 waters identified in their 2012 Integrated Report. It would remain a non-point contaminant because the source of the quantities detected would still be unknown. It has been surmised that iron may be naturally occurring, and its presence could be due to the geologic formations that underlie the area (ODEQ 2017c). Other impairments would not be expected to result from the Proposed Action, and no other point source or non-point source pollutants, contaminants, or water quality exceedances would be anticipated.

The seasonal trends in stream temperature observed at the mouth of Dog River would be expected to continue (Figure 37). Stream temperature would not be affected by the Proposed Action. Dog River stream temperatures would remain cold both above and below the diversion year-round, rarely exceeding water quality standards for temperature, and meeting the ODEQ requirements for fish and aquatic life beneficial uses. Due to the presence and use by salmon and steelhead of the lowest 2.5 miles of Dog

River, and because of the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature would continue to be ongoing by the MHNF.

Figure 37. Daily average temperature data observed in Dog River upstream of the confluence of the East Fork Hood River.



Source: CTWS 2017

The potential for Dog River to provide cold-water thermal refuge for aquatic species would remain high because of the groundwater inputs from springs and wet meadows. Cold water contributions to lower Dog River from Puppy and Brooks Meadow Creeks would also continue. Dog River would remain a cold water source for the East Fork Hood River in the low flow periods of late summer and early fall, including when full diversion into the pipeline would occur upstream at RM 6.0. Lower Dog River could be expected to remain a likely location as a core cold water habitat.

Residual effects to riparian shading from past forest management would continue to be negligible in the Dog River subwatershed. Average solar radiation to the main stem and its tributaries would remain low overall, and the majority of the length of Dog River would continue to be effectively shaded. Segments of reaches where shade was lacking would remain, and include two older clearcut plantations along approximately 0.4 miles of lower Dog River where riparian vegetation had been encroached upon during the original harvest in the 1970s, and where several small patches of streamside blowdown occur in both the lower and upper reaches. Natural recovery along these segments from growing streamside vegetation would be expected to continue.

Construction of the new pipeline would result in the removal of trees along its route. The segment below the diversion to FSR 44 would mostly be within, or on the edge of the outer riparian zone. Potential shade would be removed from the construction corridor where it overlaps the out riparian zone. The inner riparian zone would remain unaffected, and continue to function as a primary source of shade. At the crossing with Brooks Meadow Creek, trees would be removed to install a culvert the stream would flow through. Tree removal at the site would occur in the inner riparian zone, diminishing shade function. But the stream would flow inside the culvert, which would provide shade. Overall, the effects of tree removal for construction of new pipeline would be nominal.

The degree of fine sediment that can potentially enter stream waters in the subwatershed would be generated from the same sources. The greatest potential would continue to come from roads at four crossings over perennial streams. The largest source would continue to be where Highway 35 crosses over lower Dog River. The potential for road grime and grit, as well as winter sanding materials to wash into the stream waters there would remain very high.

Two other crossings, where FS road 44 crosses over Dog River and where FS road 17 crosses over Brooks Meadow Creek would also remain sources of potential fine sediment. Both however, are paved crossings where use is seasonal, sporadic, and relatively low. So the amount of road grit and fine sediment potentially generated at these crossings that could enter stream water would remain relatively low.

The fourth crossing, where Brooks Meadow Creek flows across the top of gravel pipeline service road, would be restored as a result of the Proposed Action. Streamflow would be routed through a culvert underneath the road. The potential for fine sediment to enter stream waters from the crossing would be notably reduced, and it would no longer be a chronic source of fine sediment.

Construction of the new pipeline would excavate and expose soils to erosive forces for a time until the project was completed. The pipeline intake, the segment of the new pipeline route below the diversion down to FSR 44, and the segment across Brooks Meadow Creek would be the most prone locations. Erosion control practices and BMPs would be implemented to minimize the amount of fine sediment that could potentially be delivered to Dog River and Brooks Meadow Creek. The inner riparian zone would remain intact and undisturbed along the length of the segment between the diversion and Brooks Meadow Creek, buffering effects of construction. At both the diversion and Brooks Meadow Creek, construction would minimize contact with water so that any sedimentation that could occur would be short-lived and of low magnitude.

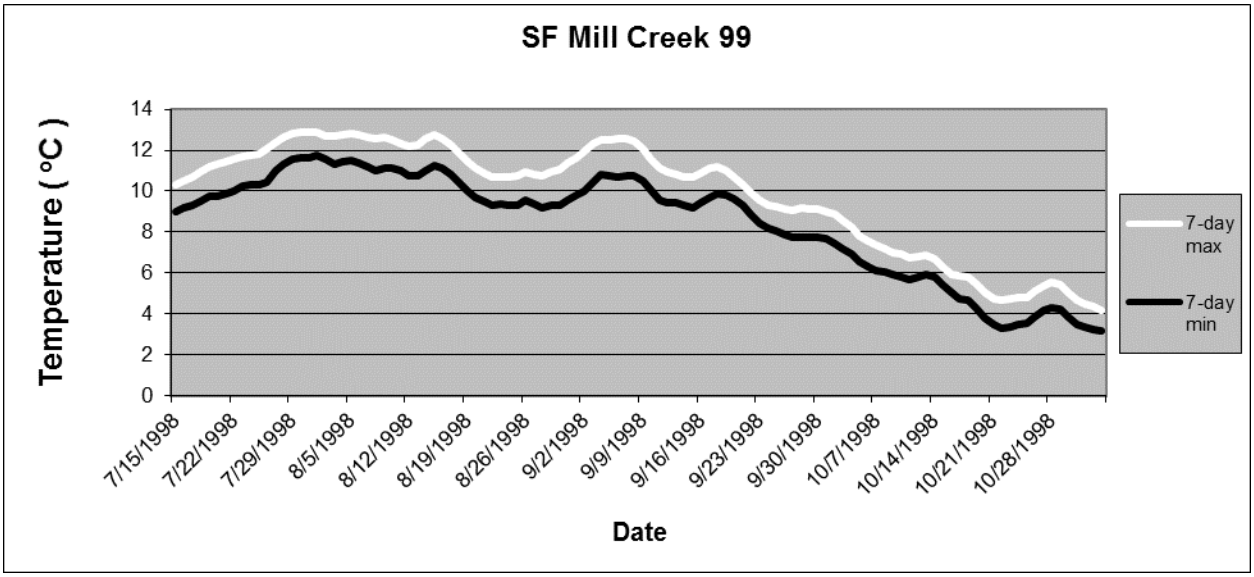
The new pipeline under the Proposed Action would eradicate the persistent water loss that leaked from the old conveyance. Surface and gully erosion would no longer result from pipeline leaks, particularly during high flows. The potential for leaks to erode flow routes and deliver fine sediment to intermittent or perennial streams would be abated. Additionally, a new pipeline would make the risk of catastrophic failure very low, diminishing considerably the potential for fine sediment and elevated turbidity to affect water quality due to a pipeline failure.

South Fork Mill Creek

Under the Proposed Action, existing effects to the water quality of South Fork Mill Creek would remain unchanged. There would continue to be no impairments to the designated beneficial uses. Other than seasonal or storm variation the quality of the stream water in the creek would be expected to remain very good. Occasionally, high concentrations of coliform could be expected to be detected by the City at the Wicks Water Treatment plant, probably originating from wildlife fecal contamination. In the past, they have also detected slightly elevated concentrations of phosphorus, possibly from accumulated sediments in the reservoir. But the dilution provided by the inflow of water from Dog River would continue to abate any effect that could necessitate special treatment.

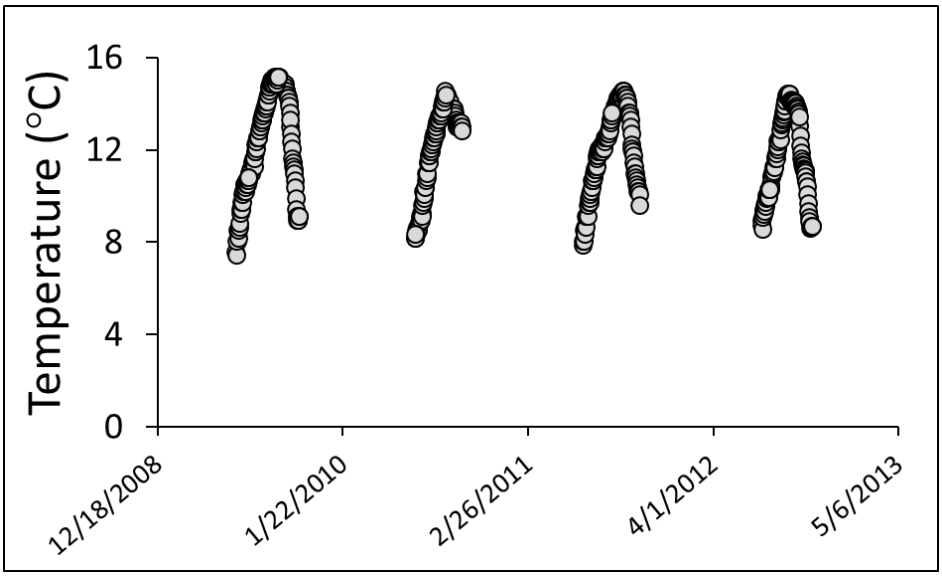
The seasonal trends in stream temperature observed below the Crow Creek Reservoir would be expected to continue (Figure 38). Stream temperature would not be affected by the Proposed Action. South Fork Mill Creek stream temperatures would remain cold year-round below the dam, rarely exceeding water quality standards for temperature, and meeting the ODEQ requirements for fish and aquatic life beneficial uses.

Figure 38. Seven-day-minimum and maximum temperatures in South Fork Mill Creek at the USFS boundary (MHNF 1999) below Crow Creek Reservoir.



Just below the dam however, the seven-day summer maximum temperature would continue to commonly be slightly increased above the 13°C standard (Figure 39). This is thought to result when drawdown during peak use in the summer would lower reservoir levels, resulting in the potential increase of temperature in the stored water that would be released into the creek. Regardless, stream temperature would not be considered to be degrading water quality in the South Fork Mill Creek. Due to the temperature TMDL for the Middle Columbia - Hood River basin, monitoring of stream temperature by the MHNF would continue.

Figure 39. Summer average daily temperature for South Fork Mill Creek (elevation of 2,500 feet), downstream of Crow Creek Reservoir near the Forest boundary.



Source: MHNF 2017

Residual effects to riparian shading from past forest management would continue to be negligible in the South Fork Mill Creek subwatershed. Average solar radiation to the main stem and its tributaries would remain low overall, and the majority of the length of South Fork Mill Creek would continue to be effectively shaded. Segments of reaches where riparian shade had been impacted by the Government Flats wildfire would continue to recover from growing streamside vegetation.

Fine sediment and turbidity would not be expected to become an impairment to the water quality of South Fork Mill Creek under the No Action Alternative. There would remain however, existing anthropogenic sources of fine sediment in the subwatershed. The primary sources on Forest Service lands are where certain segments of road connect to the channel network at specific perennial stream crossings, and where several segments of the upper reach have become slightly more incised, and in the lower reach where there is some evidence of unstable stream banks.

Three crossings associated with FS road 1721 where it crosses over Stroud Springs, the South Fork of Mill Creek, and at Alder Creek would continue to have the potential to deliver fine sediment to stream waters. The relative amount of sediment potentially delivered from these crossings would be low because these crossings are within the Municipal Watershed, which is closed to public use and gets very little traffic. The drainage structures on this road are in good condition, and have been purposefully constructed to minimize the length of road connected to the stream network. Also, all three crossings are upstream of Crow Creek Reservoir, where road sediment would be expected to settle and accumulate

A fourth crossing is currently a bridge where FS road 1720-190 crosses the South Fork of Mill Creek about ¾ of a mile below the dam. It too is within the Municipal Watershed, and seldom used. The amount of fine sediment that it could potentially generate and deliver to the creek would also be expected to remain low.

A low-water ford located about 3.5 miles downstream of the dam on non-Federal land has the potential to generate and deliver fine sediment to the creek. But it too is seldom used. It is not always passable. Periodically, it could get used during low flow periods when it would be safe to cross over. When crossed by a motorized vehicle, it could be expected that a small measure of sediment is stirred and mobilized. The duration of the disturbance would be brief, so the amount of sediment generated would be minor and short-lived.

The hydrologic regime of the South Fork Mill Creek would continue to be altered due to the diverted flows from Dog River, the seasonal spill around Crow Creek dam, and the timed releases from the reservoir. Average peak and base flows will continue to be elevated, increasing water velocity and stream turbulence. The channel and streambanks would continue to slowly adjust incrementally. Increases in sedimentation and turbidity could be expected as a result, particularly during the spring spill and late summer releases. But since the degree of channel incision and bank erosion is not widely extensive after many decades of an altered hydrologic regime, the amount of fine sediment generated as a result would continue to remain only a slight increase.

The new pipeline under the Proposed Action would eradicate the persistent water loss that leaked from the old conveyance. Surface and gully erosion would no longer result from pipeline leaks, particularly during high flows. The potential for leaks to erode flow routes and deliver fine sediment to intermittent or perennial streams would be abated. Additionally, a new pipeline would make the risk of catastrophic failure very low, diminishing considerably the potential for fine sediment and elevated turbidity to affect water quality due to a pipeline failure.

Water Rights

The City of The Dalles would continue to use surface waters certificated by the OWRD for municipal use from Dog River and the South Fork of Mill Creek, which include the four water rights currently in their name (Table 40). The amount and designated purpose of use authorized under these existing water rights

would not be expanded or transferred. The City would continue to have the right to use all of the water in upper Dog River above the point of the pipeline diversion, and 2 cfs from South Fork Mill Creek above the Wicks water treatment plant. The priority dates for these two surface water sources proceed all other claims, so they would remain senior to all other water rights from those streams. Because they are decreed and certificated municipal water rights, they will not be subject to standard forfeiture statutes, and will be protected against injurious claims (ORS 540.610 and 538.410 respectively).

Table 40. Surface Water Right Certificates for Dog River and South Fork of Mill Creek that are designated for municipal use.

City of the Dalles

Source	Application	Permit	Certificate	Claim, Decree, or Transfer	Priority date	Type of Beneficial Use	Authorized Rate or Annual Volume
Dog River			14954	Hood River decree	8/1/1870	Municipal	"All the water in stream at point of diversion"
South Fork Mill Creek			5691	Mill Creek decree	1862	Municipal	2 cfs
Crow Creek reservoir	S-43668	S-32479	60410		5/29/1967	Municipal	955 AF
South Fork Mill Creek, Dog River	R-43667	R-4988	44917		5/29/1967	Storage for Municipal	955 AF

Source: OWRDb 2019. Note: Definitions: *Permit* – Applicant has been approved to develop a water source for its designated beneficial use. *Certificate* – Applicant has "perfected" and developed the water right as per the conditions of the permit. The water right has become certified to the holder. *Decree* – Court issued water right to a holder.

These water rights would remain the purview of the OWRD, the state authority that regulates and administers their use and insures consistency with the requirements of Oregon Revised Statutes and Administrative Rules. OWRD would continue to monitor the City of the Dalles to ensure compliance with Oregon water laws pertaining to municipal use. The City of The Dalles would continue to report to OWRD their usage, proposed upgrades or changes, and provide planning documents for review consistent with the requirements and statutes for municipal water providers.

The Mt. Hood National Forest does not administer or enforce water rights. The Forest's Special Use Permits however, which authorize the City to operate and maintain the Dog River pipeline and Crow Creek Reservoir facilities located on National Forest System lands, would require that all permitted activities comply with State laws. The Mt. Hood National Forest would continue to rely on the OWRD's oversight of the City's use of water rights for compliance with the applicable State water laws.

The City would be expected to apply for an extension for their two permitted water rights slated to expire in 2021 that would provide them authorization to expand Crow Creek Reservoir, which is identified in the City's 2006 Water System Master Development Plan (permits S-53930 and R-13105). This would keep the water rights for additional storage and increased municipal use in the name of the City. It is anticipated that OWRD would grant the City a 10-year extension. If granted, it would be the second extension on each of the permits.

Priority dates for the permits are both January of 1999. Since then, only preliminary plans for raising the height of the dam have been drafted. The City has not submitted any formalized plans or filed for any other requisite approvals to prove-up on the permits so that their water rights could be certificated. Since OWRD would be expected to extend the water right permits however, reservoir expansion would remain an option if needed for the City to meet future demand. But it would remain uncertain when, or if the City intends to proceed because they would continue their search for other storage options. If they were to proceed with reservoir expansion, then NEPA would have to be initiated because the action would partially be located on National Forest System lands.

Under either Alternative, the City would be expected to exercise their limited license to conduct testing to determine the feasibility of an ASR system. The final order for the license was granted to the City by OWRD in October of 2018. The City would be authorized to divert up to 16.7 cfs using their existing water right certificates for Dog River, the South Fork of Mill Creek, and Crow Creek Reservoir. Additional diversion flow from Dog River would not be expected to meet ASR demand. OWRD would administer the City's use of the limited license, and be responsible for the enforcement of the final order's conditions.

Two other surface water rights in the Dog River and South Fork Mill Creek subwatersheds would remain held in-trust by OWRD on behalf of the ODFW (Table 41). These water rights would be administered to provide stream flow for the migration, spawning, egg incubation, fry emergence, and juvenile rearing for Coho salmon, summer and winter steelhead, rainbow trout and cutthroat trout. The flow rates allocated to them would remain applicable to the reaches of each stream below the point of diversion for the Dog River pipeline and Crow Creek dam respectively. The priority date for both instream water rights is 1991.

Table 41. In-stream surface water rights in the Dog River and South Fork Mill Creek subwatersheds and the maximum monthly allocation protected by OWRD for instream use.

Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dog River below diversion Certificate IS72078A	12.0	12.0	12.0	20.0	20.0	20.0	12.0	7.01	6.05	7.79	14.7	12.0
S Fk Mill Creek below dam Certificate IS72078A	7.0	7.0	10.0	17.0	17.0	7.8	4.8	5.4	6.1	4.8	5.5	7.0

Source: OWRD 2019b

OWRD would continue to administer these instream water rights so that any remaining water available for allocation as a water right in the watershed would be designated for the in-stream purpose. These flow allocations would be the remainder of the estimated natural average flow not being used for other senior users. As described in each of the respective certificates, they would not be expected to represent minimum flow requirements. They would not guarantee actual flow availability at those rates, but rather

reflect the maximum allocation protected for the instream beneficial use by the water right. As a condition of the certificate, they would not have priority over human consumption. They would be considered by OWRD to be junior to the City of The Dalles municipal water rights in Dog River and South Fork Mill Creek.

The City of The Dalles' water rights for Dog River and the South Fork of Mill Creek would remain senior to any federal reserved water rights because their priority pre-dates that of the establishment of the Mt. Hood National Forest (OWRD 2002). Any claims by the Forest Service to such rights would be subject to the state's adjudication process. The Forest Service would not be expected to submit any claims or assertion for federal reserved water rights in the Dog River and South Fork Mill subwatersheds.

3.3.2.3 Cumulative Effects

The spatial consideration of the cumulative effects for hydrology is limited to the Dog River and SF Mill Creek 12th-field subwatersheds. This was chosen because the potential for detecting measurable cumulative effects at this scale is better than at larger scales. Consideration of effects at larger scales was not assessed because the order of magnitude of the larger watershed size could potentially render any quantitative magnitude of cumulative effects inconsequential, and because the complexity of land uses at the larger scale could blur the certainty of effects attributable to an individual activity. The temporal bounds for the analysis is from the present to the foreseeable future when projects associated with existing decisions, funding, or identified proposals would be undertaken. The projects to be considered for cumulative effects are listed below in Table 42. Table 43 summarizes the cumulative effects of ongoing activities that have the potential to affect water quantity and/or quality in Dog River and/or SF Mill Creek.

Table 42. Ongoing and Future Activities Considered in the Cumulative Effects Analysis for Hydrology.

Activity	Dog River Subwatershed	South Fork Mill Subwatershed
Existing old Forest Service timber harvest units	X	X
Polallie Cooper Fuels Reduction Project	X	
The Dalles Watershed Phase I and II Fuels Reduction Project		X
Other timber harvests on federal, county, and private lands (including associated road/landing construction)		X
Forest Service road 4400 hazard tree removal	X	
Road decommissioning and road closures	X	X
Dog River pipeline and Crow Creek reservoir annual operations	X	X
National Forest system road & trail maintenance	X	X
Highway 35 highway maintenance and sanding	X	
Invasive plant treatments	X	
Trail relocations (Dog River Trail #675, Cooks Meadow Trail #639, Surveyor's Ridge Trail #688)	X	
Developed and dispersed campsites	X	X

The contribution of the Proposed Action to the cumulative effects on hydrologic resources of past and ongoing/future activities within the Dog River and SF Mill Creek watersheds would be minimal because the construction footprint is comparatively small and the duration of that activity is short-term. Construction would require the removal of existing trees along the pipeline route, the majority of which is directly adjacent to existing roads. Clearing widths for the construction corridor and staging/storage areas

would amount to less than 0.01 percent of either of the subwatersheds acreage. A small portion of that disturbance footprint would occur within the upper Dog River riparian reserve near the existing intake, and trees would be removed along several hundred yards of the outer riparian zone on the east side below the diversion. The resultant increase in the extent of cumulative watershed impact areas would be nominal.

Given that both Dog River and the SF Mill are designated as Special Emphasis Watersheds in the MHNF LRMP), management actions on Forest service lands within them would remain limited both spatially and temporally. No more than 25 percent of the watershed area would be in a hydrologically disturbed condition at any time. The Special Emphasis designation and LRMP guidelines would serve as controls that limit the extent of potential impacts from ongoing or future activities within the watersheds. Additionally, none of the activities listed in Table 42 would be expected to result in large measurable effects to the existing hydrologic regime in either of the watersheds. Implementation of any activities could be presumed to employ BMPs and PDCs intended to avoid and minimize impacts to hydrologic resources.

Furthermore, pipeline operations once construction is complete would continue as they have, and the amount and timing of diverted water would be expected to remain unchanged from the current condition. Ongoing primary water operations include maintenance and monitoring of facilities, controlling and managing seasonal diversion and reservoir levels. Exploration of the feasibility of Aquifer Storage and Recovery would occur using existing available water from SF Mill Creek as per OWRD permit conditions. Standard annual road maintenance services in SF Mill Ck by the City would continue. There would not be any further removal of forest vegetation, nor any new roads. No increases in administrative activities would be expected. Changes to pipeline operations and the rate of diversion could be expected in the future to meet rising demand due to a steady increase in population, and/or shifts to the available supply of water as a result of projected climate change (cumulative effects, same as PA).

Table 43. Summary of cumulative effects on water quantity and quality resulting from past, current and future projects in the Dog River Pipeline EA action area. Only activities that have a potential for cumulative effect are addressed in this table.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
		Time	Space			
Existing old Forest Service timber harvest units	Altered peak and/or base flow	No	Yes	Not likely	Older harvest units were replanted and have been growing and naturally revegetating for at least two or more decades. Effective ground cover is essentially 100%, and the forest canopy continues to develop and mature. The mix of disconnected early- and mid-seral patches constitute a small proportion of each subwatershed. Evapotranspiration and watershed processes functioning properly.	Minimal cumulative effect throughout action area because the harvest and replanting took place long ago and regrowth has been occurring for many years.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
		Time	Space			
	Water Quality Degradation	No	Yes	Not likely	The majority of older harvest units were located away from streams and riparian zones. The few units that did encroach on riparian forest along perennial streams were replanted and have been growing and naturally revegetating for at least two or more decades. Effective ground cover is essentially 100%, and the forest canopy continues to develop and mature. Vegetation in the primary riparian zone functioning to provide shade and a mix of growing, disconnected and scattered early- and mid-seral patches for potential future wood recruitment.	Minimal cumulative effect due to relatively small amount of perennial stream impacted in riparian zones and the re-growth and vegetative development that has occurred since harvest.
Polallie Cooper Fuels Reduction Project	Altered peak and/or base flow	Yes	Yes	Not likely	Approximately 90 acres would be thinned in the Dog River subwatershed as part of the Keep Stewardship contract. None of it would be located within or near riparian areas/forest. No new roads proposed. BMPs/PDCs to avoid and minimize impacts to water quality would be employed.	Nominal cumulative effect. Thinning would affect less than 1 percent of the subwatershed area. No riparian areas/forest affected. Only existing roads would be used.
	Water Quality Degradation	Yes	Yes	Not likely		

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
		Time	Space			
The Dalles Watershed Phase I & II Fuels Reduction Project	Altered peak and/or base flow	No	Yes	Slightly possible	All projects have been completed except for some slash pile burning. BMPs/PDCs to avoid and minimize impacts to water quality were employed. All streams and riparian zones were buffered by Northwest Forest Plan Riparian Reserves. Extent of thinning acres was low, and degree of canopy reduction moderate. Stand growth and vigor ultimately enhanced. Ongoing development and growth of forest stands with greater complexity and resiliency expected.	Low cumulative effect. Total area affected by a decrease in effective canopy cover about 13 percent of the subwatershed. Buffers protect streams and riparian vegetation from effects of thinning. Only the existing road system was used. Post-harvest repairs and improvements were made to drainage features and structures.
	Degradation of Water Quality	No	Yes	Not likely		
Other timber harvests on federal, county, or private lands	Altered peak and/or base flow	No	Yes	Possible	Timber management activities have occurred, and could be expected periodically on non-Forest Service lands in the lower	Minimal cumulative effect because of small proportion of the watershed expected to be affected in any

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
		Time	Space			
	Degradation of Water Quality	No	Yes	Possible	catchment of the South Fork Mill subwatershed where BLM, City and privately-owned forest industrial lands are intermixed. Oregon Forest Practices rules that buffer streams and riparian areas would be in play on non-Federal lands. Timing and extent of harvest limited by availability of merchantable stands. Currently, less than half the forested, non-Federal acreage is estimated to be available in any given decade. The need for new road construction expected to be limited to minor spurs. Road maintenance and reconstruction expected to remain minimal. Current road system connected to the drainage network at multiple locations. Drier east-side climatic conditions prevailing.	given decade. Order of magnitude estimated to be less than several hundreds of acres at any one time. Harvested areas would be re-planted within 3 years. Drinking water source area protections in play within the municipal watershed. Regrowth in previously harvested areas expected to continue and develop, and effective ground cover reestablish and be maintained.
Forest Service road 4400 hazard tree removal	Altered peak and/or base flow	Yes	Yes	None	Thinning dense thickets, and removal of hazard trees along a 100 foot-wide strip both sides of a 2-mile segment of Forest Service road	Nominal cumulative effect. Approximately 24 acres to be treated. No work in riparian zones. Minimal ground

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
		Time	Space			
	Degradation of Water Quality	Yes	Yes	None	44. Minor amount of removal of trees greater than 21 inches DBH. Lop and scatter slash. Primarily hand work. BMPs/PDCs would be employed to minimize impacts.	disturbance, nearly all hand work. Vegetation and effective ground cover would continue to grow and develop once completed.
Road Decommissioning and Closures	Altered peak and/or base flow	No	Yes	None	Road decommissioning within Dog River and SF Mill Creek has been completed. All roads within The Dalles Municipal watershed are closed to the public, with the exception of several short spurs in upper Dog River.	Nominal cumulative effect. Effective ground cover has been established on decommissioned roads, and they have stabilized. There is little to no connectivity to any water bodies. Road closures continue to limit use, which minimizes traffic generated dust or sediment.
	Degradation of Water Quality	No	Yes	None		
National Forest system road and trail maintenance activities	Altered peak and/or base flow	Yes	Yes	Not likely	Standard activities include periodic and annual inspections, removal of obstacles such as fallen trees or rocks, maintaining functional drainage features and structures, trimming encroaching vegetation, and tread repairs. Work typically occurs during the summer and fall. Wet weather activities are avoided.	Nominal cumulative effect. Work would be periodic, non-repetitive, and short-lived. The disturbance footprint would be select segments as needed. Locations could be different from year-to-year. Maintenance actions are typically intended to improve conditions, and mitigate chronic or episodic effects to hydrologic resources.
	Degradation of Water Quality	Yes	Yes	Not likely		

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
		Time	Space			
Highway 35 maintenance and winter sanding	Altered peak and/or base flow	Yes	Yes	Not likely	Sanding of the highway with crushed aggregate to enhance traction for motor vehicles occurs regularly during winter months. Traffic use and snow-plowing causes sanding materials to build up to depth on the shoulder and sides of the highway. In the spring, efforts are taken to remove and recover a portion of that build-up, but an estimated one-third to half of it is unrecoverable and remains on site. A substantial proportion of the unrecoverable sanding materials that end up on the bridge over Dog River eventually get mobilized and are deposited into the water.	Cumulative impact to Dog River is considered to be at least moderate in the reach below the bridge. Changes to the river's substrate from the sanding are observable in that reach, which is a low gradient depositional channel type. The effect is limited in extent, and is an impact only to the lowest 1/8 mile of the total 10.7 miles of stream length. Sanding has been long practiced on the highway, and can be expected to continue long-term.
	Degradation of Water Quality			Likely		
Invasive Plant Treatments	Altered peak and/or base flow	Yes	Yes	No	These activities are ongoing in the NF and SF Mill Creek and were approved under a CE. BMPs/PDCs would	Cumulative effects would be slight. No treatments near water. Chemical amounts and concentrations to

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Activities or Conditions	Relative Magnitude of Cumulative Effect
		Time	Space			
	Degradation of Water Quality	Yes	Yes	Slightly possible	be employed with any chemical application to avoid water bodies, including spill prevention and response plans. State certified applicator's license required. Treatments would be administered by hand.	be used in a single year would be low. Follow-up treatments could occur a year or two after initial application. Potential accumulations on sites with follow-up treatments would be isolated.
Trail Relocations (Dog River Trail #675, Cooks Meadow Trail #639, Surveyors Ridge Trail #688)	Altered peak and/or base flow	Yes	Yes	Not likely	The Cooks Meadow trail re-route has been completed, and most of the Surveyor's ridge reroute is also finished. The Dog River trail reroute would be expected after Keep Stewardship sale has been completed. Rerouted segments would be completed using BMPs/PDCs to minimize impacts to water, and new segments would be constructed so that the trails are disconnected with any water/streams.	Cumulative effects would be low. The potential connectivity of the re-routed segments with a water body is poor. Length of trail potentially connected to a water body is short. Drainage features and structures designed into the trail segments would be intended to disperse concentrated flow and prevent erosion of the tread.
	Degradation of Water Quality	Yes	Yes	Slightly possible		
Developed and Dispersed Campsites	Altered peak and/or base flow	Yes	No	No	There are no developed campsites in the Dog River or SF Mill Creek subwatersheds, but there would be 2 developed trailheads. Dispersed campsites are present only in the Dog River subwatershed.	Cumulative effects would be nominal. Developed trailheads are not located adjacent to any water bodies. Dispersed sites are located on ridges and on spur roads, but none are connected to water.
	Degradation of Water Quality					

3.3.3 Consistency Determination

Several key existing plans provide direction in the form of Standards and Guidelines (S&G) and recommended Best Management Practices (BMP) for planning and implementing projects. These documents include the Mt. Hood National Forest Land and Resource Plan (LRMP) (USDA 1990), and the Northwest Forest Plan (NWFP) and associated supporting documents (USDA 1994). A summary of S&G's and BMP's from these documents applicable to water quality and quantity are displayed below in Table 44. As indicated in Table 44, the Proposed Action is considered to be consistent with all of the applicabl;e S&Gs that address water quality and quantitiy.

Mt. Hood National Forest Land and Resource Plan Standards and Guidelines that Address Water Quality and Quantity:

- Consideration of BMP's – FW-54,55,56,57,58,59,60
- Analysis considerations – FW-61,62,63,64
    - Special Emphasis Watershed Allocations – FW-65,66,67
- Consideration of drinking water protection – FW-72,75,76
- Consideration of Water Use and Rights – FW-73
- Consideration of instream flows – FW-74
- Consideration of water temperature and sediment – FW-97,98,99,100,109,110,111,112,113,114,127,128,129,132,133,134,135,136

Table 44. Assessment of Consistency with Forest Plan Standards and Guidelines that Address Water Quality and Water Quantity.

S&G No.	Applicable Standards and Guideline	Consistent with S&Gs?	Comments
FW-54 to FW-60	Consideration of BMPs and compliance with Oregon State requirements (Oregon Administrative Rules, Chapter 340-41) established in accordance with the Federal Clean Water Act (1977, amended 1987)	Yes	BMPs and PDCs (project design criteria) have been developed and prescribed in the EA to prevent or minimize effects to water quality, and are consistent with the 2019 MOU with the State of Oregon DEQ.
FW-61 to FW-67	Considerations of cumulative effects and Special Emphasis Watersheds	Yes	Clearing of forest vegetation for the new pipeline would be limited in extent, and would not result in an exceedance of the Threshold of Concern for Dog River or the SF Mill Creek.
FW-72, 75, 76	Consideration of drinking water protection	Yes	Municipal water supplies are required by the State to meet safe drinking water standards. Pollution and spill prevention BMPs would be employed during construction activities, and are practices outlined in the City's

S&G No.	Applicable Standards and Guideline	Consistent with S&Gs?	Comments
			operations plans. The majority of the municipal watershed is also closed to public entry.
FW-73	Consideration of Water Use and Rights	Yes	The Forest Service has consulted with the State (OWRD) regarding the City's proposal to replace the Dog River pipeline. The Proposed Action would not violate State water law. Also, the City's water right (1870) pre-dates establishment of National Forest System lands (1908) and is senior to Federally Reserved water rights.
FW-74	Consideration of instream flows	Yes	An MOU (1972) between the City and the Mt. Hood NF designates the municipal watershed and its management objectives. Instream flow protections have been identified by the State below the Dog River diversion and Crow Creek dam. Pipeline replacement would not divert flow amounts greater than existing. Instream water rights below the diversion would not be violated. The City would provide an additional 0.5 cfs bypass flow to Dog River Aug. through October.
FW-97,98,99,100,109,110,111,112,113,114,127,128,129,132,133,134,135,136	Consideration of water temperature and sediment	Yes	The majority of the construction would be located outside of Riparian Reserves except for several key segments of the route. BMPs and PDCs would be employed during construction activities to prevent or minimize effects to water quality. Temperature and sediment have not been issues resulting from the City's operations in the past and are not expected to be future concerns with their ongoing use.

Northwest Forest Plan (NWFP) Standards and Guidelines:

- Standards and Guidelines addressing Key Watersheds (NWFP ROD pg. C-7)
- Standards and Guidelines addressing Riparian Reserves (NWFP ROD pg. C-31 through C-38)

Table 45. Consistency with Key Standards and Guidelines from the Northwest Forest Plan for Key Watersheds and Riparian Reserves.

Allocation	Applicable Standards and Guideline	Consistent with S&Gs?	Comments
Key Watersheds	• Reduce road system. No new roads • Watershed Analysis requisite • Watershed restoration emphasized	Yes	No new roads have been proposed. Unneeded roads have been identified and decommissioned in past actions. Roads in the SF Mill portion of the municipal watershed are closed to public use. Watershed Analysis was completed in 2000. Watershed restoration projects have been identified. A new culvert will replace a low water ford where the service road crosses Brooks Meadow Creek, eliminating the capture of streamflow and providing passage for aquatic organisms.
Riparian Reserves	• Roads Management	Yes	One half-mile of the 100-year old access and service road that would be used during construction is within the outer zone of a Riparian Reserve. BMPs and PDCs would be employed during construction activities to prevent or minimize effects to water quality and the riparian zone.
Riparian Reserves	• General Riparian Management	Yes	About 0.8 miles of the new pipeline would be constructed within the outer zone of the Dog River and Brooks Meadows Creeks Riparian Reserve, adjacent and parallel to the 100-year old access and service road. Included within the clearing limits of this construction corridor are many trees to be removed. The inner zone of the Riparian Reserve would remain intact and functional, providing adequate shade and potential LWD recruitment.
Riparian Reserves	• Watershed Restoration	Yes	A new culvert will replace a low water ford where the service road crosses Brooks Meadow Creek, eliminating the interception of streamflow and providing passage for aquatic organisms.

Additional Considerations for consistency with the objectives of the Aquatic Conservation Strategy in the NWFP.

- The range of Pacific Ocean anadromy does not extend into the project area, and is limited within the analysis subwatersheds by natural waterfall migration barriers in the lowest reaches of both Dog River and SF Mill Creek. So, consistency of the pipeline replacement to the ACS is not directly applicable. Replacement of the pipeline, however, is upstream within contributing areas of anadromy below, so indirectly consistency is a consideration. As such, construction of a new pipeline is not considered to be a consistency issue. Operations of the pipeline, and diversion of water into it for transfer are indirect considerations.
- Application of the NWFP and thus ACS to other contracts, permits, and special use authorizations that pre-date the ROD (1994), will be applied at the time of their renewal. The 1912 Agreement and 1972 MOU between the City and the Mt Hood NF pre-date the ROD, as does the original Special Use Permit of 1964. The City's decreed water right has a priority date of 1870 and pre-dates establishment of the Mt. Hood Nat Forest. Consistency of the City's water use and operations as authorized under a SUP would be a consideration at the time of renewal.
- Approximately ¾ of the total construction corridor for the pipeline is outside of Riparian Reserves. BMPs and PDCs to be employed during construction would be expected to avoid or minimize further effects to aquatic and hydrologic resources within and outside of Riparian Reserves. Potential effects from construction would be limited to an approximately 6-month period.
- Water use and operations by the City would not be expected to change substantially as a result of a new, larger pipeline. Water availability and instream flows downstream of the Dog River pipeline and Crow Creek reservoir would be maintained. Natural flow that is generated below the Dog River diversion, and the Wicks water treatment plant would continue to provide instream flow available to support downstream beneficial uses and TES aquatic habitat. Effects of water use and diversion on the hydrologic and sediment regime, and riparian zone function would essentially remain as they have for the last 100 plus years.

3.4 Fisheries and Aquatic Fauna

3.4.1 Existing Condition

The affected environment, also known as the action area, is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action [50 CFR §402.02]. For the purposes of this analysis, the action area includes all of the Dog River subwatershed area downstream of the point of diversion, as well as the South Fork Mill Creek drainage downstream to Crow Creek Reservoir (Figure 40). This action area includes all areas where ground disturbance would take place for the proposed activities, as well as aquatic habitat areas downstream where potential effects could occur.

The 6th field watersheds were used as the basis for the site-specific analysis summarized in this BE while the 5th field sub-watersheds were used for larger scale habitat effects analysis. Although subwatershed or drainage boundaries delineate much of the action area, the actual expected effects will only be realized in a small portion of the watershed.

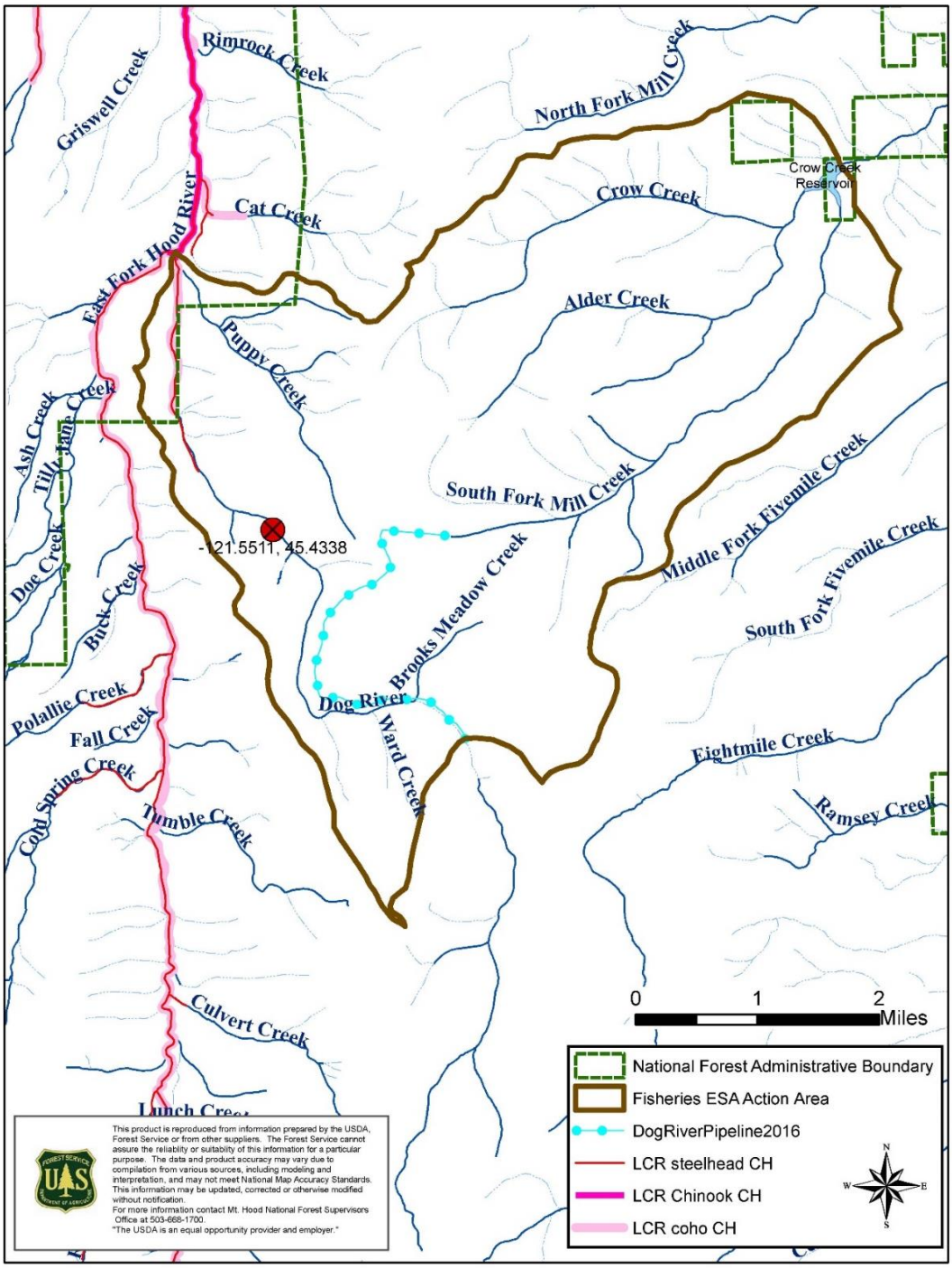
Dog River

The Dog River subwatershed comprises about 8,142 acres. The highest elevation of the subwatershed is the top of Lookout Mountain at 6,525 feet, and the lowest elevation at the mouth of Dog River at about 2,105 feet. Average precipitation in this subwatershed has historically ranged between 55 inches annually at the lowest elevation to 75 inches at the higher elevations. The hydrology of Dog River is driven by spring (groundwater) contributions during base flow periods, and by the addition of snowmelt during high flow periods, with the majority of runoff taking place in the spring and early summer (May to June). In addition, there are episodic rain-on-snow events that can cause rapid snowmelt and heavy runoff that can result in short durations of high peak flow spikes from November to February. The main perennial tributaries to Dog River are Brooks Meadow Creek and Puppy Creek. Dog River subwatershed is approximately 11 percent of the larger 5th field hydrologic unit of the East Fork Hood River (72,337 acres). Other than the lower ¼ mile, the river channel is steep with an average gradient of 7% and 11% in the 2 reaches surveyed between RM 0-5.1 (MHNF, 2000a). Base flows are supported by numerous groundwater/spring inputs. The uppermost critical habitat designation ends at RM 2.0, but for this BE, Listed Fish Habitat (LFH) is delineated to RM 2.6 at a 60' waterfall (Dog River Falls). The Oregon Department of Fish and Wildlife (ODFW) considers that, in some years, small numbers of steelhead may potentially make it up to this waterfall. The subwatershed is largely forested with subalpine fir and pacific silver fir in upper elevations, transitioning to a drier forest made up of grand fir and Douglas-fir, with a few ponderosa pine, at lower elevations (MHNF 1996).

South Fork Mill Creek

The South Fork Mill Creek subwatershed comprises about 18,240 acres. The highest elevation is about 5,050 feet on Mill Creek Buttes to about 740 feet at the confluence with North Fork Mill creek approximately 7 miles downstream from the National Forest Boundary. Average precipitation in this subwatershed has historically ranged between about 60 inches annually at the higher elevations, to 17 inches at the lowest elevations to the east. In contrast to Dog River, South Fork Mill Creek has a relatively gentle gradient that averaged 3% and 6% in the 2 reaches within the action area (MHNF, 2011). Since 1887, South Fork Mill Creek has received input from the Dog River ditch/pipeline, before flowing into Crow Creek Reservoir. Dog River pipeline contributes roughly 95% of the total annual flow to the creek (MHNF 2011). The USFS Stream survey in 2011 noted 2 very small (unnamed) tributaries on river right. Both tributaries are spring fed, with one originating from Stroud springs and the other spring unnamed. At RM 11.1, the Crow Creek Reservoir is a 28-acre impoundment at an elevation of 2,600 feet and has a maximum depth of 65 feet and a storage capacity of 267 million gallons. There are no LFH within the SF Mill Creek portion of the action area due to Mill Creek falls located at RM 3.0. The drainage is largely forested with Western hemlock, grand fir, Douglas-fir, and ponderosa pine.

Figure 40. ESA action area and extent of Critical Habitat. Note: Red dot with "x" is location of Dog River Falls and upper extent of Listed Fish Habitat.



Pipeline Operations

The City of the Dalles has an 1870 state-issued water right for all of the water in the stream at the point of the Dog River diversion. Peak reservoir fill period occurs from October to early Feb, up to capacity of pipeline (12.3 cfs). In most years, Crow Creek reservoir is filled to capacity by early Feb. In some years it is full well before that. Not all flow is diverted when filling the reservoir; there is some bypass flow during this time. Once the reservoir is full, intake is reduced (using a gate screw) to maintain flow to the reservoir that averages 3 cfs (although in winter when the headgate is not very accessible, the City lets spill over the dam until they can safely access the site). During the dry months of the year (approximately July through early November) the City diverts most of Dog River flow into the Dog River transmission pipe (RM 6.0).

Although most of the river flow is diverted during July-November, surface flows are replaced by groundwater immediately downstream of the diversion. A USFS stream survey from July 26 – August 30 of 2000 noted wetted stream channel in all areas downstream of the diversion. The discharge rate of 8.3 cfs was recorded at the mouth on July 26, 2000. Field visits in August of 2016 and September of 2019 also noted wetted channel immediately below the diversion; directly from leaking wood check boards, as well as groundwater recharge.

Land Ownership/Allocation

Most of the action area of Dog River and SF Mill Creek is within the Mt. Hood National Forest (MHNF) boundary, with the exception of portions surrounding Crow Creek Reservoir, as well as the lower 1.4 miles of Dog River. Mt. Hood Meadows has ownership from RM 0-0.7 (mouth to Hwy 35 crossing), while Hood River County has ownership from RM 0.7 to 1.4. The USFS MHNF boundary starts at Dog River RM 1.4.

On USFS lands, Northwest Forest Plan (NWFP) Land Allocation for the action area is a mixture of Late Successional Reserve, Matrix, and Riparian Reserve (Figure 3). The upper portion of Dog River (38% of the subwatershed) and all of the SF Mill drainage is designated as The Dalles Watershed Management Unit, and provides a drinking water source for the City of The Dalles. Due to the high value beneficial uses of Dog River (drinking water), it was designated as a Special Emphasis Watershed in the MHNF Land and Resource Management Plan (LRMP; MHNF 2017a).

3.4.1.1 Environmental Baseline

The environmental baseline discussion describes existing aquatic habitat conditions, particularly as they relate to designated critical habitat primary constituent elements (PCE) in the action area; and then describes Proposed, Endangered, Threatened, and Sensitive Aquatic Species within the action area. Only those species and associated habitat that are found within the action are discussed and analyzed since there would be no effect/impact to species/habitat outside the action area.

3.4.1.1.1 Existing Aquatic Habitat Conditions within the Action Area, Including Designated Critical Habitat and Essential Fish Habitat

The project area has been impacted over the past century by timber harvest, road building, floods, fires, fire suppression, municipal water diversion, and recreational activities. Separately and cumulatively, these activities have resulted in loss of function of natural processes related to water quality and quantity, riparian and floodplain function and connectivity, in-channel habitat, and obstruction free migration corridors for aquatic organisms. As a result of this project, some additional effects to those processes are possible. Project Design Criteria (PDC) have been developed to minimize those impacts.

The section below describes the current condition for habitat indicators that are used to determine attainment of the Aquatic Conservation Strategy (ACS) as outlined in the Northwest Forest Plan. Additional ACS habitat parameters and/or fluvial processes are analyzed in the Hydrology Specialist Report.

A baseline determination of functioning, functioning at risk, or not properly functioning is given to each habitat element that may be affected by the project and summarized in Table 55.

Aquatic habitat data were collected from stream surveys, water quality monitoring, queries of GIS databases, and watershed analyses. Although the surveys vary in age, all are after 1996, which was the last major flood event to dramatically change stream habitat conditions (Table 46).

Table 46. Stream Survey Data from the 2000 MHNF Dog River Stream Survey.

Reach	To River Mile	Average Wetted Width (feet)	Entrenchment Ratio	Width-to-Depth Ratio	Average Percent Gradient	Dominant Substrate	Rosgen Channel Type	Valley Form
1	1.8	14.2	2.3	15.6	7	Cobble	B3a	Narrow V-shape
2	5.1	13.2	1.5	15.4	11	Gravel	A4a+	Narrow V-shape
3	7.9	8.5	1.7	18.5	3	Gravel	B4	Trough-like open
4	9.8	4.6	2.05	14.9	10	Cobble	A3	Trough-like open

Stream Temperature

Stream temperature plays a critical role in determining metabolic rates, physiological function, and life-history of aquatic organisms as well as ecological processes such as nutrient cycling and productivity (Allen and Castillo, 2007). Aquatic species are restricted to temperature ranges that limit their distribution and available habitat. For salmonid species, there is a well-established connection between temperature and growth rate. Warmer temperatures increase feeding activity and rates of digestion, but also increase respiratory rates and energetic costs (Allen and Castillo, 2007). The Ultimate Upper Incipient Lethal Temperature (UUILT) of most salmonids falls within the range 21 to 26°C; however, multiple exposures to sub-lethal temperatures can lead to mortality (McCollough 1999). However, growth and development can be limited long before temperature approach lethal conditions. For most salmon and trout, the, preferred maximum temperatures range from 12 – 14 °C, which is close to optimal temperatures for maximum growth efficiency (Brett 1952 as cited in Groot and Margolis 1991).

From 1994-2002, stream temperature data were collected via data logger by the MHNF Hood River Ranger District at RM 0.1 (Highway 35 culvert) and is displayed in Figure 40. In addition, temperature monitoring from July 7 to October 19, 2000 was conducted as part of a USFS stream survey (MHNF 2000a) that recorded the 7-day maximum temperature remained below 13°Celsius. There are thirty-three surface water tributaries noted by the 2000 stream survey crew. All tributary temperatures were measured at midday via calibrated handheld digital thermometers for Dog River during the July 26-August 30, 2000 stream survey, with temperatures that ranged from 3-11° C. Most tributaries were 5° C or less. Dog River flow stays cold year-round due to these numerous cold-water spring contributions. A June 2017 technical memorandum from the CTWS described Dog River as potential cold-water thermal refuge for salmon

species in the East Fork Hood River because of the groundwater inputs from springs and wet meadows (CTWS 2017). Results from their stream temperature monitoring near the mouth between May 2016 and May 2017 are displayed in Figure 41. That data corroborates the 7-day maximum temperature findings of the MHNF, and verifies further the cold water contribution of Dog River to the East Fork Hood River, particularly during inherent low flow periods in late summer and early fall.

Figure 41. Mt. Hood National Forest (MHNF) stream temperature monitoring data (1994-2002) in Dog River just upstream of the Highway 35 culvert (near mouth).

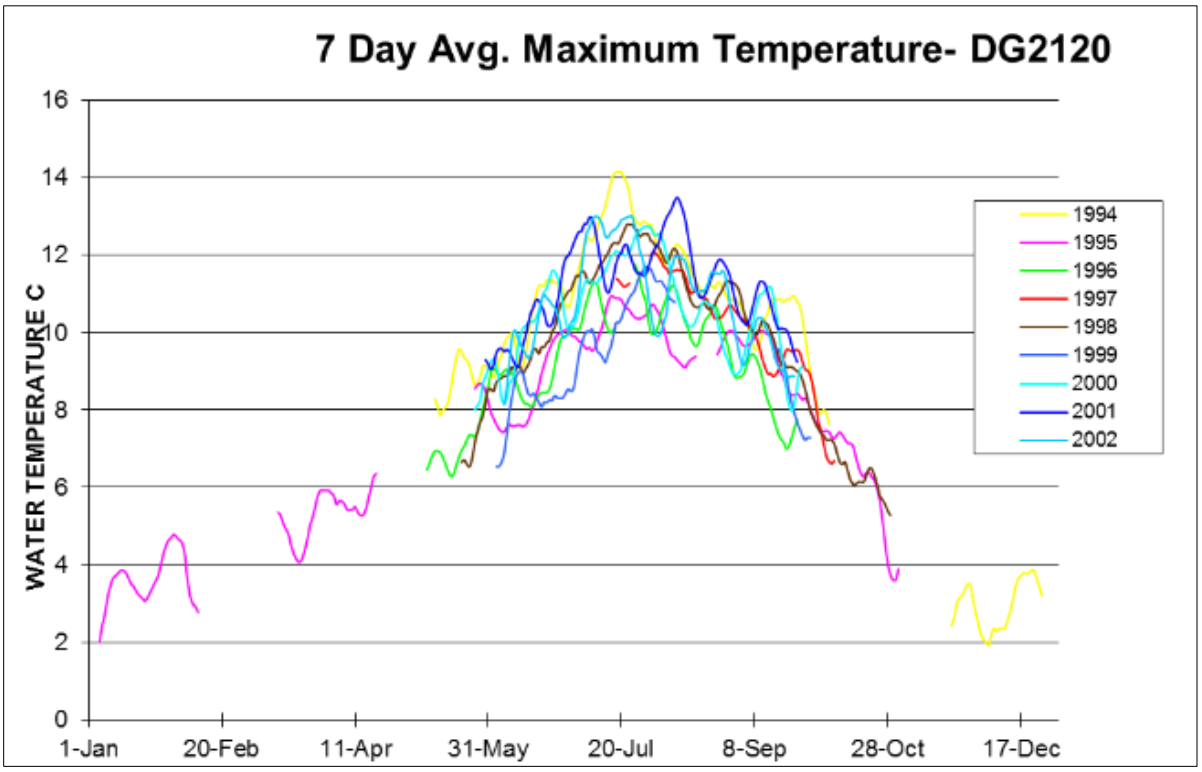
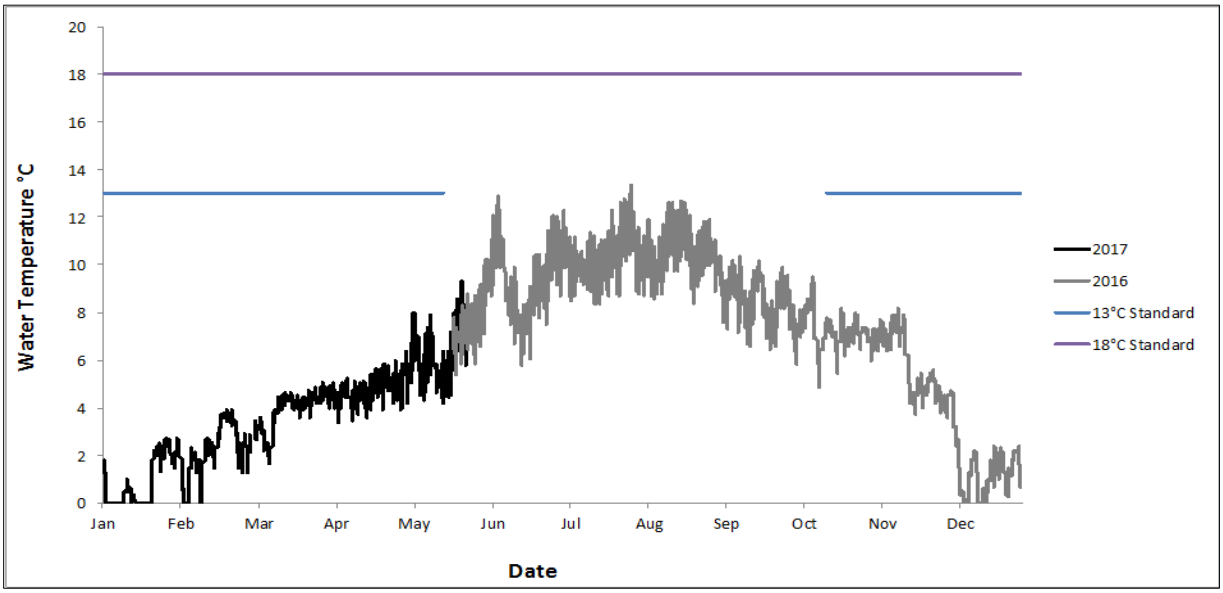
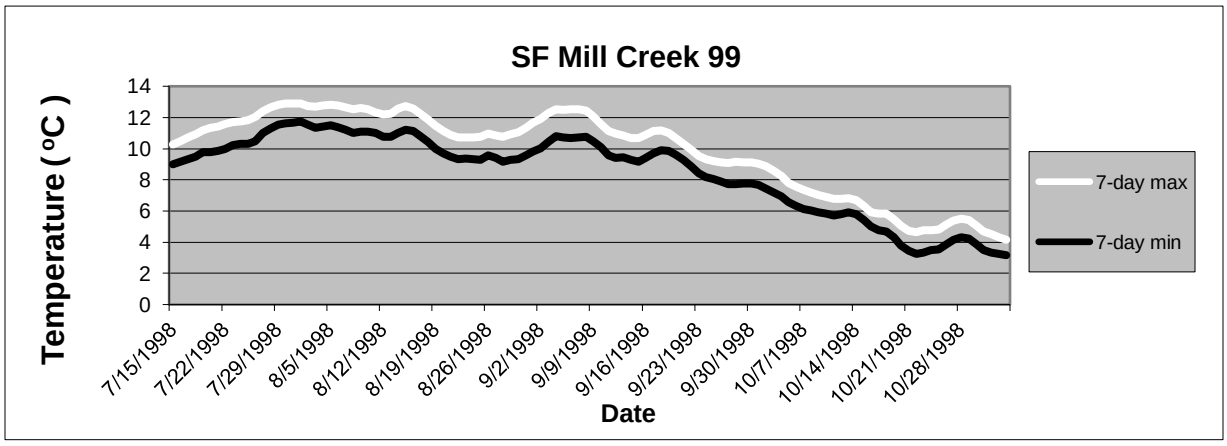


Figure 42. Daily average temperature data for Dog River upstream of the Highway 35 culvert (CTWS 2017).



A temperature data logger was installed in South Fork Mill Creek, at the USFS boundary 2.7 miles downstream of Crow Creek Reservoir (downstream of Action Area), from July 9, 1999 to November 3, 1999, by the MHNF stream survey crew (USFS 1999). Seven-day average minimum and maximum water temperatures for South Fork Mill Creek did not exceed 13°C (Figure 42). Within the Action Area, handheld temperature readings were regularly taken, totaling 39 readings, as the crew surveyed from Crow Creek Reservoir to the headwaters of SF Mill Creek (5.2 miles) from September 28 to October 13 of 1999. Readings were all taken at midday. Main channel readings ranged from 4-7 °C, and 3 tributary readings varied from 5-6 °C, including the diversion input from Dog River that was classified as a tributary.

Figure 43. Seven-day-minimum and maximum temperatures in South Fork Mill Creek at the USFS boundary 2.7 miles downstream of Crow Creek Reservoir (MHNF 1999).



Sediment & Substrate Character

Fine sediment deposition and turbidity in streams can adversely affect fish and fish habitat, particularly for salmonids, by reducing the quantity and/or quality of spawning habitat; reducing food supply by impacting invertebrate habitat; reducing interstitial habitat, thereby decreasing fry survival; and reducing pool quality and quantity. Both past and on-going land use activities can contribute fine sediment in streams. The Mt. Hood National Forest Land and Resource Management Plan (forest plan) states that spawning habitat shall maintain less than 20 percent fine sediments less than 2 millimeters (FW-096).

Fine sediment levels in Dog River are low (Table 47). Substrate data from the 2000 USFS stream survey showed that small cobbles and coarse gravel are dominant in Dog River; Median particle size (D50) in the three reaches (RM 0-7.9) were 73.4 mm, 64.7 mm, and 23.4 mm.

Table 47. The percent of surface fine sediment measured by Wolman pebble counts in streams within the Dog River Pipeline Project action area.

Stream	Year Surveyed	River Miles	Percent fines <6mm	Percent fines <2mm
Dog River	2000	0.0 – 1.8	8	5
Dog River	2000	1.8 – 5.1	17	14
Dog River	2000	5.1 – 7.9	12	10

Substrate data from the 2011 USFS stream survey in South Fork Mill Creek recorded sand (<2 mm) accounted for 11-23%. Observations by FS personnel noted moderate silt levels that caused some gravel embeddedness. Coarse gravel (16-32 mm) accounted for 16-31% of the substrate. In the upper most reach, medium gravel (4-16 mm) accounted for 51% of the substrate. Small cobbles and coarse gravel are dominant in Dog River and gravel is dominant in South Fork Mill Creek. Both streams have low levels of turbidity although surface fines are slightly high (>20%) in SF Mill Creek.

Chemical Contamination/Nutrients

There are very low potential sources for chemical contamination in the Dog River and South Fork Mill Creek watersheds. Most of the upper action area is closed to entry within The Dalles Watershed Management Area. The rest of the area is largely commercial forest land, which also has seasonal recreation use. There is no agricultural or industrial land in the action area. Oregon Highway 35 is the only (paved) road that crosses LFH. This road is designed to route road surface contaminants onto vegetated areas. Therefore, chemical contamination is not a process of concern in the action area.

Physical Barriers

There are numerous natural barriers (steep gradients and waterfalls) in both the Dog River Watersheds and Mill Creek. As previously described, these waterfalls act as upstream migration barriers to anadromous fish. There are no anthropogenic barriers to ESA listed fish in the action area. However, there are several anthropogenic barriers to resident trout migration in the action area. The diversion structure at RM 6.1 is almost a complete barrier to upstream migration but does allow for downstream fish passage during higher flow periods. The culvert that passes Dog River under USFS Road 17 is classified as a year-round migration barrier. And two culverts on Brooks Meadows Creek are barriers (USFS 1710 Road crossing and USFS 4400 – 014).

Large Woody Debris

Action area streams are very close to meeting Aquatic Passage (AP) standards for >20 pieces per mile (Table 48). Recruitment potential along nearly the entire length of Dog River is considered to be good to excellent. Most of its length flows through lands administered by the Forest Service. The riparian corridor and upland slopes are heavily forested. Disturbance within the subwatershed has been very minimal, and there is an abundance of stream-adjacent large standing conifers. The upper reach of Dog River above the pipeline intake is within the designated The Dalles Watershed Management Unit, which is a protected area with limited access. Along the lower reaches of Dog River below the intake, which are outside of the watershed management area, access is also somewhat limited. There have been; however, several stands where timber had been harvested about thirty years ago. The lower margins of these two older harvest units partially encroached upon the riparian zone, though a buffer was left untouched to protect the river and its banks. This condition applies to about 4 percent of the total length of the riparian corridor. The remaining 96 percent of the corridor has been unaffected by any large-scale disturbance, and the recruitment potential for large wood is high.

In the South Fork Mill Creek subwatershed, large wood recruitment along riparian corridors is also good. These stream reaches are all within The Dalles Watershed Management Unit and located on lands administered by the Forest Service downstream to Crow Creek Reservoir. There has been timber harvest in the form of thinning and fuel reduction projects adjacent to portions of the riparian corridor within the subwatershed. Intact riparian buffers, however, have not been treated and there remains an abundant source of stream-adjacent large conifers available for potential recruitment. None of the large wood can move outside the action area into downstream LFH due to the complete barrier at Crow Creek Reservoir (and dam).

Table 48. The in stream large wood summary for surveyed streams in the Dog River Pipeline Project action area.

Stream	Year Surveyed	River Mile	Number of Pieces Medium	Number of Pieces Large	Pieces per Mile Medium	Pieces per Mile Large	Total
Dog River	2000	0.0 – 1.8	40	78	17	27	44
Dog River	2000	1.8 – 5.1	47	55	19	22	41
SF Mill Creek	2011	11.3 – 15.6	37	32	9	7	16
SF Mill Creek	2011	15.6 – 15.9	2	1	5	3	8

Pool Frequency and Quality/Large Pools

Pool habitat is a critical component of healthy stream habitat for salmonid populations. The forest plan requires that pool habitat be maintained or increased as a result of a given project (FW-088) and that streams contain one or more primary pools per five to seven channel widths in low-gradient streams (less than 3 percent slope), and one per three channel widths in steeper channels (FW-090/091). A primary pool is defined as a pool at least 3 feet deep, which occupies at least half of the low-water flow channel. Pool frequency is often related to the occurrence of large wood or other channel obstructions (Montgomery et al. 1995) and pool depth is a function of a variety of factors including sediment input and the ability of the stream at that site to scour, and maintain, a pool. Fine sediment above natural

background levels can fill pools and increase bed mobility, resulting in shallower scour depths (Buffington et al. 2002).

Pool frequency in all stream reaches within the action area is below AP and Forest Plan standards (Table 49). This is less about intact riparian habitat being able to provide adequate pool-forming wood, and is rather more indicative of these small streams being transport reaches or are located in naturally riffle dominated canyons. Other than the lower ¼ mile, the Dog River channel is steep with an average gradient of 7% and 11% in the 2 reaches surveyed between RM 0-5.1 (MHNF, 2000a). South Fork Mill Creek gradient averaged 3% and 6% in the 2 reaches within the action area (MHNF, 2011).

Table 49. Pool habitat summary for surveyed streams found within the Dog River Pipeline Project action area, including total pools per mile; primary pools (pools ≥3ft. deep) per mile, and the AP standard (pools per mile).

Stream	Year Surveyed	River Miles	Total Pools per Mile	Primary Pools per Mile	AP Pools per Mile Standard
Dog River	2000	0.0 – 1.8	19	5	63
Dog River	2000	1.8 – 5.1	17	5	63
SF Mill Creek	2011	11.3 – 15.6	27	2	70
SF Mill Creek	2011	15.6 – 15.9	0	0	184

Pool quality is a descriptive measure of their suitability for fish and other aquatic fauna. Pools of higher quality are deeper and contain some form of cover for fish (i.e. large wood, undercover bank, water turbulence bubbles). Pools in the action area generally have adequate cover, temperature regime, and have not been impacted by fine sediment deposition. Adequate sources of large wood are available for both long term and short-term recruitment.

Off Channel Habitat and Floodplain Connectivity

Off channel habitat is infrequent because of the steepness of the streams in the action area. Few side channels are present in Dog River and SF Mill Creek, and they tend to be high energy habitats; there are few off-channel features such as oxbows or backwaters. Most this is a natural condition due to the confined valley form and steep gradients of Dog River and moderately confined valley for SF Mill Creek, with the exception of the area at Oregon Highway 35. The highway, at RM 0.7 constricts Dog River through a 60’ double box culvert and reduces floodplain connectivity and off-channel habitat through this low gradient (1%) reach.

Refugia

Limited refugia are present within the action area for adult and juvenile spring Chinook salmon, Coho salmon, and winter steelhead. Most of this is a natural condition due to steep gradients of Dog River, with the exception of Highway 35. The highway, at RM 0.7 constricts Dog River through a 60’ double box culvert and reduces complexity and refugia habitat through this low gradient (1%) reach.

Intact riparian reserves, conservation areas, ground water upwelling areas, and seeps are present and protected in the action area. Cold water year-round provides a temperature refugia for resident and anadromous fish in Dog River, although access is naturally limited due to steep gradients and waterfalls. On SF Mill, a waterfall downstream of the action area prevents any passage of anadromous species into the action area.

Width to Depth Ratio & Streambank Condition

Within the action area average bankfull width to depth (W/D) ratios ranged from 15.4 to 18.5 for Dog River and 10.1 for South Fork Mill Creek. The 2000 Dog River stream survey and 2011 SF Mill Creek survey noted very low stream bank instability that would contribute to alterations of W/D ratios from natural conditions. The watersheds have little disturbance, especially in riparian areas. The exception is at Oregon highway 35, at RM 0.7, which constricts Dog River through a 60' double box culvert through one of the few low gradient (1%) reach accessible to anadromous fish. The channel is clearly altered permanently at this location, including W/D ratios.

The 2000 Dog River stream survey and 2011 SF Mill Creek survey noted very low stream bank instability in both watersheds.

Changes in Peak/Base Flows

The hydrology of Dog River is driven by spring (groundwater) contributions during baseflow periods, and by the addition of snowmelt during high flow periods, with the majority of runoff taking place in the spring and early summer (May to June). Downstream of the diversion, the main perennial tributaries to Dog River are Brooks Meadow Creek and Puppy Creek. Hydrological data availability for Dog River is very limited. Records exist from a historic USGS stream gage just upstream of the diversion from 1960-1971 (Figure 43) and some very limited flow data is available from both the City of The Dalles at the pipeline diversion location and from the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWS) just upstream of the confluence with the EFHR. Peak runoff events are often driven by rain-on-snow events and snowmelt during November to June, with 20–100 cfs peak flows recorded from 1960-1971 in Dog River just above the diversion point (USGS @ http://waterdata.usgs.gov).

Estimated D95 flows (flows that are exceeded 95% of the time, i.e., summer low flows) for Dog River above the confluence with East Fork Hood River are 8.5 cfs, 0.3 cfs for Puppy Creek (3.5% contribution), 6.5 cfs for Dog River above the Pipeline intake and 0.8 cfs for Brooks Meadow Creek (~12% contribution; Table 50; USGS 2017). D5 flows (flows that are exceeded only 5% of the time, i.e., peak spring runoff flows) for the drainage are estimated to be 96.1 cfs for Dog River at the confluence with EFHR, 17.8 cfs for Puppy Creek (~19% contribution), 35.9 cfs for Dog River above the Pipeline diversion and 4.2 cfs for Brooks Meadow Creek (~24% contribution; Table 50). A maximum recorded flow of 100 cfs was measured at the USGS gage just above the intake on May 29, 1969.

A portion of Dog River flow is diverted for municipal use by the City of The Dalles at RM 6.0 which decreases the actual D95 flows downstream of the diversion. Average stream and diversion flow data from the City of The Dalles for spring through fall of 2016 are presented in Table 51. Historically, the entire flow of the river has been diverted by The Dalles from June through October (approximately 3–10 cfs; Table 50); however, only a portion of flows from November to May (approximately 30%–70%) are diverted. Flow diversions from the spring to fall of 2016 ranged from 2.7 cfs in late September to 10.2 cfs in late May 2016 (Table 51), whereas Dog River flows ranged from 2.4 cfs in late September to 21 cfs in early May 2016. Sufficient flow to fill the pipeline is generally available in May and June, although the pipeline may only fill to capacity 8% of the time. Although nearly the entire flow of the river is diverted in the summer, surface flows are replaced by groundwater immediately downstream of the diversion. Ten tributaries enter Dog River downstream of the diversion; with 6 entering Dog River between the diversion and LFH. A USFS stream survey from July 26 – August 30 of 2000 noted wetted stream channel in all areas downstream of the diversion. The discharge rate of 8.3 cfs was recorded at the mouth on July 26, 2000.

In cases when the pipeline is full in the winter and spring, roughly 1.9 cfs are thought to leak from the pipeline. Efforts to determine the flow path of the leakage have been indeterminate (MHNF 2017c). Small

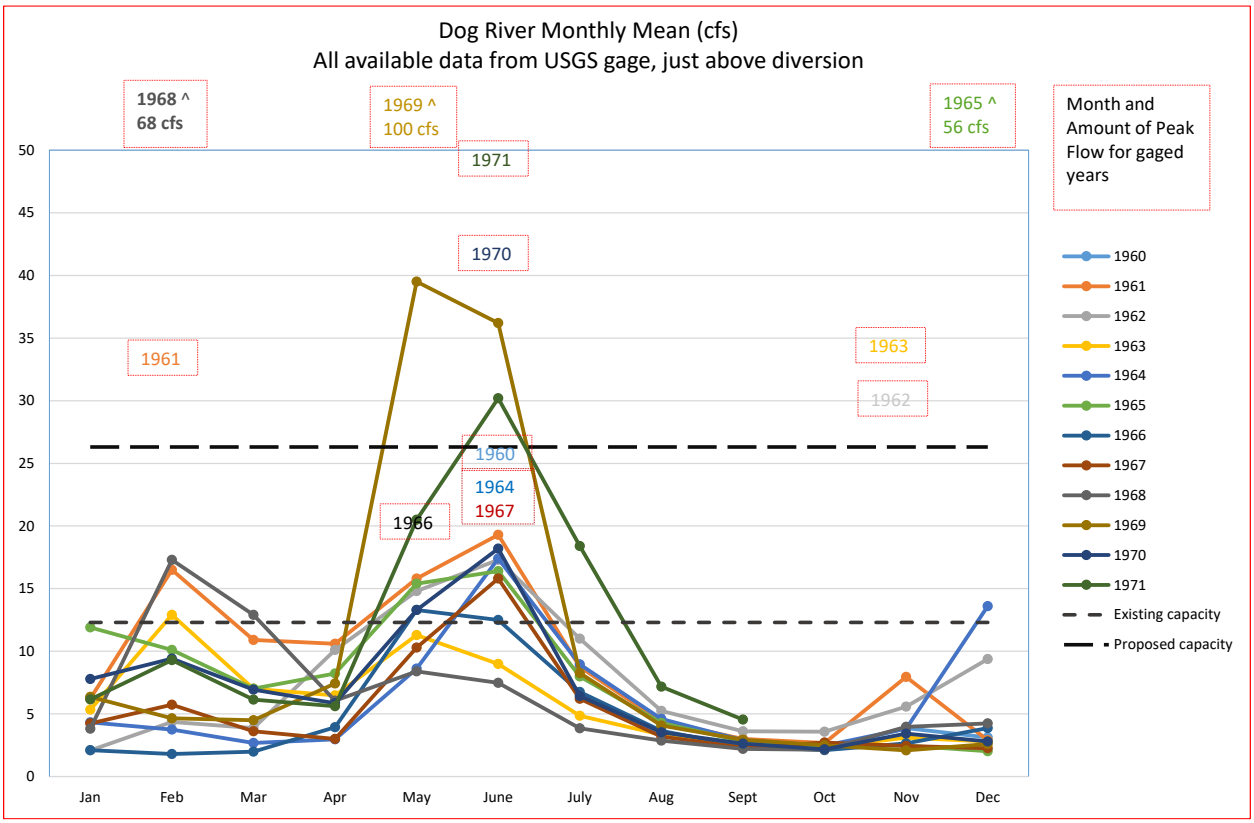
leaks have been observed at several sites along the pipeline, but the location of the majority of the loss is unknown.

Table 50. StreamStats Low Flow Statistics Estimates for Sites within the Dog River Watershed (values are cfs).

Site Name	D5	D50	D95
Brooks Meadow	4.2	1.3	0.8
Dog River Above Intake	35.9	11.2	6.5
Puppy Creek	17.8	2.4	0.3
Dog River at Confluence	96.1	23.6	8.5

Source: USGS (2017) Note: D5 represents the streamflow estimated to be exceeded 5% of the time, D50 represents the streamflow estimated to be exceeded 50% of the time and D95 represents the streamflow estimated to be exceeded 95% of the time.

Figure 44. Average monthly flow for Dog River immediately upstream of the Dog River Diversion, from 1961 to 1971.



Source: USGS @ http://waterdata.usgs.gov

Table 51. Monthly Average Flow for Dog River and the Dog River Pipeline.

	May	June	July	August	September	October
Dog River	15.7	7.7	4.4	3.3	2.7	3.6
Dog River Diversion	8.1	7.6	4.9	3.5	3.0	3.6
Percent of Dog River diverted	52%	99%	109%	108%	112%	99%

Note: Values for percent of Dog River diverted that exceed 100% are because of measurement variation. From June to October 2016, the entire flow of Dog River was diverted into the Dog River Diversion (City of the Dalles).

Very little flow data are available for South Fork Mill Creek. Dam release and spillway flows are available from the City of The Dalles for 2005 to 2015. Low flow statistics for South Fork Mill Creek, Crow Creek, and Alder Creek were generated with the USGS StreamStats software (Table 52; USGS 2017). South Fork Mill Creek has an estimated D95 of 0.85 cfs, and Crow Creek has an estimated D95 of 0.28 cfs, which indicates that Crow Creek would naturally contribute roughly one third of the base flow. The Dog River Diversion commonly transfers approximately 3 cfs to South Fork Mill Creek in the late summer (when D95 flows are most common) and up to approximately 10 cfs during high flow events in the winter and spring (see Figure 10 above depicting Dog River and Pipeline flows).

Table 52. StreamStats Low Flow Statistics Estimates for Sites within South Fork Mill Creek Watershed.

Site Name	D5	D50	D95
Crow Creek	48.9	2.45	0.28
Alder Creek	19.8	0.95	0.035
South Fork Mill Creek	135	6.66	0.85

Source: USGS (2017) Note: D5 represents the streamflow exceeded 5% of the time, D50 represents the streamflow exceeded 50% of the time and D95 represents the streamflow exceeded 95% of the time.

A reduction in canopy cover has the potential to influence peak/base flows. A reduction in canopy cover can reduce the volume of stream flow that is taken up by vegetation and lost to evapotranspiration. Portions of the watershed have been logged in the upper watershed; however, the trees in these patches have begun to grow back since they were harvested. Aggregate recovery percentage for Dog River subwatershed was calculated as 97.8% in 2015 (USFS, 2016). South Fork Mill Creek is part of the Dalles Municipal Watershed and is a Special Emphasis Watershed in the MHNF Land and Resource Management Plan and therefore certain management actions have been taken to safeguard the supply of domestic water to The Dalles. Management and commercial activities such as road development and timber harvest for fuels reduction have influenced the forested cover of the watershed over the years. Approximately 7% of the combined North and South Fork Mill Creek Watershed is made up of younger managed stands with less than 70% cover and an average DBH of less than 8 inches (MHNF 2017a), meaning that despite past timber harvest and wildfire the majority of the forested canopy still functions to

intercept rainfall and perform evapotranspiration processes at the watershed-scale. Given the high canopy cover and low level of disturbance in the action area, it is unlikely that the action area has experienced increased baseflow or modified peak flows due to forest canopy removal.

3.4.1.1.2 Proposed, Endangered, Threatened, and Sensitive Aquatic Species within the Action Area

Fish Species Presence / Absence

Dog River, Brooks Meadow and South Fork Mill are all perennial fish-bearing streams. Maximum upper limits for ESA Listed Fish Habitat (LFH) in Dog River ends at RM 2.6, and in South Fork Mill Creek at RM 3.0; both due to natural waterfalls. Designated Critical Habitat for LCR Chinook ends at ~RM 0.1 (highway 35), LCR Coho at RM 1.4 (FS boundary), and LCR steelhead at RM 2.0. Due to the steep gradient, ODFW estimates that Coho and Chinook distribution currently ends at ~RM 0.2 (Puppy Creek confluence), while a very small number of steelhead may be able to make it all the way to Dog River Falls at RM 2.6 in optimal water years. Dog River Falls at RM 2.6 is thus considered the upper extent of Listed Fish Habitat (LFH) for this BE. Cutthroat trout are present in Brooks Meadow Creek, South Fork Mill Creek and Dog River. Coastal rainbow trout are found in lower Dog River but have not been documented above the Dog River and Brooks Meadow confluence.

Lower Columbia River (LCR) steelhead (*Oncorhynchus mykiss)* - Both LCR summer and winter steelhead runs are present in the Hood River Basin; however, only winter steelhead are present in the EFHR. Steelhead are found in the EFHR and the lower reaches of Dog River (Rod French, ODFW, personal communication, 2017) including the action area (Figure 40). Adult winter steelhead typically enter the Hood River in early December to mid-June before spawning from mid-January to late June. Most juvenile steelhead emigrate as age-2 or age-3 smolts and spend 2 years rearing in the ocean before returning as adults Winter steelhead are found in the East Fork of the Hood River and have been documented in Dog River and in the East Fork near the confluence of Dog River.

Mid-Columbia River (MCR) steelhead and their critical habitat are present in the North Fork Mill Creek and South Fork Mill Creek 6th field subwatershed but are not present in the action area. MCR Steelhead have been documented by ODFW up to Mill Creek Falls (RM 3.0) on South Fork Mill Creek, which is 8 miles downstream of Crow Creek Reservoir. Since LFH for MCR steelhead is not in the Action Area, this species will not be discussed further in this BE.

LCR Coho salmon (*O. kisutch*) - There is no artificial propagation program for Coho salmon in the Hood River Basin. Coho salmon distribution is based on limited survey information obtained from Confederated Tribes of Warm Springs and ODFW.

Coho salmon are a minority anadromous species in the Hood River compared with Chinook salmon and steelhead. The number of returning adults varies widely, averaging 243 per year but ranged from 13 to 1020 in the period 1992 - 2009, and a large proportion of the escapement is made up of hatchery strays from other river systems (Reagan 2011). The unmarked portion of the run each year is only a fraction of the entire run. For the 2009 run year, the last year Coho were trapped and counted prior to the decommissioning of Powerdale Dam (and fish passage facility), 70 natural and 563 stray hatchery Coho salmon passed upstream into the Hood River. There is no artificial propagation program for Coho salmon in the Hood River Basin.

Coho distribution in the Hood River and especially the action area is not as well understood as Chinook salmon and steelhead. Little distribution and spawning survey monitoring has focused specifically on Coho. Neither CTWS, USFS, or ODFW conduct spawning surveys specifically for Coho but spawning has been noted in the lower East Fork Hood River and some tributaries. Based on the intermittent presence of juveniles in the action area, successful spawning is occurring, likely downstream in the

mainstem East Fork, as well as possibly Dog River in the action area. Spawning surveys in the action area have included the mouths of Dog River, Puppy Creek, Tilly Jane Creek, and Ash Creek. No Coho spawners were detected in 2014 in these 4 reaches, although juveniles have been noted in CTWS 2010 and 2011 snorkel surveys.

Upper limits for LCR Coho salmon ends at the Puppy Creek confluence with Dog River (RM 0.14) due to steep gradient beyond this point. Listed critical habitat for Coho salmon ends upstream in Dog River at RM 1.4, at the Forest Boundary.

LCR Chinook salmon (*O. tshawytscha*) - Chinook salmon in the Hood River basin were extirpated in the mid 1990's, and a run has been reintroduced originating from the Round Butte hatchery on the Deschutes River (CTWS and ODFW, 2000). As of 2014, the present Hood River spring-run Chinook hatchery stock is not an ESA-listed population under the ESA (FR Vol 79: 20802-20817; April 14, 2014). A final critical habitat designation was published on September 2, 2005, with an effective date of January 2, 2006, and remains unchanged at current time. Distribution and critical habitat of the LCR chinook evolutionary significant units (ESU) within the action area is shown in Figure 40. EFH in the action area is commensurate with designated critical habitat. Spring Chinook salmon are present in the action area. Fall Chinook salmon are found lower in the Hood River Basin outside of the action area.

CTWS has conducted annual spring Chinook salmon spawning surveys since 2008 (CTWS 2017). Redds have been observed in Dog River eight of the nine years monitored. While spring Chinook spawning is common in Dog River, it appears to be very restricted as all redds have been observed downstream of the Highway 35 culvert (RM 0.07).

Chinook typically enter the Hood River beginning in April and spawning commences the following August through September. Numbers of returning spring Chinook salmon adults to the Hood River averaged 500 per year and ranged from 85 to 1236 from 1992 to 2010.

Upper limits for LCR chinook and Coho salmon ends at the Puppy Creek confluence with Dog River (RM 0.14) due to steep gradient beyond this point. Designated critical habitat for Chinook salmon stops at Highway 35 crossing at RM 0.07 in Dog River (Figure 40).

3.4.1.1.3 Regional Forester's Special Status Species List - Sensitive Vertebrates and Invertebrates July 2015

As part of the NEPA process, the Forest Service reviews programs and activities to determine their potential effect on sensitive species. Only sensitive species are required to be addressed in a biological evaluation (Forest Service Manual 2670). Distribution, life history, etc. for many strategic species are poorly understood; thus when they are found while conducting surveys for other species, the Forest Service requires recording location(s) in corporate databases established by the agency.

Fish Species Presence/Absence

Pacific lamprey - Pacific lamprey are listed as a state sensitive species and a U.S. Fish and Wildlife Service Species of Concern. Upper limit data for Pacific lamprey is very limited in both the East Fork Hood River and Mill Creek 5th Field Watersheds. In general, little is known about lamprey presence in the project area or area of influence. The upper limit for Pacific lamprey is presumed to be the lower reach of Dog River below Dog River falls (Rod French, ODFW, personal communication, 2017). Upper limits for Pacific lamprey in South Fork Mill Creek is likely Mill Creek falls at RM 3.0.

Pacific lamprey migrate from freshwater streams to the Pacific Ocean, then return upstream to spawn. Typical spawning habitat is similar to that for salmon or steelhead trout, in medium- and large-sized, low-gradient Rivers and streams. Lampreys construct a nest (called a redd) in small gravel substrate. Females can lay up to 100,000 eggs, which are fertilized externally by the male. Adult lampreys die within four days of spawning. Pacific lampreys spend most of their life in freshwater streams before entering the ocean as adults to feed. Young lamprey burrow into the muddy bottoms of backwater pools and eddies, where they filter the mud and water. The juveniles, called ammocoetes, live in fresh water for up to 5 or 6 years. Juvenile lampreys are filter feeders. After a two-month metamorphosis they emerge as adults less than 5 inches long, then migrate downstream to saltwater. In the ocean they grow to 16 to 27 inches before returning after 1 or 2 years to fresh water to spawn and die. Adults are parasitic on other fish, scavenge, or are predators while in the ocean. Pacific lampreys do not feed while traveling to spawn. Pacific lampreys are vulnerable to habitat losses due to reduced river flows, water diversions, dredging, streambed scouring, channelization, inadequate protection of streamside vegetation, chemical pollution and spills, and impeded upstream passage due to dams and poorly designed road culverts.

Inland Columbia Basin Redband Trout - Inland redband trout may be present in the North Fork Mill and South Fork Mill Creek 6th field subwatershed, but are not present in the action area. Genetic analysis of salmonids from mainstem Mill Creek indicated a mixed population of inland redband and coastal cutthroat trout immediately below the confluence of the North and South Forks, predominantly redband trout. Rainbow trout identified as redband had a high frequency of the redband allele, thus it is assumed they are the inland variety (Gregg et al., 1995). Progressing downstream, coastal cutthroat trout presence dissipated giving way to a pure inland redband population. Salmonids in South Fork Mill Creek above Mill Creek Falls are cutthroat trout (USFS, 2000). Redband are not known to be present in Dog River. For this analysis, resident inland redband trout distribution is assumed to be identical to steelhead distribution in Mill Creek.

Coastal Cutthroat Trout - Coastal cutthroat trout are known to be present in Dog River up to about RM 8.5 and in Brooks Meadow Creek from its confluence with Dog River upstream to the FS road 17 crossing (RM 0.3). The FS road 17 culvert is considered to be a fish passage barrier. It is not presently known if coastal cutthroat trout are present in Brooks Meadow Creek upstream of FS road 17 crossing. However, cutthroat trout have been observed in Brooks Meadow (USFS, 1999, MHNF, unpublished data).

Coastal cutthroat trout are the only salmonids known to be present in South Fork Mill Creek above Mill Creek Falls. Forest Service personnel have observed cutthroat trout while electrofishing and made visual

observation of salmonids during surveys in South Fork Mill Creek up to RM 16.3 (USFS, 1999, MHNF, unpublished data). The Dog River water transmission pipeline can entrain fish at the diversion due to the lack of a fish screen. A 2010 genetic analysis (Smith et al. 2010), conducted by MHNF, ODFW, and USFWS Abernathy Fish Technology Center, found cutthroat trout tissue samples collected in the Upper Dog River (above the Dog River diversion headgate), South Fork Mill Creek, and Crow Creek (a tributary to South Fork Mill Creek) were from the same genetic population group.

Aquatic Macroinvertebrate Presence/Absence

There are three aquatic mollusks and two caddisflies known or suspected to occur on the Forest included on the Region 6 Regional Forester's 2011 Sensitive Species list (Table 53). In addition, there are four mollusks and three caddisflies considered strategic species by the Regional Forester. Only the Dalles Juga is known to occur within the Action Area. Two of the strategic mollusks (Basalt Juga and Columbia duskysnail) were also listed as Survey and Manage Category A species requiring management of known sites and minimizing inadvertent loss of undiscovered sites (USFS and BLM 2001). For the purposes of this report/biological evaluation, the only two strategic species discussed further are the Columbia duskysnail and Basalt Juga since they are Survey and Manage species as described above.

Dalles Juga - This species of aquatic mollusk has been found in Mill Creek and the central and eastern Columbia River Gorge from Hood River to The Dalles, in Hood River and Wasco Counties, Oregon, and Skamania County, Washington (Frest and Johannes 1995). The Dalles juga is found at low elevation large springs and small-medium streams with a stable gravel substrate and fast-flowing, unpolluted, highly-oxygenated cold water. Relatively few macrophytes or epiphytic algal taxa are present, with Rorippa being the most frequently encountered. The species cannot survive long out of water (Frest and Johannes 1995).

Columbia Duskysnail and Basalt Juga - The Columbia duskysnail and Basalt Juga have been documented on the MHNF. Prior to summer of 2015 the Columbia duskysnails found on MHNF were believed to be (Colligyrus sp. nov.), but after DNA analysis was conducted in 2015 by Liu H-P, Hershler R., Rossel C (2015), specimens taken from the Dog River subwatershed (Brooks Meadow Creek), were determined to be Rocky Mountain duskysnail (Colligyrus greggi), which are not on the 2015 Regional Forester's Special Status Species List. Basalt Juga has only been found on MHNF in the North Fork Mill Creek drainage. Since these two species are Survey and Manage species rather than Special Status Species, they will not be discussed further in this document.

Table 53. Region 6 (R6) special status species either documented or suspected to occur within the Mt. Hood National Forest and within the Dog River Pipeline Project action area (Yes, No, Assumed, Unknown).

Scientific name	Common name	Forest presence	Action Area Presence Dog River	Action Area Presence Mill Creek
Sensitive Species				
Entosphenus tridentatus	Pacific lamprey	Documented	Assumed	Assumed
Onchorynchus mykiss gairdneri	Redband trout	Documented	No	Yes
Onchorynchus clarki	Coastal cutthroat trout	Documented	Yes	Yes
Juga hemphilli dallesensis	Dalles juga	Documented	Yes	Yes
Juga hemphilli	Barren juga –	Documented	No	No
Juga hemphilli maupinensis	Purple-lipped juga	Suspected	No	No
Allomyia scotti	Scott's apatanian caddisfly	Documented	No	No
Namamyia plutonis	Caddisfly (no common name)	Suspected	Unknown	Unknown
Strategic Species				
Fluminicola sp. nov. (Pinhead)	Pinhead pebblesnail	Suspected	No	No
***Juga* sp. nov. (Basalt)**	**Basalt juga**	**Documented**	**Yes**	**Yes**
Juga sp. nov. (Brown)	Brown juga	Suspected	No	No
***Lyogyrus (Colligyrus)* sp. nov.(Columbia)**	**Columbia duskysnail**	**Documented**	**Yes**	**Yes**
Pristinicola hemphilli	Pristine springsnail	Suspected	No	No
Lepania cascada	A caddisfly (no common name)	Suspected	No	No
Moselyana comosa	A caddisfly (no common name)	Suspected	No	No
Rhyacophila unipunctata	One-spot rhyacophilan caddisfly	Documented	No	No

Note: The two species in bold are also Survey and Manage species as outlined in Forest Service et al. 2001.

3.4.2 Effects Analysis

Analysis Assumptions and Methodology

This analysis utilizes research, relevant monitoring, field data, previous experience and professional judgment, as well as GIS information, to provide the context, amount, and duration of potential direct, indirect and cumulative effects on aquatic resources from the proposed project. The physical scientist reports on Hydrology provide the basis for the analysis for effects to aquatic habitat. The analysis method utilized to determine potential impact to fish, aquatic invertebrates, and their associated habitat are listed below.

1. Determine known and suspected locations of federally listed or proposed aquatic species, designated critical habitat, essential fish habitat, Region 6 Regional Forester's sensitive species and survey and manage species in relation to proposed project activities.
2. Assess proposed project activities and determine the aquatic habitat elements potentially impacted and the geographic area where effects could occur (i.e., the action area). Project activities include:
    - Abandonment of old pipeline/installation of new pipeline
    - Installation of aquatic organism passage (AOP) and pipeline crossing at Brooks Meadow Creek
    - Installation of fish screen and diversion/outlet structures
    - Temporary staging areas/material hauling
    - Pipeline operations
3. Overlap the species/habitat locations with the action area and determine which species/habitat could be affected by project activities.
4. When species/habitat overlaps with the action area, predict impacts from proposed project activities to individuals and their associated habitat. Potential effects to aquatic fauna and habitat were determined by analyzing the following:

    - Direct and/or indirect effects to individuals from proposed activities;
    - Potential reductions in stream shade and subsequent increases in water temperature compared to existing levels;
    - Potential increases in erosion and fine sediment input to streams and wetlands compared to existing levels;
    - Potential increases in chemical contaminants/nutrients;
    - Presence of physical barriers;
    - Potential effects to existing and future levels of large wood in stream channels and riparian reserves, including any effects on large wood recruitment; off-channel habitat and floodplain connectivity, width/depth ratio, and streambank condition; and quantity and quality of pool habitat;
    - Potential effects to peak and or base flows;
    - Cumulative effects associated with ongoing or proposed projects in the action area or close enough so that cumulative effects could occur.

Effects to the biological resource were determined based on professional experience, data, and literature.

Direct and Indirect Effects

Direct Effects

Direct effects are those that directly impact aquatic species/habitat. Commonly the activity needs to be in close proximity to the water body where they reside, often within the water body itself. From an aquatic perspective, direct effects most often result in disturbance to aquatic organisms—forcing movement or a flight response. Depending on the activity, it is possible that individuals can be injured or killed; this is almost always a result of people or equipment working directly in water.

In this case, the project elements that are likely to directly affect aquatic species or habitat are the additional 0.5 cfs in late summer and the culvert replacement and fish screen installation projects. These could directly affect resident fish and other sensitive aquatic organisms that are adjacent to or immediately downstream of those actions. Direct effects to resident fish species in Dog River could include a slight increase in available habitat below the diversion due to increases in late summer flow.

Direct effects could also include reduced feeding efficiency during times of increased turbidity, the possibility of individual mortality during construction, and capture of resident cutthroat trout during work area isolation.

Fish rely on sight to feed, and therefore feeding success could be hampered during those times turbidity is increased. This would be a short-term effect since turbid conditions would dissipate soon after the in-stream work phase was completed; generally in a few hours. Any time there is digging or equipment in the live stream channel there is a possibility that fish could be killed or seriously injured by being crushed or run over by equipment or materials. Because aquatic macroinvertebrates are relatively immobile, especially mollusks, it is likely such organisms would be injured or killed during construction if they are present at the site. This impact would occur at the site scale and not across the range of any aquatic macroinvertebrate species thus, the effects would be localized.

Design and engineering surveys would be conducted at the culvert crossing. When these surveys are carried out within or in close proximity to streams, harassment of fish can occur. In some instances, fish are flushed from hiding cover and can become more susceptible to predation. The disturbance typically lasts a few hours and will not have population level effects and is considered to be negligible at the 6th field and project scale.

Prior to the culvert installation, resident fish will need to be captured and removed from the project area and block nets will be installed to prevent fish movement into the project during construction. Both the capture and loss of fish passage will directly affect resident cutthroat trout. Following in-water work guidelines, and the strict adherence to applicable PDC's, would limit the direct effects on fish and aquatic mollusk species and result in negligible effects at the watershed scale.

Indirect Effects

Indirect effects are effects caused by or resulting from the proposed actions, are later in time, and are reasonably certain to occur. For example, when streamside forests are removed, an indirect effect associated with shade reduction could be an increase in water temperature. The magnitude of such an effect, if it occurred, would depend on the amount of vegetation removed, location and elevation of the stream, amount of stream flow, etc. In this case, indirect effects may affect resident trout present within close proximity to the restoration actions but have little to no effect on ESA species or LFH present farther downstream. The following analysis evaluate potential indirect effects on habitat indicators that result from the no action alternative and the proposed action alternative.

The proposed action has been stated earlier in this document. This report separates the proposed action into five project elements, which are described in detail below. Project Design Criteria have been developed for each of the project elements and can be found in Chapter 2 of the Dog River Pipeline Replacement EA.

Abandonment of Old Pipeline/Installation of New Pipeline

The primary elements of the project are the abandonment in place of the old 18" wooden pipeline and installation of the new 24" pipeline. Existing trees and dead wood will be cut and removed within the 25-foot pipeline right-of-way along the pipeline route within the pipeline service road, and at planned staging areas (Figure 47). An excavator will dig approximately a 4-foot deep by 3 to 4-foot wide trench, piling the excavated material to either side. The excavator will place the pipe in the trench and then cover the pipe section with gravel or sand and fill in the ditch with the removed material. Additional gravel or sand will be transported to the excavator by a small rubber-tired or tracked vehicle.

As water would still need to be passed to SF Mill Creek, a temporary bypass pipe would run from the end of the newly installed pipe around the active construction area to the open end of the existing pipe. The bypass pipe could consist of 8″ aluminum sprinkler-type pipe, which could be moved by hand. Two lines

could run parallel for up to 500 feet. Installation of the bypass pipe would be around existing trees, logs, and rock.

It is estimated that around 438 live trees ranging in size from 6” to 48” dbh will be removed along the approximately 3.4-mile pipeline route. Of these 438 trees, roughly 12 are larger than 24” dbh, 170 are between 12” and 14” inches, and around 256 trees are 11” and smaller. In addition to the live trees approximately 198 standing dead trees would be cut. Of these, over half are between 11” and 20” inches, 22 between 20” to 30”, roughly 3 are over 30” dbh with the remainder under 11” dbh. Around 11 acres total would be affected. At its closest point, this affected Riparian Reserve area (Table 54) is about 2.7 miles upstream of Listed Fish Habitat (LFH) and 3.3 upstream of Critical Habitat (CH). This project element does not involve in-water work.

Upon project completion, all disturbed areas would be rehabilitated in a manner that results in similar or better than pre-work conditions through removal from the National Forest all of project related waste, decompaction of soil, spreading of non-vegetation stockpiled materials (soil, etc.) seeding, or planting with local native seed mixes or plants, and restoration of stream channel bed and banks. Five percent of the largest felled trees (live or dead) will be left on site, evenly distributed over the disturbed area.

Table 54. The length of proposed new pipeline in various streamside zones.

Riparian Reserve	300’ on each side of fish-bearing stream of Dog River and Brooks Meadow Creek	0.93 miles (4,900’)
1 Site Potential Tree	130’ from Dog River and Brooks Meadow Creek	0.53 miles (2,800’)
	100’ from Dog River and Brooks Meadow Creek	0.15 miles (815’)

Installation of Aquatic Organism Passage (AOP) and Pipeline Crossing at Brooks Meadow Creek

Brooks Meadow Creek is a perennial stream tributary to Dog River that is about 1 mile in length and contains resident cutthroat trout. It is located 2.8 miles upstream of LFH.

There are 2 locations for this project element, and they both involve in-water work. First, the pipeline is proposed to be buried under the channel near RM 0.1 of Brooks Meadow Creek.

Second, USFS Road 1700-014 crosses Brooks Meadow Creek at RM 0.2. The road parallels the pipeline for much of its length and provides equipment and maintenance access to the pipeline. It is currently a rough, natural surface, single lane road with an undersized culvert carrying Brooks Meadow Creek beneath. Due to its small size, the culvert has failed, resulting in Brooks Meadow Creek flooding over the road prism (Figure 48). The project would install a cement prefabricated open box culvert that will provide Aquatic Organism Passage (AOP) at all life stages and eliminate a chronic sediment source. During the culvert construction, the stream would be re-routed around the work area as the culvert is being installed. Additionally, because the existing pipeline is too fragile to handle surface vehicle traffic, the construction area would be accessed along the newly constructed section of the pipeline. It is unlikely that any mature trees will need to be removed to install the AOP culvert at the Brooks Meadow Creek crossing. Vegetation removal at the crossing will largely consist of brushing low vegetation rather than removal of mature trees.

Installation of Fish Screen and Diversion/Outlet Structures

The current diversion of water from Dog River into the existing pipeline is not equipped with a fish screen (Figure 48). This project will install a fish screen at the diversion. The proposed structure will be an in-channel screening structure that will prevent passage of resident trout into the diversion. The fish screen will meet ODFW fish screening criteria. While the fish screen is designed to work year-round, the lack of electricity at the diversion means there is no mechanism to de-ice the fish screen during winter which could result in a failure of the diversion. Therefore, the structure will be designed and constructed in a manner that will allow its removal in the winter under heavy icing conditions. The pipe inlet, flow measuring facilities, and discharge structure would also be replaced.

Temporary Staging Areas/Material Hauling

There are multiple staging areas identified for the construction period (Figure 45). None are in Riparian Reserve. A 1-acre staging area would be located at the 1700-014 road at the top of the hill west of the Brooks Meadow Creek Crossing and would accommodate the transfer of pipe from the primary storage area to the construction area. It will also act as the storage area for trees/logs removed from the corridor before they are removed from the project (Figure 45). Minor realignment of the 1700-014 road between Brooks Meadow Creek and the staging area would be completed to allow for construction vehicle traffic. There are several other locations identified for storing pipe and gravel/sand: 1) on either side of the 1700-691 where it intersects with the 1700-690; 2) along road 4400-011 at the junction with road 4400; or, 3) at an old landing off of the 1700. Gravel and sand may also be stored at the junction of the 1700 and the 1700-680 roads. All the staging areas will be rehabilitated upon completion of the project.

Roads where equipment, materials, and gravel or log hauling will occur within the action area are located outside Riparian Reserves with 3 exceptions:

- The Dog River pipeline access road (Rd 1700-014 and 4400-011), which is within 100' of Dog River and Brooks Meadow Creek for about 815'. This native surface pipeline access road is about 2.7 miles upstream of LFH, at its closest point (3.3 upstream of CH).
- The 1700 road, which is paved, crosses Brooks Meadow Creek. This paved road crossing is about 3.1 miles upstream of LFH. Roadsides are densely vegetated at this location.
- Oregon Highway 35 near the confluence of EFHR and at Dufur Mill Road (4400) which crosses Dog River as well as several smaller streams. These road crossings do cross over LFH. Both roads are paved, have wide shoulders and good drainage.

Pipeline Operations

The new pipeline would continue to be maintained and operated as it conventionally has for many decades, conveying water diverted from upper Dog River to the South Fork of Mill Creek and stored in Crow Creek Reservoir for municipal use by the City of the Dalles (City) in accordance with existing state and federal authorizations. Current operations entail the diversion of Dog River flow year-round, including the diversion of almost all flows during the summer and early fall months. Peak reservoir fill period occurs from October to early February. Dave Anderson, City of The Dalles Public Works director for the last 12 years (and The Dalles Municipal Watershed manager for the prior 15 years), notes that in most years Crow Creek reservoir is filled to capacity by early February (personal communication). In some years it is full well before that. The City does not divert all of the stream flow when filling the reservoir. There is bypass flow during this time. Once the reservoir is full, the intake is reduced (using a screw gate) to maintain flow to the reservoir that averages around 3 cfs (although in winter when the headgate is not very accessible they let spill over Crow Creek dam until they can safely access the site). The existing operating plan allows the majority of spring peak flows to bypass the intake and continue down Dog River.

The proposed project will modify the current pipeline operations by leaving a minimum instream bypass flow of 0.5 cfs (August 1 to October 31) during a portion of the low stream flow period. The new 24" pipeline has a capacity of 26.3 cfs compared to the current pipe's capacity of 12.3 cfs.

Figure 45. Project Area including pipeline location, staging areas, and culvert replacement.

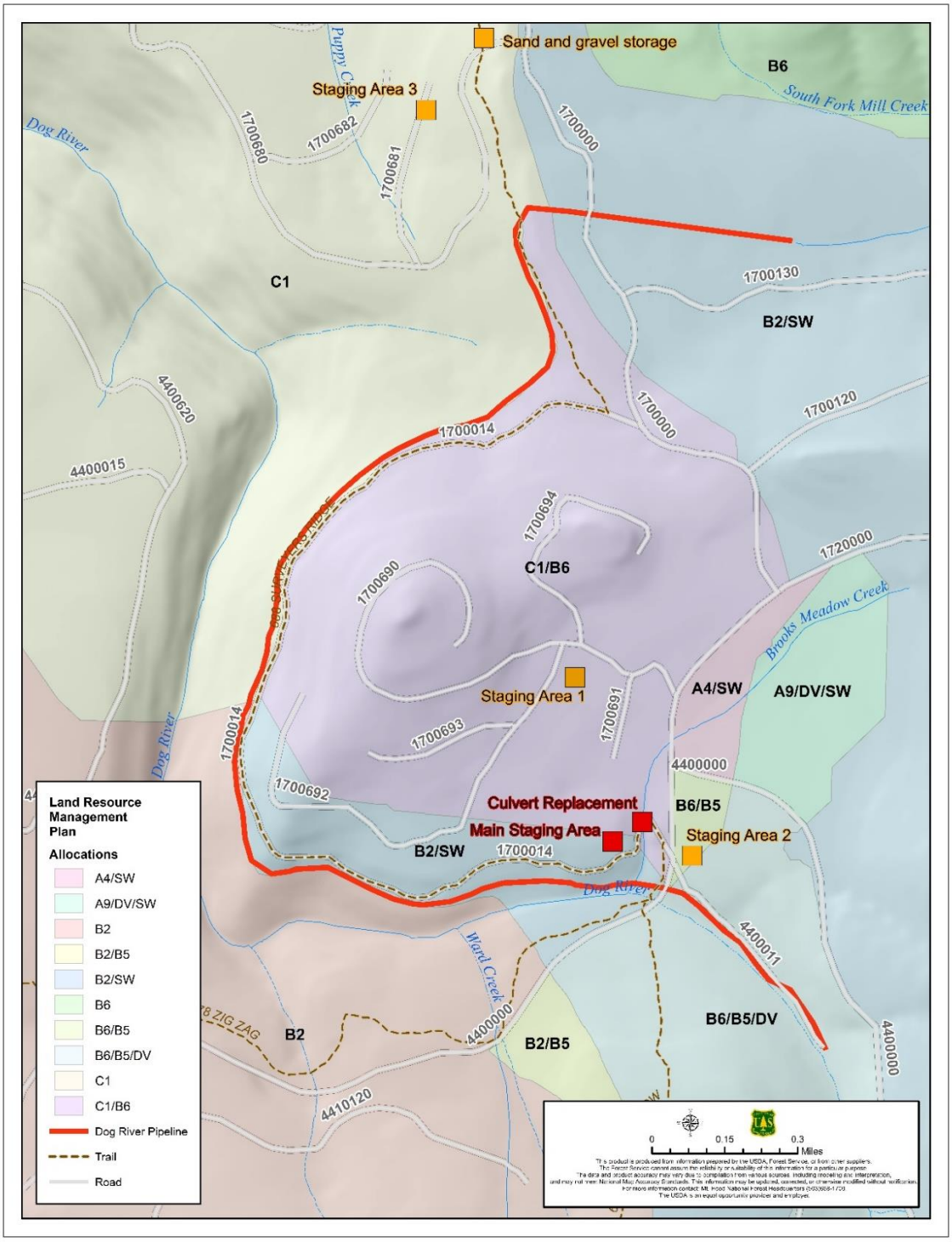


Figure 46. Top row photos: USFS Road 1700-014 road crossing ford at Brooks Meadow Creek. Middle row photos: Existing Diversion Structure on Dog River at RM 6.0. Bottom row photos: Existing Pipeline Intake at Diversion Structure on Dog River at RM 6.0.

3.4.2.1 Temperature

No Action

Stream temperature would not be affected under the No Action Alternative. The seasonal trends in stream temperature observed at the mouth of Dog River would be expected to continue. Dog River stream temperatures would remain cold both above and below the diversion year-round, rarely exceeding water quality standards for temperature, and meeting the ODEQ requirements for fish and aquatic life beneficial uses (Hydrologist Specialist Report). Under the No Action Alternative, existing effects to the water quality of South Fork Mill Creek would remain unchanged. There would continue to be no impairments to the designated beneficial uses

Proposed Action - Abandonment of Old Pipeline/Installation of New Pipeline

The primary elements of the project that could alter stream temperature are the abandonment in place of the old 18" wooden pipeline and installation of the new 24" pipeline. Existing trees and dead wood will be cut and removed within the 25-foot pipeline right-of-way along the pipeline route within the pipeline service road. It is estimated that less than 600 trees total will be removed along the 3.6-mile pipeline route. Around 11 acres total would be affected. This project element does not involve in-water work. At its closest point, this affected Riparian Reserve area is about 2.7 miles upstream of Listed Fish Habitat (LFH), and 3.3 miles upstream of CH, in Dog River.

Tree falling outside of 1 Site Potential Tree height (130') has no causal mechanism to affect stream shading that would affect water temperature, thus tree falling in 2.92 out of the total 3.6 mile pipeline will have a **neutral** effect on water temperature.

Tree falling to replace the diversion outlet in headwaters of SF Mill Creek has no possibility of affecting LFH because of the pronounced distance (>11 miles from pipeline outlet to LFH), and more significantly, the juxtaposition of an impoundment (28-acre Crow Creek reservoir/dam) that disconnects potential project impacts from LFH.

Tree removal within a site potential tree height has the potential to affect stream temperature through removal of tree canopy that provides shade to streams. Approximately 0.68 miles (3,615') of pipeline road will have trees removed within this zone of Dog River and the mouth of Brooks Meadow Creek.

The removal of trees in this zone will have a **discountable** effect to resident cutthroat trout and a **discountable** effect to stream temperature in LFH due to the following:

- 0.3 miles out of the 0.68 miles pipeline opening is only on the north side of the stream. Little stream shading is provided by trees on the north bank.
- A very small amount (815') of pipeline is within 100' (of one side) of the stream. The majority of the pipeline that is 100-130' away from the stream will have additional shading provided by 100' of undisturbed over story trees, understory hardwoods, and streamside shrubs.
- At its closest point, this affected riparian area is about 2.7 miles upstream of Listed Fish Habitat (LFH), and there are 6 cold water tributaries between this point and LFH (tributaries contributed 4.5-10 ^{o}C flow when recorded during August 2000).
- The riparian corridor is intact and densely forested the entire length from the diversion to LFH.

Proposed Action - Installation of AOP and Pipeline Crossing at Brooks Meadow Creek

Brooks Meadow Creek is a small (<1 cfs during summer) spring-fed stream that stays cold year-round. A 2000 USFS stream survey measured the mouth at 10 ^{o}C in early August, and field visits in summer of 2016 confirm the very cold stream temperatures in the portion that runs through Brooks Meadow.

It is unlikely that any mature trees will need to be removed to install the AOP culvert at the Brooks Meadow Creek crossing. Vegetation removal at the crossing will largely consist of brushing low vegetation rather than removal of mature trees. A few trees will likely be removed to allow for the pipeline to cross under Brooks Meadow Creek, with a clearing width of 25 feet perpendicular to the creek.

The pipeline crossing is approximately 2.9 miles upstream of LFH, with the AOP installation at approximately 3.0 miles upstream of LFH. Since few, if any, overstory trees are will be affected by the AOP installation, this action will have **neutral** effect on water temperature.

Tree removal has the potential to affect stream temperature through removal of trees that provide shade to streams. Tree removal adjacent to Brooks Meadow Creek accounts for about 0.06 acres of opening. The 25-foot wide opening will be perpendicular to the stream and thus still retain mature trees immediately adjacent to this small section of opening that will provide shade for the majority of the day. There is **discountable** chance that stream temperatures in LFH will be affected by this element due to the very slight increase in solar contribution at the crossing site, which is located 2.9 miles upstream of LFH. This is especially true since 4 tributaries enter Dog River between the project site and LFH, with contributions of 5-7 ^{o}C flow, as measured during August 2000.

Proposed Action - Installation of Fish Screen and Diversion/Outlet Structures

The installation of fish screen and diversion structures are within the footprint of existing disturbed areas. As no shading of the stream will be affected, this project element has no causal mechanism to affect stream temperature. Therefore, installation of fish screening and diversion/outlet structures will have a **neutral** effect on stream temperatures.

Proposed Action - Temporary Staging Areas/Material Hauling

None of the temporary staging areas are in riparian reserve, thus there is no causal mechanism to affect stream shade. Timber and rock haul, regardless of location or duration, will not reduce shade and has no causal mechanism to increase water temperature. Therefore, both temporary staging areas and timber/rock hauling will have a **neutral** effect on water temperature.

Road maintenance has the potential to remove shade producing vegetation through danger tree removal near perennial streams. Proposed road maintenance activities (that includes danger tree treatment) are all located outside Riparian Reserves, except for the Dog River pipeline access road (Rd 1700-014 and 4400-011), which is within 100' of Dog River and Brooks Meadow Creek for about 815'. This native surface pipeline access road is about 2.7 miles upstream of LFH, at its closest point (3.3 upstream of CH).

Approximately 815' of pipeline road may have some danger trees removed within 100' of Dog River and the mouth of Brooks Meadow Creek.

The removal of a few danger trees in this zone will have **discountable** effect to stream temperature in LFH due to the following:

- A very small amount (815') of road is being treated, with <10 danger trees expected to need falling.

- At its closest point, this affected riparian area is about 2.7 miles upstream of Listed Fish Habitat (LFH), and there are 6 cold water tributaries between this point and LFH (tributaries contributed 4.5-10 ^{o}C flow when recorded during August 2000).
- Other than the 815', the riparian corridor is intact and densely forested the entire length from the diversion to LFH.

Proposed Action - Pipeline Operations

Current operations entail the diversion of Dog River flow year-round. The entire flow of the river has typically been diverted by the City from June through October (approximately 3–10 cfs); however, only a portion of flows from November to May (approximately 30%–70%) are diverted. The proposed project will modify the current pipeline operations by leaving a minimum instream flow of 0.5 cfs (August 1 to October 31) during a portion of the low stream flow period. The new 24" pipeline has a total capacity of 26.3 cfs as compared to the current capacity of 12.3 cfs (a 114% increase). The expanded capacity would allow the filling of Crow Creek Reservoir faster by diverting a greater portion of the Dog River peak flows when available. Once the reservoir is full (historically by early February), pipeline diverted flows are reduced to around 3 cfs for the remainder of winter and early spring.

Flow diversions from the spring to fall of 2016 ranged from approximately 2.7 cfs in late September to 10.2 cfs in late May 2016, whereas Dog River flows ranged from 2.4 cfs in late September to 21 cfs in early May 2016. Although the entire flow of the river is diverted in the summer, surface flows are replaced by groundwater immediately downstream of the diversion. A USFS stream survey from July 26 – August 30 of 2000 noted wetted stream channel in all areas downstream of the diversion. The discharge rate of 8.3 cfs was recorded at the mouth on July 26, 2000.

The diversion is located at RM 6.0 and is 3.4 miles upstream of LFH in Dog River. Changes in pipeline operations from the diversion point to Crow Creek Reservoir has **neutral** possibility of affecting LFH in SF Mill Creek because there are no proposed changes to operations downstream of the reservoir, which is 7 miles upstream of LFH. Diversion of surface flow has the potential to increase downstream temperatures due to the lowered volume, reduced depth, and decreased buffering capacity, which is more prone to warming from solar exposure.

As displayed in the baseline temperature data, Dog River is a very cold system yearround within LFH and almost always meets the 13ºC requirements of listed fish species based on the ODEQ criteria. Current stream temperatures are warmest (above 10ºC) generally from June to September in the 11 years of available data. The proposed action will divert the same amount of flow (all available surface water) from June to July, while leaving more instream flow (0.5 cfs) in August through October than current conditions. As flow diversion will either be the same or lesser in amount during the warmest period (June-September) with the proposed action, there will be **discountable** effects to stream temperatures in Dog River LFH from current conditions.

Summary of Effects on Temperature

After field validation of stream habitat in the action area, project design criteria (PDC) were developed by the interdisciplinary team to minimize water quality impacts, including any from reduction of shade that may affect stream temperature. Some minor shade reduction may occur on perennial resident fish only streams within the action area, but effects will be **discountable** for LFH due to the combination of pronounced distance (>2.5 miles), existing cold year-round temperature baseline, cold spring influence (4.5-10 ^{o}C summer contribution) from multiple tributaries downstream of the action, a retention of 0.5 cfs minimum instream flow during August-October, and the small fraction (~900') of canopy reduction as compared to intact riparian area in almost all of the action area.

3.4.2.2 Sediment and Substrate Character

No Action

For most of the length of Dog River, direct access to the channel would remain limited and human perturbation other than water management would be low. The stream banks and main channel could be expected to remain primarily stable, and the sediment supply would not be expected to undergo an aberrant change from previous trends. Substrate would continue to be dominated by gravels and cobbles. The average amount of fine sediment observed throughout all reaches would likely remain low to moderate on an area weighted basis (Hydrology Specialist Report). The failed culvert at Road 1700-014 at the Brooks Meadow crossing would continue to route fines into Brooks Meadow Creek resulting in an increase in fines at the local scale. If the culvert is not replaced, there would be no construction-related fines generated.

In South Fork Mill Creek substrate would be expected to remain dominated by coarse gravel. Fine sediment generated by streambank erosion and incision would essentially be routed through the system by the elevated water velocity that results from diverted Dog River flows, although it could continue to accumulate in the few pools or short aggrading segments in Reaches 1 and 2. Above the dam, the majority of fine sediment generated would most likely continue to settle in the reservoir, while below the dam it could accumulate behind the Wicks intake structure.

Proposed Action - Abandonment of Old Pipeline/Installation of New Pipeline

The primary elements of the project are the abandonment in place of the old 18" wooden pipeline and installation of the new 24" pipeline. Existing trees and dead wood will be cut and removed within the 25-foot pipeline right-of-way along the pipeline route within the pipeline service road. An excavator will dig approximately a 4-foot deep by 3 to 4-foot wide trench, piling the excavated material to either side. The excavator will place the pipe in the trench and then cover the pipe section with gravel or sand and fill in the ditch with the removed material. Additional gravel or sand will be transported to the excavator by a small rubber-tired or tracked vehicle.

This project element does not involve in-water work (except at Brooks Meadow crossing that is described in the project element below). At its closest point, this affected Riparian Reserve area is about 2.7 miles upstream of Listed Fish Habitat (LFH), and 3.3 miles upstream of CH, in Dog River.

Installation of a new pipeline outlet in the headwaters of SF Mill Creek has no possibility of affecting LFH because of the pronounced distance (>11 miles from pipeline outlet to LFH), and more significantly, the juxtaposition of an impoundment (28-acre Crow Creek reservoir/dam) that disconnects potential project impacts from LFH.

Installation of new pipeline adjacent to the existing pipeline does not involve any in-water work (except at Brooks Meadow crossing that is described in the project element below. Any potential overland erosion that may introduce suspended sediment to stream channels will not occur as there are PDCs that will be applied. The most pertinent one states, "Temporary Erosion Controls – Place sediment barriers prior to construction around sites where significant levels of erosion may enter the stream directly or through road ditches. Temporary erosion controls will be in place before any significant alteration of the action site and will be removed once the site has been stabilized following construction activities."

Due to this and other standard erosion control PDCs in place for this project, the probability that any fine sediment generated during pipeline placement traveling overland and reaching adjacent streams and LFH (2.7 miles downstream) is considered **discountable**.

Proposed Action - Installation of AOP and pipeline crossing at Brooks Meadow Creek

Instream excavation will be necessary to install the AOP at the current road ford crossing, as well as install the pipeline under the Brooks Meadows Creek channel.

The pipeline crossing is approximately 2.9 miles upstream of LFH on Dog River, with the AOP installation at approximately 3.0 miles upstream of LFH in Dog River. There is no hydrologic connection of this element to SF Mill Creek drainage.

Excavation work associated with installation of the AOP and the new pipeline at Brooks Meadow Creek could potentially introduce suspended sediment to the Brooks Meadow Creek stream channel. The installation of the AOP culvert as proposed will eliminate an active ford, thereby reducing potential turbidity and fine sediment at the site scale and benefitting resident fish species and habitat.

PDC will be applied that minimize sediment introduction to surface waters, including work area isolation during construction and timing during lowest flow period (ODFW in-water work window of July 15-August 31). Although PDC stipulate de-watering the culvert removal site during implementation, sediment will likely be mobilized and transported when the channel is re-watered post-construction, as well as during the first few significant precipitation events.

Silt, the sediment size most easily transported and that which usually results in turbid conditions, can be transported over a wide range of flows, even very low flows (Swanston 1991). However, the particles will settle where stream energy drops significantly such as behind obstructions. From 2010 to 2013, turbidity monitoring during all stream culvert removals and/or replacements on the Mt. Hood NF recorded that turbidity plumes were short lived and not visually detectable past 700' feet downstream of the worksite (MHNF, unpublished data as reported annually to NMFS and USFWS; NMFS 2013). Note that these observations were made mostly in anadromous streams that are larger than Dog River so in this smaller stream, most of the silt is not expected to be transported as far as in larger streams.

Turbidity decreases downstream from the source relatively rapidly both in space and time. A study on Idaho and Washington streams by Foltz et al. (2008) found that turbidity decreased by an order of magnitude within 328' of the source following culvert removal, and turbidity dropped to background levels within ½ mile on average. This distance is likely a much longer distance than what would occur in Dog River, as his study included 11 stream crossings, where 7 had no mitigation control in place (no de-watering of construction area and no restrictions on heavy equipment in live water). At the mitigated sites the turbidity and sediment yields directly below the road crossings were many orders of magnitude less than at unmitigated sites. At the three sites with mitigation the peak turbidity during construction (including channel re-watering) was 1,300 mg/L, compared with 9,900 and 22,000 mg/L at the two unmitigated sites.

In summary, the probability that fine sediment/turbidity will affect LFH in Dog River is **discountable** due to the following:

- Three years of formal monitoring of forest culvert installation and replacements show sediment/turbidity impacts to extend to a maximum of 700' downstream. Decades of on-site implementation monitoring observations is consistent with the formal monitoring results.
- Studies of culvert work, with much less mitigation controls in place, noted turbidity/sediment impacts up to 0.5 miles downstream. PDC will be applied at Brooks Meadow Creek sites to minimize sediment introduction to surface waters, including work area isolation during construction and construction timing during lowest flow period (ODFW in-water work window of July 15-August 31).

- LFH is ≥2.9 miles downstream of the instream culvert installation and pipeline crossing.

The installation of a new fish passable culvert at Brooks Meadow will have the long-term benefit of improving year-round resident fish passage and reducing sediment delivery downstream of the crossing. As a result, the culvert installation will have a beneficial effect to cutthroat trout over the long term.

Proposed Action - Installation of Fish Screen and Diversion/Outlet Structures

The diversion structure and fish screen are at RM 6.0 on Dog River; a distance of 3.4 miles upstream of LFH. The outlet structure is on SF Mill Creek, above Crow Creek Reservoir, and has no connection to LFH.

To minimize impacts to resident fish and habitat, fish screen installation and structure replacement activities are planned to be completed within the ODFW instream work period of July 15 to August 31. In order to reduce the potential for introduction of sediment into stream channels, streamflow will be diverted around work areas. Upon project completion, the construction site will slowly be re-watered to prevent loss of surface water downstream (as the construction site streambed absorbs water) and to prevent a sudden release of suspended sediment. Monitoring will be completed during re-watering to ensure no stranding of aquatic organisms occurs or excessive sediment is released below the construction site. These, along with other standard construction and erosion control PDC, will greatly reduce sediment/turbidity release into Dog River channel.

Sediment and/or turbidity levels will increase during re-watering and after the first few significant precipitation events post-construction. Turbidity monitoring of all 23 in-water aquatic restoration projects was completed on the Mt. Hood NF from 2010 to 2013. All projects followed pertinent PDC as required by the ESA consultation BO (NMFS 2013). Restoration projects were diverse in nature, and included culvert removal/replacement, large wood placement (via excavator and helicopter), side channel re-connection, and gravel/wood augmentation (downstream of dammed rivers). Monitoring showed that turbidity plumes were short lived and visually detectable from 25 to 1000 feet downstream of the worksite (MHNF, unpublished data as reported annually to NMFS and USFWS). In-stream wood placements via excavator (in live streams) were the type of project that generally created the longest turbidity plumes downstream.

The combination of construction and erosion-control PDCs, as well as the extended distance upstream (3.4 miles) from LFH, eliminates the likelihood of sediment/turbidity to affect LFH, and thus is **discountable** in effect.

The installation of a new fish screen at the diversion will reduce entrainment of fish during most of the year. As a result, the fish screen will have a beneficial effect to cutthroat trout over the long term.

Proposed Action - Temporary Staging Areas/Material Hauling

There are multiple staging areas identified for the construction period. None are in a Riparian Reserve. As there are no surface hydrologic connection to streams or other waterbodies (PDC A-5), the use of temporary staging areas will be **discountable** in sediment/turbidity effect to LFH.

Roads where equipment, materials, and gravel or log hauling will occur within the action area are located outside Riparian Reserves with 3 exceptions:

- The Dog River pipeline access road (Rd 1700-014 and 4400-011), which is within 100' of Dog River and Brooks Meadow Creek for about 815': This native surface pipeline access road has one stream crossing at Brooks Meadow Creek, which is about 3.0 miles upstream of LFH.
- The 1700 road at the Brooks Meadow Creek crossing: This paved road crossing is about 3.1 miles upstream of LFH. Roadsides are densely vegetated at this location. No maintenance will be needed for this road system as associated with this project.
- Oregon Highway 35 (over Dog River near the confluence of EFHR) and Road 4400 which crosses Dog River as well as several smaller streams: These road crossings do cross over LFH. Both roads are paved, have wide shoulders and good drainage. No maintenance will be needed for these road systems as associated with this project.

The haul on paved Oregon Highway 35, Road 44, and Road 1700, as well as the lack of associated road maintenance actions, will not cause any soil or instream disturbance that would lead to sediment/turbidity effects at the site scale nor at LFH (**discountable** effect).

The native surface Dog River pipeline access road (Rd 1700-014 and 4400-011) will have haul as well as associated road maintenance actions, which include:

- Cleaning of road cross drain culverts, sloping the road to drain, and/or install water bars to help drain surface and reduce sediment flows.
- Placing, rolling and compacting 3/4" (-) aggregate material 100' each direction of road crossing at Brooks Meadow Creek crossing to minimize the delivery of sediment erosion to the stream.
- (If road is to be used in the wet season) surfacing of road with 3" (-) aggregate or other surfacing material to minimize sediment flows.

Haul, and associated road maintenance, conducted further from stream channels than the closest drainage relief culvert is not expected to result in sediment increases in area streams because the drainage relief culverts empty onto well-vegetated areas that are not hydrologically connected to stream channels. The presence of well-vegetated buffers between cross drain culvert outlets and streams will be sufficient to halt overland erosion before it can enter streams. The Dog River access road has one short point of surface hydrologic connection to streams at the Brooks Meadow Creek crossing. The stream at this location is <1 cfs summer flow, with little annual variation due to its spring-fed source about 1 mile upstream.

Although the entire goal of road maintenance is to reduce sediment transport from existing conditions (including conversion of native road stream crossing to aggregate surface, installation of water bars to improve draining onto vegetated surfaces and the cleaning of road drain culverts), road maintenance activities do have the potential to increase short-term road crossing related erosion and sediment during rainfall events due to initial soil surface disturbance. Temporary Erosion Controls adjacent to the stream crossing and through road ditches will capture sediment before it enters the stream channel. Any turbidity created by road maintenance activities would most likely be washed from the road or ditch surface in the first few precipitation events immediately after work has been completed. These sporadic events may cause disturbed fine soil to be mobilized downstream and potentially into stream channels for a short time. Overall, road maintenance will have a **discountable** effect in sediment/turbidity to LFH.

Proposed Action - Pipeline Operations

The changes in pipeline operations (diversion flow timing and volume) does not involve any soil disturbance or instream alterations. This project element has no causal mechanism to affect sediment/turbidity, therefore, will have a **neutral** effect on this indicator.

Changes in pipeline operations (diversion flow timing and volume) from the diversion point to Crow Creek Reservoir has **neutral** possibility of affecting sediment/turbidity levels in LFH in SF Mill Creek because there are no proposed changes to operations downstream of the reservoir, which is 7 miles upstream of LFH.

Summary of Effects on: Sediment and Substrate Character

The proposed project will result in disturbed soil in localized areas that has the potential to enter stream channels; primarily associated with diversion structure replacement/fish screening, material hauling, road maintenance, and AOP installation. Sediment/turbidity levels may be detectable at the site scale within resident fish only streams but will be **discountable** at LFH due to multiple PDC that minimize sediment mobilization, as well as the pronounced distance ($\geq$2.9 miles) between instream work and LFH. Over the long term, the new culvert installation should result in reduced sediment delivery at the local scale.

3.4.2.3 Chemical Contamination/Nutrients

No Action

Currently, there are very low potential sources for chemical contamination in the Dog River and South Fork Mill Creek watersheds. Most of the upper action area is closed to entry within The Dalles Watershed Management Area. The rest of the area is largely commercial forest land, which also has seasonal recreation use. There is no agricultural or industrial land in the action area. Highway 44 is paved and as a result may contribute to vehicle related chemicals/pollutants at stream crossings over Dog River and Brooks Meadow Creek at the local scale but has not been identified as a process of concern. Oregon Highway 35 is the only (paved) road that crosses LFH. This road is designed to route road surface contaminants onto vegetated areas. Therefore, chemical contamination is not a process of concern in the action area.

Proposed action

Installation of new pipeline, AOP culvert placement, diversion structure/fish screen and outlet replacement all require heavy equipment that carry and use petrochemicals to work within resident fish stream channels. It is extremely unlikely that heavy equipment and haul vehicles will spill contaminants. Standard construction PDC are in place to ensure that materials for emergency hazardous materials control are onsite (e.g., silt fence, straw bales, oil-absorbing floating boom whenever surface water is present), as well as requiring all equipment used for instream work be cleaned for petroleum accumulations, and leaks repaired prior to entering the project area. Such equipment includes large machinery, stationary power equipment (e.g., generators, canes, etc.), and gas-powered equipment with tanks larger than five gallons.

Based on decades of staff experience that encompass tens of thousands of log truck loads hauled off the MHNF, as well as use of heavy equipment for in-stream restoration projects, there have been very few chemical spills ever noted. Log/rock/pipe hauling, and use of heavy equipment in-stream will have a **discountable** effect on chemical contamination in LFH and **may impact individuals and habitat** for resident fish.

Proposed Action - Pipeline Operations

Pipeline operations does not involve the use of any agricultural or industrial contaminants, nor involve use of nutrients, thus has no causal mechanism for contamination in resident trout habitat or in LFH – the effect is **neutral**.

Summary of Effects on Chemical Contamination/Nutrients

With PDC in place, the potential contaminants used as part of project implementation are not likely to enter the stream network. Therefore, there will be a discountable effect on the indicator in LFH/CH and may impact individual fish and habitat for resident fish.

3.4.2.4 Physical Barriers

No Action

Currently, there are numerous natural barriers (steep gradients and waterfalls) in both the Dog River Watersheds and Mill Creek. As previously described, these waterfalls act as upstream migration barriers to anadromous fish. There are no anthropogenic barriers to ESA listed fish in the action area. However, there are several anthropogenic barriers to resident trout migration in the action area. The Dog River diversion structure at RM 6.1 is almost a complete barrier to upstream migration but does allow for downstream fish passage during higher flow periods. The culvert that passes Dog River under USFS Road 17 is classified as a year-round migration barrier. And two culverts on Brooks Meadows Creek are barriers (USFS 1710 Road crossing and USFS 4400 – 014). Wicks Reservoir acts as an upstream barrier to resident fish in Mill Creek. Under the No Action alternative, there would be no change to listed fish or resident trout migration in the action area.

Proposed Action – Installation of AOP Culvert

None of the action elements are located in LFH stream channels thus there is no causal mechanism to affect this indicator. The project activities neither correct nor create any fish passage barriers for ESA-Listed Species, although resident cutthroat trout will **benefit** locally from fish screening of the Dog River diversion structure and replacement of a ford crossing with an AOP culvert in Brooks Meadow Creek. All projects elements have a **neutral** effect to LFH for this indicator within the action area.

Proposed Action – Installation of Fish Screens & Diversion Outlet Structure

None of these action elements are located in LFH stream channels thus there is no causal mechanism to affect this indicator. Installation of fish screens at the outlet structure does prevent resident trout from being entrained into the pipeline during most of the year. However, since the fish screens may not operate in winter, resident trout will likely still be entrained during that time. These project elements neither correct nor create any fish passage barriers for ESA-Listed Species but resident cutthroat trout will benefit from better fish screening of the Dog River diversion structure. All projects elements will have **No Effect** to LFH for this indicator within the action area and a neutral effect to resident trout.

Proposed Action – Abandonment of Pipeline and Temporary Staging

None of these action elements are located in LFH stream channels thus there is no causal mechanism to affect this indicator. These action elements have no causal mechanism to create passage barriers for resident trout. All project elements will have **No effect** to LFH or resident trout for this indicator within the action area.

Summary of Effects on Physical Barriers

Under the proposed action alternative resident fish would benefit slightly from improved passage at Brooks Meadow Creek and reduced entrainment into the pipeline. There would be no change in the proposed or no action to LFH/CH. Therefore, there will be a **neutral effect** on the indicator in LFH/CH.

3.4.2.5 Large Woody Debris, Pool Frequency & Quality/Large Pools, Off-channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, and Streambank Condition

These habitat indicators are grouped together in this effects analysis because they are interrelated, and in this action area these indicators are often linked with the amount of in-channel and floodplain large wood.

No Action

Large wood recruitment potential would not be affected under the No Action alternative in any of the action area. Almost all the action area streams are very close to meeting AP standard for >20 pieces per mile and recruitment potential along nearly the entire length of Dog River will remain high. In the South Fork Mill Creek subwatershed, large wood recruitment along riparian corridors is also good. These stream reaches are all within The Dalles Watershed Management Unit and located on lands administered by the Forest Service downstream to Crow Creek Reservoir. Within the pipeline right of way, trees will continue to be removed as needed to maintain the integrity of the pipeline.

Under the No Action Alternative, diversion from Dog River and storage and release in Crow Creek Reservoir would continue to modify the flow regime in the Dog River and South Fork Mill Creek subwatersheds.

In Dog River, changes to channel forming processes related to modified streamflow would continue to mostly affect Reaches 1, 2, and the lower segment of 3. Effects would be greatest in the lower segment of Reach 3 immediately below the diversion because it would continue to be partially dewatered for a half-mile downstream to Cooks Meadow in the summer and early fall months. The overall reduction in average annual flow and the absence of base flows in this reach would continue to be the cause for the decline of pool depth and quality, a decrease of the width-to-depth ratio, and a reduced wetted perimeter.

In SF Mill Creek, elevated average base and peak flows will continue to increase water velocity seasonally and gradually deepen entrenchment. Width-to-depth ratios could be expected to slowly decrease, and the wetted perimeter enlarge. The short segments of channel where unstable and undercut streambanks were observed in Reaches 1 and 2 could progressively expand. For these reasons, pool abundance and quality would remain low. Most of the segments in each of these reaches would continue to be fast flowing, and not conducive to pool formation.

Off-channel habitat and floodplain connectivity will remain unchanged under the no action alternative largely due to the confined valley form and steep gradients that exist in Dog River and the moderately confined valley form of SF Mill Creek. Highway 35 will continue to constrict Dog River's floodplain at its confluence with the East Fork Hood River.

Proposed Action - Abandonment of Old Pipeline/Installation of New Pipeline

Approximately 600 existing trees will be removed along approximately 1,500 feet of the pipeline corridor in relatively close proximity to aquatic habitat; however, this portion of the pipeline route is not near LFH, therefore, the action will have a **discountable** effect on LFH and minor, site scale effect on resident fish habitat. No construction activities will be close enough to Dog River to affect stream channel characteristics.

Proposed Action - Installation of AOP and Pipeline Crossing at Brooks Meadow Creek

Brooks Meadow Creek will be temporarily dammed during the low-flow summer period and the water will be re-routed around the work area as the pipe is being installed. The pipe will be laid under the creek channel and the creek channel will be rehabilitated back to existing channel conditions to the degree possible. A temporary culvert at the existing crossing could be installed during construction and removed after completion of the project. The installation of a new AOP at Brooks Meadow Creek should improve channel process in the short segment below the road. Erosion will be reduced which should improve pool formation and function; flow will no longer go overland providing for improved channeling forming processes immediately downstream.

Installation of the AOP and burial of the pipeline will be conducted in areas previously disturbed by a road crossing (ford) and previous pipeline burial. None of the action elements are located in LFH stream channels therefore, the action will have a **discountable** effect on LFH and minor, site scale effect on resident fish habitat.

Proposed Action - Installation of Fish Screen and Diversion/Outlet Structures

The new diversion/outlet structures and the fish screen will be constructed in approximately the same locations as the existing structures; however, these structures are not located in or near LFH/CH. Instream work associated with fish screen and diversion/outlet structures will not affect channel characteristics in the immediate area or in downstream LFH, therefore the effect will be **neutral** and no further analysis is necessary. PDC and BMPs will greatly minimize the amount sediment entering Dog River and South Fork Mill Creek during construction of these instream structures. Sediment from this element will have an **insignificant** effect on turbidity and fine sediment levels in LFH and minor, site scale effect on resident fish habitat during project implementation but should result in benefits to resident over the long-term.

Proposed Action - Temporary Staging Areas/Materials Hauling

Road crossings and landing areas that may affect instream habitat elements are located at least 0.2 miles from LFH/CH and as a result will have a **discountable** effect on LFH but could result in minor, site scale effects to resident fish habitat.

Fine sediment generated from hauling traffic will increase in action area streams at road crossings. Most of this sediment will disperse and settle before reaching LFH; however, some will eventually make its way into LFH. As in upper stream reaches this fine sediment will be deposited in slow water habitats, primarily pools and stream margins. The small amount of fine sediment reaching LFH would be immeasurable against background levels, thus sediment deposition in pools will have a **discountable** effect on pool quantity and quality, and the number of large pools will remain the same. Similarly, sediment deposition will have a **discountable** effect on stream width to depth ratio and habitat refugia due to the small amount of sediment deposited.

Proposed Action - Pipeline Operations

In the Dog River sub-watershed, channel characteristics would continue to be altered by the modified flow regime. Winter and summer flows would continue to be affected most. Early and mid-winter flows would be attenuated which could alter the redistribution of substrate and subsequent re-working of the channel configuration, potentially reducing pool depth, LWD density, and habitat heterogeneity (Poff et al. 1997).

Elevated flows diverted into South Fork Mill Creek from Dog River have the potential to alter stream channel habitat indicators; however, it is unlikely that volumes entering the pipeline will exceed current volumes. Pipeline operations will manage diverted flows so that the erosive effects to the channel from

high magnitude surges of water will be minimized. Changes in pipeline operations from the diversion point to Crow Creek Reservoir has **neutral** possibility of affecting LFH in SF Mill Creek because there are no proposed changes to operations downstream of the reservoir, which is 7 miles upstream of LFH.

The proposed action will divert the same amount of flow November to July, while leaving more instream flow (minimum 0.5 cfs) from August through October than current conditions. As flow diversion will be the same or lesser in amount, the transport of large wood, and the maintenance/creation of pools and other habitat features will be maintained. The increase in instream flows at the diversion point (RM 6) from August to October may have the potential to have slight **positive (beneficial)** effects to pool volume in LFH (RM 2.6) during this typical low-flow period in Dog River.

Summary of Effects on Large Woody Debris, Pool Frequency & Quality/Large Pools, Off-channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, and Streambank Condition

Overall, the Dog River Pipeline Project construction elements will result in **discountable** effects to channel habitat indicators as described above. Disturbance is small in scale (<1 acre) and > 2 miles from LFH. The proposed action includes diversion of the same amount of flow (all available surface water) from November to July, while leaving more instream flow (0.5 cfs) from August through October than current conditions. As flow diversion will be the same or lesser in amount, the transport of large wood, and the maintenance/creation of pools and other habitat features will be maintained. The increase in instream flows at the diversion point (RM 6) from August to October may have the potential to have slight **positive** effects to pool volume in LFH (RM 2.6) during this typical low-flow period in Dog River.

3.4.2.6 Change in Peak/Base Flows

No Action

Under the No Action Alternative, diversion from Dog River and storage and release in Crow Creek Reservoir would continue to modify the flow regime in the Dog River and South Fork Mill Creek subwatersheds.

In South Fork Mill Creek mid- and early winter flows, spring flows, and summer flows would continue to be affected most. Direct access to the main channel of South Fork Mill Creek would remain limited and human perturbation other than water management would be low. Average peak flows in early and mid-winter would remain elevated above naturalized levels due to contributions from diversion. Below the dam, they would be reduced due to the filling of the reservoir and retention for storage. Average spring peak flows would remain higher than naturalized above and below the dam because of diversion contributions and spill combined with release. Base flows above and below the dam would also remain elevated above naturalized levels due to contributions from diversion and releases downstream. Changes in habitat quality would continue to have a slightly negative effect on resident trout habitat process and No Effect or Neutral on LFH/CH.

In Dog River, effects to streamflow from pipeline diversion would continue to be greatest during the late summer and early fall when flows are lowest, and nearly 100 percent of upper Dog River is diverted into the pipeline. During this time, the lowest eighth of a mile segment of Reach 3 below the pipeline diversion would continue to be partially dewatered reducing the quantity of available habitat to resident trout and aquatic macroinvertebrates. Instream flows to this segment would continue to be restored naturally just downstream by springs, seeps, and hyporheic flow. Reaches 1 and 2 of Dog River would remain a perennial stream type. Impacts to LFH/CH in reach 1 would continue to be negligible

Proposed Action - Abandonment of Old Pipeline/Installation of New Pipeline

Pipeline operations is the primary project element affecting potential changes in peak/base flows. Pipeline abandonment and installation of the new pipeline will not affect existing conditions because it will be necessary to maintain diversion of water through a temporary pipe while the new pipeline is under construction. The same is true for installation of the AOP and installation of the new pipeline at Brooks Meadow Creek. Flows will be maintained and diverted during construction activities for all related project structures (Hydrologist Specialist Report).

The abandonment and installation of the new pipeline will have a **neutral** effect on LFH/CH since flows will be maintained during construction through a temporary bypass pipe. The removal of trees and the resultant reduction in canopy cover to install the new pipeline and maintain a service road has the potential to indirectly influence peak/base flows. A reduction in canopy cover can alter the volume and timing of stream flow due to reduced evapotranspiration rate and increased snow accumulation. Temporary staging areas and haul routes are largely in previously disturbed areas and no overstory trees are expected to need removal. This element has no causal mechanism (**neutral**) to affect changes to peak or base flows.

The abandonment and installation of the new pipeline would remove trees from around 11 acres in total, with the vast majority (9.7 acres) in the Dog River subwatershed. This accounts for around 0.1 % of watershed in Dog River subwatershed and 0.01% of the South Fork Mill Creek subwatershed. Given the high canopy cover and low level of disturbance in the current action area, it is unlikely (**discountable effects**) that the action area will experience increased base flow or modified peak flows due to the extremely minor acreage of forest canopy removal to install the new pipeline and maintain a service road.

Proposed Action - Installation of AOP and pipeline crossing at Brooks Meadow Creek

Activities associated with the construction of the project have low potential to cause impacts to water quantity in Brooks Meadow Creek. The damming and diversion of Brooks Meadow Creek during the construction period may result in a temporary decrease in water quantity in the lowest reach of the creek and in Dog River while the AOP (culvert) is being installed; however, the decrease would be temporary and minimal. Additionally, a section of the creek may be transformed into a small reservoir (slower velocities, greater water depths, etc.) until the temporary dam is removed and the creek is routed through the new culvert under the access road.

Brooks Meadow Creek is not in close proximity to LFH or CH, therefore the temporary damming and diversion of the creek will not affect listed fish species. The existing ford of Brooks Meadow Creek is approximately 2.1 miles from the nearest LFH/CH. As a result of this proximity assessment, the effect of this action on peak/base flows is **neutral** and no further analysis is needed.

Proposed Action - Installation of Fish Screen and Diversion/Outlet Structures

This project element has no causal mechanism to affect this indicator as flows will be maintained during construction.

The proposed fish screen and diversion/outlet structures in Dog River and South Fork Mill Creek are not in close proximity to LFH or CH and existing flows will be maintained during construction activities, therefore these activities will not affect aquatic species or LFH/CH. As a result, the effect of these actions on peak/base flows are expected to be **neutral** and no further analysis is needed.

Proposed Action - Temporary Staging Areas/Materials Hauling

Temporary roads and material hauling will not occur in the proximity of LFH/CH therefore the effects of these activities on peak/base flows will be **neutral** and no further analysis is needed.

Proposed Action - Pipeline Operations

The Proposed Project will continue to divert flows from Dog River into South Fork Mill Creek for storage in Crow Creek Reservoir. A portion of the river's flow will be diverted by the pipeline throughout the year, thus altering both peak and base flow. The effects of diversion on peak flows would continue to be greatest during the late fall and early winter months when Crow Creek Reservoir is filling. Diversion will decrease the overall magnitude of mean daily peak flows in Dog River during that time. Data indicate it could be by as much as 70 percent in a year when total fall/winter precipitation is below normal. The majority of peak runoff however, which occurs in the spring, would not be expected to be attenuated nearly to that degree. This is because in most years, Crow Creek Reservoir would be filled by early to mid-February. Typically, the majority of the spring freshet would not be diverted, and would pass downstream to lower Dog River (Hydrology Specialist Report). Summer base flows in Dog River would increase compared to existing conditions as a result of the required minimum in-stream flow of the 0.5 cfs from August 1 to October 31. The majority of the Dog River flow (~80%–83%) would still be diverted from the channel during these low-flow periods. The greatest potential for impacts to water quantity would be within Reach 3 of Dog River immediately downstream of the intake; however, inputs from hyporheic flow and perennial tributaries (such as Brooks Meadow Creek) that enter Dog River shortly downstream of the diversion will help recover its surface flow.

The replacement of the Dog River pipeline will have low potential for short- and long-term impacts to peak/base flows in the Dog River and South Fork Mill Creek watersheds.

During high flow periods (winter and spring) pipeline operations will have the potential to decrease water quantity in Dog River because of the expanded capacity of the replacement pipeline (24-inch diameter) to divert additional water. This expanded capacity will allow The Dalles to fill Crow Creek Reservoir faster by diverting a greater proportion of peak flows when they are available. Once the Reservoir is filled, the amount of diverted flow will be decreased. Pipeline diversions during high-flow periods will decrease the magnitude of peak flows in the river, since up to 26.3 cfs (73% of the estimated D5 flow of 35.9 cfs) (USGS 2017) could be diverted. The diversion capacity of the replacement pipeline will be greater than the average monthly flow in May (15.6 cfs) and June (18.2 cfs) in Dog River upstream of the diversion (MHNF 2017a), therefore the pipeline will only be filled during peak runoff events. USGS streamflow records from 1960–1971 indicate that Dog River flows at the site of the diversion may reach 26.3 cfs or greater in 2 of every 3 years; however, the duration of those peak flows will be minimal. The potential to divert the entirety of spring runoff flows into the pipeline will generally be constrained by flow availability (peak flows may only last a matter of hours or days) and Crow Creek Reservoir storage capacity. It is expected that the diversion schedule will be similar to the existing schedule although the larger replacement pipeline will be filled to capacity less frequently, due to the larger capacity of the replacement pipeline.

Changes in flows to Reaches 1–3 downstream of the diversion have the potential to be greater than those associated with existing conditions because of the increased capacity of the replacement pipeline. However, the existing pipeline is rarely filled to capacity due to lack of flow in Dog River and/or Crow Creek Reservoir storage capacity.

The Dog River pipeline inlet (Lat/Long is: N 45 24.454 W 121 31.156) is located at about river mile (RM) 6.0 in Dog River, or about 0.5 RM upstream of the Forest Service Rd 4400 in the Dog River 6th field subwatershed of the East Fork Hood River 5th field watershed. The Dog River pipeline outlet (Lat/Long is: N 45 25.904 W 121 31.2544,054) flows into the South Fork Mill Creek at about RM 15.5.

South Fork Mill Creek is the primary drainage in the South Fork Mill Creek 6th field subwatershed of the Mill Creek 5th field watershed. Only the lower reaches (reaches 1 and 2) of Dog River is in proximity to LFH and critical habitat. Effects to LFH in this reach are likely to be **discountable** because input from hyporheic flow and perennial tributaries such as Brooks Meadow Creek that enter Dog River shortly downstream of the diversion will help recover surface flow diverted through the pipeline.

The probability of affecting seasonal peak and base flows in LFH/CH within the action area is not discountable. The slight negative effect from this project element is **insignificant** in magnitude and presents no measurable risk to listed species or habitat.

The potential for effects to the quantity of water in South Fork Mill Creek will be low under the Proposed Action although peak flows will have the potential to increase from 12.3 to 26.3 cfs (a 114% increase) with the expanded pipeline capacity. Despite the increased pipeline capacity, the frequency with which the pipeline will be filled to capacity will be low due to the lack of available Dog River flow and Crow Creek Reservoir storage capacity limitations. Additionally, habitat impacts from higher magnitude surges during peak flows will be minimized through management of pipeline operations.

The Dog River replacement pipeline will have low potential for short- and long-term impacts to peak/base flows within the Dog River watershed. A portion of the river's flow will be diverted by the pipeline throughout the year, thus reducing water quantity; although the severity of impacts will vary seasonally and will only change from the existing condition during August 1 to October 31 due to the inclusion of a Project Design Criterion that will require a minimum in-stream flow of 0.5 cfs to be left in the river during that period. The flow in Dog River during these months would increase thus reducing the magnitude of water quantity effects. The majority of the Dog River flow (~80%–83%) will still be diverted from the channel during this low-flow period. The only potential for water quantity impacts to LFH will be within Reach 1where listed species may be present; however, inputs from hyporheic flow and perennial tributaries (such as Brooks Meadow Creek) that enter the river shortly downstream of the diversion will help to recover surface flow in this lower reach. Installation of a new pipeline would eradicate the water loss that has persisted for many decades from the old conveyance line. The total amount of water loss would no longer factor into the amount of water diverted from Dog River to meet demand. Conveyance of water using the new pipeline would become more efficient, so that only the water needed to meet demand would be withdrawn. The amount of unused water diverted from Dog River could be minimized. Since operations that manage the timing and amount of water diverted from Dog River would change little under the Proposed Action, the amount of water loss due to leakage could become available as bypass flow downstream, or to fill Crow Creek Reservoir earlier in the winter and maintain its surface elevation longer into the spring. The water that was lost to leakage during base flows, would be available for maintaining at least 0.5 cfs bypass flow downstream to lower Dog River from August 1 to October 31.

During high flow periods (winter and spring) the Project has the potential to decrease water quantity in Dog River due to the expanded capacity of the replacement pipeline (24-inch diameter) to divert additional water. This expanded capacity will allow The Dalles to fill Crow Creek Reservoir faster by diverting a greater proportion of peak flows when they are available. Once the Reservoir is filled, the amount of diverted flow will be decreased. Pipeline diversions during high-flow periods will decrease the magnitude of peak flows in the river, by as much as 26.3 cfs (73% of the estimated D5 flow of 35.9 cfs) (USGS 2017). The diversion capacity of the replacement pipeline will be greater than the average monthly flow in May (15.6 cfs) and June (18.2 cfs) in Dog River just upstream of the diversion (MHNF 2017b), and therefore the pipeline could only be filled during peak runoff events. USGS streamflow records from 1960–1971 indicate that Dog River flows at the site of the diversion may reach 26.3 cfs or greater in 2 of every 3 years; however, the duration of those peak flows may be minimal. It is expected that the diversion schedule under the Proposed Action will be similar to existing volumes, although the

larger replacement pipeline will be filled to capacity less frequently, due to the larger capacity of the replacement pipeline.

Effects to Reaches downstream of the diversion have the potential to be greater than those associated with existing conditions due to the increased capacity of the replacement pipeline. However, the existing pipeline is rarely filled to capacity due to lack of flow in Dog River and/or Crow Creek Reservoir storage capacity.

Summary of Effects on Peak/Base Flows

Installation of AOP and pipeline crossing at Brooks Meadow Creek, and installation of fish screen and diversion/outlet structures has no causal mechanism to affect this indicator (**neutral**) since baseline flows will be maintained during and post construction, and no removal of trees will occur. A reduction in canopy cover can alter the volume and timing of stream flow due to reduced evapotranspiration rate and increased snow accumulation. Temporary staging areas and haul routes are largely in previously disturbed areas and no overstory trees are expected to need removal. This element also has no causal mechanism (**neutral**) to affect changes to peak or base flows.

There are no proposed changes to operations downstream of Crow Creek Reservoir, which is 7 miles upstream of LFH, thus there is **neutral** possibility of affecting baseline peak/base flow levels in LFH in SF Mill Creek.

The larger Dog River diversion pipe capacity may allow larger flow volume to be captured opportunistically from episodic storm events from November-February over the current 12.3 cfs, and these short-term events may allow reservoir fill at a few days (to weeks) earlier than current rate. The quantity of water diverted from upper Dog River and its tributaries would remain largely unchanged from current conditions between early November and July, thus there will be **discountable** effects to peak flows in Dog River. The change in pipeline operations to maintain at least 0.5 cfs bypass flow at the diversion point from August 1 to October 31 is expected to result in a slight increase in base flow in LFH that is 3.4 miles downstream. Overall, there may be a slight **positive** effect from this project element at LFH from the increased base flow volume as compared to baseline (no bypass flows at diversion point). This is expected to benefit Coho and Chinook spawning habitat, as well as slightly increase rearing habitat (pool depth) for steelhead, Coho and Chinook juveniles.

3.4.2.7 Effects Determination

Determinations for the proposed action were made as a result of analysis at the 6th-field watershed scale. The checklist for Documenting Environmental Baseline and Effects of Proposed Action(s) on Relevant Indicators was consulted for this project and a cumulative effects analysis was completed. Potential effects to steelhead trout, Chinook salmon, Coho salmon, and resident cutthroat and rainbow trout using a habitat approach is summarized below (Table 55). The AP provides a dichotomous key which is utilized to reach the appropriate ESA effect determination (Table 56).

Potential effects to water quality or habitat resulting from the project will be substantially diminished and immeasurable by the time they reach known occurrence of LCR chinook, Coho, and steelhead therefore the effects will be discountable and the determination **Not Likely to Adversely Affect (NLAA)**. Under the proposed project there will be **No Effect (NE)** to Middle Columbia River (MCR) steelhead and their critical habitat since they are not known to occur within the project action area.

The Magnuson-Stevens Fishery Conservation and Management Act (amended 1996) required designation of Essential Fish Habitat (EFH) for Chinook and Coho salmon. The Dog River and East Fork Hood River Basins (HUC 17070105) are designated as Chinook and Coho salmon EFH. Although both species have been documented in the EFHR and lower Dog River, EFH would not be adversely affected (NAA) by the

project since project effects will be ameliorated within the distance from the intake structure downstream to their known occurrence.

Coastal cutthroat trout and Dalles Juga are present in the project area where in-water activities will occur. The project **may impact coastal cutthroat trout and Dalles Juga individuals or habitat (MIIH).** However, project actions will not likely contribute to a trend towards federal listing since fish present in the immediate area will be relocated prior to in-water work as per project PDCs and BMPs. Impacts are expected to be minimal and localized. The project will likely benefit cutthroat trout by providing additional bypass flow during the typical low flow period (August 1to October 31) in Dog River downstream of the intake structure.

Pacific lamprey is thought to be present only in the lower reach of Dog River and the South Fork of Mill Creek although its presence has not been documented. Upper limits for Pacific lamprey in South Fork Mill Creek is likely Mill Creek falls at RM 3.0 and lower Dog River below Dog River falls. The project **may impact pacific lamprey individuals or habitat (MIIH).**

Inland redband trout may be present in the North Fork Mill and South Fork Mill Creek 6th field subwatershed but are not present in the project area or action area. Salmonids in South Fork Mill Creek above Mill Creek Falls are cutthroat trout (USFS, 2000). For this analysis, resident inland redband trout distribution is assumed to be the same as MCR steelhead distribution, therefore the effects determination is no impact.

Table 55. Summary of effects of project elements on aquatic habitat indicators.

Indicator	Element Summary						Indicator Summary
	Action Area Baseline Condition	**Pipeline Abandon/ Installation**	**AOP**	**Fish Screen/ Inlet/ Outlet**	**Roads/ Material Hauling**	**Pipeline Ops.**	
Temperature	PF	D	D	N	D	D	D
Sediment and Substrate Character	PF – Dog River FAR – SF Mill	D	D	D	D	N	D
Chemicals/Nutrients	PF	D	D	D	D	N	D
Physical Barriers	PF	N	N	N	N	N	N
Large Woody Debris	FAR	D	D	N	D	B	D
Pool Frequency and Quality, Large Pools	FAR	D	D	N	D	B	D
Off-channel Habitat, Floodplain Connectivity	FAR	D	D	N	D	B	D
Refugia	FAR	D	D	N	D	B	D
Width to Depth Ratio	FAR	D	D	N	D	B	D
Streambank Condition	PF	D	D	N	D	B	D
Change in Peak/Base Flows	FAR	D	N	N	D	D for Peak B for Base	D

Table key:

PF	Properly functioning	N	Neutral
FAR	Functioning at risk	D	Discountable
NPF	Not properly functioning	I	Insignificant
		B	Beneficial

Table 56. Analytical process project effects determination key for species and designated critical habitat

1) Do any of the indicator summaries have a positive or negative conclusion?		
	X	Yes - Go to 2
		No – No Effect
2) Are the indicator summary results only positive?		
		Yes – NLAA
	X	No – Go to 3
3) If any of the indicator summary results are negative, are the effects insignificant or Discountable?		
	X	Yes – NLAA
		No – LAA, fill out Adverse Effects Form

This project was designed to minimize negative effects to aquatic habitat, water quality, and ESA listed fish species and sensitive aquatic species through PDCs, while still meeting the resource objectives identified in the proposed action.

This project is located in relatively close proximity to habitat utilized by summer steelhead, spring Chinook and Coho salmon so land management actions are often likely to expose fish to negative effects. However, the implementation of this project will not likely result in negative effects of measurable

magnitude to any of the habitat or population indicators. Direct take to any listed fish in the action area will not occur under implementation of any project element.

Table 57. The Dog River Pipeline Project effects determination summary for ESA listed species, designated critical habitat and essential habitat, and Region 6 Regional Forester's Sensitive Species.

Listed Species Or Habitat	**ESA Status**	**ESA / EFH ESA/EFH Determination**	
		No Action	**Proposed Action**
Lower Columbia River Chinook Salmon – Critical Habitat	Designated	May Affect, Not Likely to Adversely Affect	**May Affect, Not Likely to Adversely Affect**
Lower Columbia River Chinook Salmon – Essential Habitat	Designated	Not Adversely Affected	**Not Adversely Affected**
Lower Columbia River Coho Salmon – ESU	Threatened	May Affect, Not Likely to Adversely Affect	**May Affect, Not Likely to Adversely Affect**
Lower Columbia River Coho Salmon – Critical Habitat	Designated	May Affect, Not Likely to Adversely Affect	**May Affect, Not Likely to Adversely Affect**
Lower Columbia River Coho Salmon – Essential Habitat	Designated	Not Adversely Affected	**Not Adversely Affected**
Lower Columbia River Steelhead Trout – ESU	Threatened	May Affect, Not Likely to Adversely Affect	**May Affect, Not Likely to Adversely Affect**
Lower Columbia River Steelhead Trout – Critical Habitat	**Designated**	**May Affect, Not Likely to Adversely Affect**	**May Affect, Not Likely to Adversely Affect**

Region 6 Sensitive Aquatic Species	**Location**	**No Action**	**Proposed Action**
Pacific Lamprey	Dog River, Mill Creek	May Impact Individuals or Habitat	**May Impact Individuals or Habitat**
Cutthroat Trout	Dog River, Mill Creek	May Impact Individuals or Habitat	**May Impact Individuals or Habitat**
Dalles Juga	Mill Creek	May Impact Individuals or Habitat	**May Impact Individuals or Habitat**
Rocky Mountain Duskysnail	Dog River, Mill Creek	May Impact Individuals or Habitat	May Impact Individuals or Habitat

3.4.2.8 Cumulative Effects

Cumulative effects include the effects of past, present, and reasonably foreseeable future state, tribal, local or private actions that overlap in time and space within the action area (i.e., affected environment) of the Federal action subject to consultations (50 CFR 402.02). The "reasonably foreseeable" clause is a key factor in assessing and applying cumulative effects and could include actions that are permitted, imminent, have an obligation of venture, or have initiated contracts (U.S. Fish and Wildlife Service and NOAA Fisheries 1998). Past and present impacts are incorporated as part of the environmental baseline and discussed below.

Only those indicators that are affected by the project are included in the cumulative effects analysis; if the action has no direct/indirect effects there would be no cumulative effects. The spatial context for the

following cumulative effects analysis is the action area as described previously. Project activities occurring outside this area may have an effect on aquatic species and/or habitat but would not add to those effects from project activities proposed in this environmental assessment. The temporal context depends on the existing or future project/activity. If there is an overlap in time from an effects perspective, then it is included.

Cumulative effects from an aquatic species and habitat perspective overlap considerably with water quality (peak/base flows, sediment) cumulative effects because most of the attributes analyzed by the hydrologist are directly related to aquatic habitat conditions.

Table 58. Summary of past, present, and reasonably foreseeable future actions which may contribute to cumulative effects to aquatic fauna and habitat for the no action and proposed action alternatives

Project	Potential Effects	Overlap in time	Overlap in space	Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Stream Habitat Effects
Existing Old Forest Service Timber Harvest Units	Large Wood Recruitment Potential; Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank Condition.	Yes	Yes	Not Likely	Projects completed. Removing large wood from stream channels was a common practice into the 1970's thus the amount of large wood in many streams within the action area have less large wood than historic conditions. None of the actions proposed in this EA would directly reduce existing levels of large wood in any stream. Indirect effects, associated with slight reductions in large wood recruitment potential, could result in localized reduction in recruitment along the Dog River pipeline corridor north of the 44 road and along a localized area on Brooks Meadow Creek that is adjacent to the pipeline corridor. This may result in a small decrease in large wood recruitment and thus less in stream wood for the next 50 years or more within those reaches.	All the habitat indicators for this project were either discountable, neutral, or insignificant. Some impact is possible in terms of rearing habitat to resident salmonids in reaches adjacent to the pipeline in Dog River and Brooks Meadow Creek. There would be no discernible impact downstream where ESA aquatic species and CH occurs.

Existing Old Forest Service Timber Harvest Units	Stream Temp	Yes	Yes	Not likely	After field validation of stream habitat in the action area, PDCs were developed by the inter-disciplinary team to minimize water quality impacts, including any from reduction of shade that may affect stream temperature. Some minor shade reduction may occur on perennial resident fish-only streams within the action area, but effects will be discountable at LFH due to the combination of pronounced distance (>2.5 miles), existing cold year-round temperature baseline, cold spring influence (4.5-10ºC summer contribution) from multiple tributaries downstream of the action, a retention of 0.5 cfs minimum instream flow during August -October, and the small fraction (~900') of canopy reduction as compared to intact riparian area in almost all of the action area.	All the habitat indicators for this project were either discountable, neutral, or insignificant. There is the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale but those will be limited to isolated locations (such as road crossings) that would have no causal relationship to accumulate measurable effects. There would be no discernible impact downstream where ESA aquatic species and CH occurs.
	Altered Peak/Base Flows	No	Yes	Not Likely	A reduction in forest canopy cover can alter the volume and timing of stream flow due to reduced evapotranspiration rate and increased snow accumulation. The quantity of water diverted from upper Dog River and its tributaries would remain unchanged from current conditions between early November and July, thus there will be **discountable** effects to peak flows in Dog River. The change in pipeline operations to maintain at least 0.5 cfs bypass flow at the diversion point from August 1 to October 31 is expected to result in a slight increase in base	Overall, there may be a slight **positive** effect from this project element below the diversion and at downstream in LFH from the increased base flow volume as compared to baseline (no bypass flows at diversion point). This is expected to have a slight benefit to resident trout individuals and their habitat as well as Coho and Chinook spawning habitat, as well as slightly increase rearing habitat (pool

					flow in LFH that is 3.4 miles downstream. There are no proposed changes to operations downstream of Crow Creek Reservoir, which is 7 miles upstream of LFH, thus there is **neutral** possibility of affecting baseline peak/base flow levels in LFH in SF Mill Creek.	depth) for steelhead, Coho and Chinook juveniles.
Existing Old Forest Service Timber Harvest Units	Sediment	Yes	Yes	No	The proposed project will result in disturbed soil in localized areas that has the potential to enter stream channels; primarily associated with diversion structure replacement/fish screening, material hauling, road maintenance, and AOP installation. Sediment/turbidity levels may be detectable at the site scale within resident fish only streams, but will be discountable at LFH due to multiple PDCs that minimize sediment mobilization, as well as the pronounced distance (>2.9 miles) between instream work and LFH.	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects from turbidity and fine sediment levels in LFH were insignificant due to the extended distance (≥2.9 miles) of the project to LFH. There is the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale but those will be limited to isolated locations (such as road crossings) that would have no causal relationship to accumulate measurable effects. The installation of the AOP culvert as proposed will eliminate an active ford crossing thereby reducing potential turbidity and fine sediment at the site scale that will benefit resident

						fish species and habitat.
Timber harvests on federal, county and private lands including associated road/ landing construc-tion	Large Wood Recruitment Potential, Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank Condition. Change in Peak/Base Flows, Sediment	No	Yes	Not Likely	Projects completed. Although most previous timber harvest occurred decades ago riparian stands were treated more aggressively in many areas than current practices and thus the amount of standing wood remaining was less than desired conditions. These areas are still recovering (trees are still growing) and those less 40 years old in particular have yet to grow to a size where they would contribute meaningfully to riparian/stream habitat even if they were to fall. The riparian tree removal proposed in this EA would increase the riparian area that would not contribute as much large wood compared to no action.	Minimal cumulative effect throughout action area because the reduction in large wood recruitment potential resulting from proposed project would be quite small (less than 1 percent of Riparian Reserves affected). This reduction in large wood potential would not directly affect aquatic fauna or habitat; indirect effects could result in localized reductions in in-stream large wood and pool habitat quality and quantity.
Polallie Cooper Fuels Reduction Project	Large Wood Recruitment Potential, Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank	Yes	Yes	Not Likely	An overlap in time and location may exist with other timber management on USFS managed land. There are PDC's in place that prevent measurable effects to the habitat indicators described above. Private and/or County timber activities in the Dog River and SF Mill Creek watersheds are limited in location and scale as the majority of both watersheds are federally managed. Therefore, the potential	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during

	Condition. Sediment				for effects to habitat indicators resulting from non-federal timber management are likely immeasurable at the 6th field scale.	project implementation at the site scale. Timber harvest activities within the Dog River and Mill Creek watershed could result in some direct localized effects to resident trout and aquatic mollusks but will be limited to isolated locations (such as road crossings) that would have no causal relationship to accumulate measurable effects.
	Altered Peak and/or Base Flows	Yes	Yes	Not Likely	A reduction in forest canopy cover can alter the volume and timing of stream flow due to reduced evapotranspiration rate and increased snow accumulation. The quantity of water diverted from upper Dog River and its tributaries would remain unchanged from current conditions between early November and July, thus there will be **discountable** effects to peak flows in Dog River. The change in pipeline operations to maintain at least 0.5 cfs bypass flow at the diversion point from August 1 to October 31 is expected to result in a slight increase in base flow in LFH that is 3.4 miles downstream. There are no proposed changes to operations downstream of Crow Creek Reservoir, which is 7 miles upstream of LFH, thus there is **neutral** possibility of affecting baseline peak/base flow levels in LFH in SF Mill Creek.	Overall, there may be a slight **positive** effect from this project element below the diversion and at downstream in LFH from the increased base flow volume as compared to baseline (no bypass flows at diversion point). This is expected to have a slight benefit to resident trout individuals and their habitat as well as Coho and Chinook spawning habitat, as well as slightly increase rearing habitat (pool depth) for steelhead, Coho and Chinook juveniles.

Forest Service Road 4400 Hazard tree Removal	Large Woody Debris Recruitment Potential, Stream temperature	Yes	Yes	Not Likely	An overlap in time and location may exist with other timber management on USFS managed land. There are PDC's in place that prevent measurable effects to the habitat indicators described above. Private and/or County timber activities in the Dog River and SF Mill Creek watersheds are limited in location and scale as the majority of both watersheds are federally managed. Therefore, the potential for effects to habitat indicators resulting from non-federal timber management are likely immeasurable at the 6th field scale.	Habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale. Timber harvest activities within the Dog River and Mill Creek watershed could result in some direct localized effects to resident trout and aquatic mollusks but will be limited to isolated locations (such as road crossings) that would have no causal relationship to accumulate measurable effects.
The Dalles Watershed Phase I and II Fuel Reduction	Large Wood Recruitment Potential	Yes	Yes	Unlikely	Removing large wood from stream channels was a common practice into the 1970's thus the amount of large wood in many streams within the action area have less large wood than historic conditions. None of the actions proposed in this EA would directly reduce existing levels of large wood in any stream. Indirect effects, associated with slight reductions in large wood recruitment potential, could result in localized reduction in recruitment along the Dog River pipeline corridor north of the 44 road and	A reduction of large wood recruitment could result in fewer pools and some reduction in channel stability because one of the major roughness elements that forms and maintains habitat is large wood. All the habitat indicators for this project were either discountable, neutral, or insignificant.

					along a localized area on Brooks Meadow Creek that is adjacent to the pipeline corridor. This may result in less large wood recruitment and thus less in stream wood for the next 50 years or more within those reaches.	Some impact is possible in terms of rearing habitat to resident salmonids in reaches adjacent to the pipeline in Dog River and Brooks Meadow Creek. There would be no discernible impact downstream where ESA aquatic species and CH occurs. A negligible impact to aquatic macrointertebrate populations as a whole, but some localized habitat degradation possible. Therefore, effects to aquatic species were insignificant at the 12th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks at the site scale.
Road Decommis-sioning and Closures	Sediment	Yes	Yes	Not likely	After field validation of stream habitat in the action area, PDCs were developed by the inter-disciplinary team to minimize water quality impacts.	All the habitat indicators for this project were either discountable, neutral, or insignificant. Some impact is possible in terms of rearing habitat to resident salmonids in reaches adjacent to the pipeline in Dog River and Brooks Meadow Creek. There would be no discernible impact downstream where ESA

						aquatic species and CH occurs.
National Forest System road and trail mainten-ance activities	Sediment	Yes	Yes	No	The proposed project will result in disturbed soil in localized areas that has the potential to enter stream channels; primarily associated with diversion structure replacement/fish screening, material hauling, road maintenance, and AOP installation. Sediment/turbidity levels may be detectable at the site scale within resident fish only streams,but will be discountable at LFH due to multiple PDCs that minimize sediment mobilization, as well as the pronounced distance (>2.9 miles) between instream work and LFH.	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects from turbidity and fine sediment levels in LFH were insignificant due to the extended distance (≥2.9 miles) of the project to LFH. There is the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale but those will be limited to isolated locations (such as road crossings) that would have no causal relationship to accumulate measurable effects.

The Dalles Fuels Reduction Project	Change in Peak/Base Flows	Yes	Yes	No	A reduction in forest canopy cover can alter the volume and timing of stream flow due to reduced evapotranspiration rate and increased snow accumulation. There could be an increase in diversion during the late fall and early winter due to larger diameter pipe. But it would only be when there is a higher amount of flow available. In other words, diversion would not be increased, only capacity to capture more when it's there. Thus there will be **discountable** effects to peak flows in Dog River. The change in pipeline operations to maintain at least 0.5 cfs bypass flow at the diversion point from August 1 to October 31 is expected to result in a slight increase in base flow in LFH that is 3.4 miles downstream. There are no proposed changes to operations downstream of Crow Creek Reservoir, which is 7 miles upstream of LFH, thus there is **neutral** possibility of affecting baseline peak/base flow levels in LFH in SF Mill Creek.	Overall, there may be a slight **positive** effect from this project element below the diversion and at downstream in LFH from the increased base flow volume as compared to baseline (no bypass flows at diversion point). This is expected to have a slight benefit to resident trout individuals and their habitat as well as Coho and Chinook spawning habitat, as well as slightly increase rearing habitat (pool depth) for steelhead, Coho and Chinook juveniles.

The Dalles Fuels Reduction Project	Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank Condition.	Yes	Yes	No	An overlap in time and location may exist with this project. PDC's were in place during the Watershed Fuels reduction that prevent measurable effects to these habitat indicators.	None
Ongoing City of The Dalles Operations in the Municipal Watershed	Large Wood Recruitment Potential, Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank Condition. Sediment, Peak/Base Flows	Yes	Yes	Not Likely	An overlap in time and location may exist with this project. The City has PDC in place that prevent measurable effects to the habitat indicators described above.	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale.
Dufur Mill Road (44) and USFS Road 17 Mainten-ance	Habitat Indicators	Yes	Yes	No	An overlap in time and location may exist with this project. Trail projects and this project have PDC's in place that prevent measurable effects to the habitat indicators described above. Treating weeks may be beneficial to some of the habitat indicators described above.	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic

						mollusks during project implementation at the site scale. Trail maintenance has no causal relationship that would accumulate localized effects to resident fish or aquatic mollusks and may be beneficial at the 6th field scale.
Surveyors Ridge and Other Ongoing Trail Mainte-nance	Habitat Indicators	Yes	Yes	No	An overlap in time and location may exist with this project. Weed maintenance projects and this project have PDC's in place that prevent measurable effects to the habitat indicators described above. Managing invasive weeds will be beneficial to the habitat indicators described above.	None
Specific Noxious Weeds Treatments		Yes	Yes	None	None	None
Trail relocations (Dog River Trail #675, Cooks Meadow Trail #639, Surveyor's Ridge Trail #688)	Large Wood Recruitment Potential, Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Streambank Condition. Sediment	Yes	Yes	Not Likely	An overlap in time and location may exist with this project. Both the trail relocation project and this project have PDC's in place that prevent measurable effects to the habitat indicators described above..	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale. Roadside sanding at highway 35 would not measurably accumulate effects to resident fish or aquatic mollusks.

Highway 35 road Mainten-ance and Sanding	Sediment	Yes	Yes	Not Likely	The proposed project will result in disturbed soil in localized areas that has the potential to enter stream channels; primarily associated with diversion structure replacement/fish screening, material hauling, road maintenance, and AOP installation. Sediment/turbidity levels may be detectable at the site scale within resident fish only streams, but will be discountable at LFH due to multiple PDCs that minimize sediment mobilization, as well as the pronounced distance (>2.9 miles) between instream work and LFH	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale.
Developed and Dispersed Camping	Large Wood Recruitment Potential, Channel and floodplain processes: Pool Frequency and Quality and Large Pools, Off-Channel Habitat and Floodplain Connectivity, Refugia, Width/Depth Ratio, Peak/Base Flows, Streambank Condition. Sediment	Yes	Yes	No	An overlap in time and location may exist with this project. Developed and dispersed recreation is managed to prevent measurable effects to the habitat indicators described above.	The habitat indicators for this project were either discountable, neutral, or insignificant. Effects to aquatic species were insignificant at the 6th field scale with the potential for some effects to individual resident cutthroat and/or aquatic mollusks during project implementation at the site scale. Recreation has causal relationship that would accumulate effects to resident fish or aquatic mollusks.

3.4.3 Consistency Determination

The Dog River Pipeline Project is consistent with all applicable fish/aquatic related federal law, plans, and guidelines as outlined below.

Law, Regulation & Policy

The Mt. Hood National Forest Plan and the Northwest Forest Plan provide guidance for projects in the form of Standards and Guidelines and recommended Best Management Practices (BMP). There is overlap between aquatics and water quality in terms of applicable standards and guidelines; therefore, those listed below are directly related to fisheries, or other aquatic special status species. The other water quality standards can be found in the Hydrology specialist report.

Mt. Hood Forest Plan Standards and Guidelines include (pages Four-64, Four-69, Four-257–258):

Fisheries: FW-137, -138, -139, -145, -147

Threatened, Endangered and Sensitive Plants and Animals: FW-174, -175, -176

B7 General Riparian Area: B7-028, -030, -031, -032, -033, -037, -038, -059

Northwest Forest Plan Standards and Guidelines include:

Riparian Reserve Standard and Guides and Aquatic Conservation Strategy (ACS)

In addition to the above, the Forest Service is required to assess and disclose the effects of any Federal action on Regional Forester's special status species, as outlined in the Endangered Species Act of 1973 and National Forest Management Act of 1976 (see effects determination section). The Magnuson-Stevens Fishery Conservation and Management Act of 1976 requires the Forest Service to assess and disclose the affects to Essential Fish Habitat. Clean Water Act compliance and consistency with the standard and guidelines outlined in the Northwest Forest Plan Aquatic Conservation Strategy objectives determination is provided for in this analysis and is also discussed in the Hydrology specialist report.

Desired Future Condition

The desired future condition (DFC) for streams and associated riparian areas within the Dog River Project Area is summarized in several sources as outlined below:

The NWFP Aquatic Conservation Strategy (ACS) was developed"…to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands." Within the strategy are nine ACS objectives that give direction regarding maintenance and/or restoration of aquatic processes key to watershed health. These objectives can be considered desired future conditions from an aquatics perspective for the project area and are described and discussed below.

Finally, the Forest Plan presents desired future conidtions for all management areas, including General Riparian Areas. The list of DFC can be found on pag3e Four-254 in the LRMP, and the General Riparian Area management goal is to "…achieve and maintain riparian and aquatic habitat conidtions for the sustained, long-term production of fish, selected wildlife and plant species, and high quality water for the full spectrum of the Forest's riparian and aquatic areas.

Survey and Manage

This project is consistent with the survey requirements in the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA and BLM).

Aquatic Conservation Strategy

In order for a project to proceed, "a decision maker must find that the proposed management activitiy is consistant with the Aquatic Conservation Strategy objectives" (ROD B-10) from the Northwest Forest Plan Record of Decision. The nine objectives are listed on page B-11 of the ROD. Portions of the effects

analysis in this document focus on key parameters or indicators that make of elements of the nine ACS objectives, to determine if the project would restore, maintain, or degrade these indicators. Once this determination is made, the indicators are examined together with the Range of Natural Variability to ascertain whether the project is consistent with the objectives. A description of the range of natual variability from the Watershed Analysis are included in the "Existing Conditions" section of this report and the Hydrologist Specialist Report. The following table displays specific indicators that comprise the ACS objectives and the effects section that covers this indicator in the Environmental Assessment. Also, refer to the Fisheries Biological Assessment for additional effects descriptions.

The following table displays the individual indicator and the effect the alternative have on those indicators at the 5th, 6th, and 7th field watershed scale. Fifth field watersheds are generally large in size (40,000 acres to 250,000 acres), while 6th and 7th field watersheds are smaller (5,000 acres to 40,000 acres and 2,000 acres to 5,000 acres respectively).

Table 59. ACS Objective Indicators in the EA.

Indicators	Analysis Found in the Effects Section of the EA
Water Temperature	Hydrology, Fisheries
Sediment	Soil Productivity, Water Quality, Fisheries
Contaminents	Hydrology. Fisheries
Physical Barriers	Hydrology, Fisheries
Substrate	Fisheries
Large Woody Debri	Fisheries
Pool Frequency	Fisheries
Pool Quality	Fisheries
Off-Channel Habitat	Fisheries
Refugia	Fisheries
Width/Depth Ratio	Fisheries
Streambank Condition	Hydrology, Fisheries
Floodplain Connectivity	Hydrology, Fisheries
Peak/base Flows	Hydrology, Fisheries
Drainage Network Increase	Hydrology
Riparian Reserves	Hydrology, Fisheries

Table 60. ACS Objective Indicators for each Alternative.

Indicators	Effects - No Action	Effects - Proposed Action
Water Quality:		
Temperature	M	M
Sediment	M	M
Chemical Contamination	M	M
Habitat Access:		
Physical Barriers	D	R – due to culvert replacement
Habitat Elements:		
Substrate	M	M
Large Woody Debris	M	M
Pool Frequency	M	M
Pool Quality	M	M
Off-Channel Habitat	M	M
Refugia	M	M
Channel Conditions and Dynamics:		
Width/Depth Ratio	M	M
Streamback Condition	M	M
Floodplain Connectivity	M	M
Flow/Hydrology:		
Peak/Base Flows	M	Slight restore (R) in Dog River, M in South Fork Mill
Drainage Network Increase	M	M
Watershed Condition:		
Riparian Reserves	M	M

Note: The abbreviations in the table are defined as R=Restore which means the actions(s) would result in acceleration of the recovery rate of the indicator; M=Maintain which means that the function of an indicator does not change by implementing the action(s) or recovery would continue at its current rate; and D=Degrade which means changing the function of the indicator for the worse.

3.5 Visual Qualities

3.5.1 Existing Condition

Scenic Context for Planning Area

The terrain along the existing pipeline corridor is mostly forested with gently rolling hills. Three miles of the pipeline falls along the Surveyors Ridge Trail #688. This portion of the pipeline corridor as well as the vast majority of the remainder of the existing pipeline corridor is bordered by mature trees. Where the trail and the pipeline overlap, the trail tread averages about 24” wide. Most human activity along the corridor occurs where it overlaps with Surveyors Ridge Trail. The remainder of the corridor likely receives the highest amount of human use for pipeline maintenance. The overstory along the pipeline corridor is comprised of mixed conifer forest (Douglas-fir, grand fir, and ponderosa pine. There is little understory throughout the project area due to the density of the existing stand along the pipeline.

Human effects are noticeable throughout the project area as a result of the establishment and maintenance of the pipeline. Fire suppression over the past 100 years has led to lower species diversity and fewer openings in the stands adjacent to the pipeline, making visibility outside of the corridor difficult.

Visual Management Areas and Scenic Viewshed (B2)

Table 61. Visual Quality Objectives (VQOs 1) by Management Area.

Distance Zone from Viewer Position

Management Areas	Approximate Percentage of Project Area	Foreground	Middleground	Background
Scenic Viewshed (B2)	48%	Management Area Standards and Guidelines specific to Dufur Mill Road Scenic Viewshed	Management Area Standards and Guidelines specific to Dufur Mill Road Scenic Viewshed	Management Area Standards and Guidelines specific to Dufur Mill Road Scenic Viewshed
Wood Product Emphasis (C1)	38%	Modification	Modification	Modification
Special Emphasis Watershed (B6)	14%	Modification	Modification	Modification

Dufur Mill Road Scenic Viewshed (FSR 4400)

The Dog River Pipeline crosses Dufur Mill Road approximately 1200 feet south of the road’s intersection with FSR 1700. The pipeline crosses the road here and possibly runs parallel to the western edge of the road for less than 500 feet. The pipeline corridor itself is not easily visible from the road although it is approximately 90 feet west of the edge of the roadway, as it is screened by dense conifers and is at least 10 feet below the road grade of Dufur Mill Road.

The viewshed from the portion of the Dufur Mill Road which falls within the project area is heavily vegetated. Views beyond the shoulders of the road are blocked by this vegetation. The topography of this portion of the roadway also prohibits extended views. West of the road, the surrounding area is below road grade, while east of the road is steeper and above grade.

Overall, the views from this designated viewshed are of scenically attractive landscape dominated by natural line, colors, textures and forms. It is a thickly forested landscape with some signs of human activity stemming from trail intersections and signs of old timber sales further east, and outside of the project area. Some short portions of the road where previous harvest occurred, and trail intersections, meet a partial retention Visual Quality Objective (VQO) and not the prescribed retention VQO. However the majority of the road meets the prescribed retention VQO for the foreground (within ½ mile of the roadway), partial retention VQO for the mid-ground (1/2 mile – 5 miles from the roadway), and partial retention for the background (more than 5 miles from the roadway).

Project Area Trails

Surveyors Ridge Trail #688 intersects with the planning area. Visual sensitivity levels of the trail are classified by the Mt. Hood National Forest Plan. Within these sensitivity levels visual quality objectives are prescribed for foreground, far foreground, and middleground.

Designated Trails within the Planning Area

As a sensitivity level II trail intersecting the project area, Surveyors Ridge Trail currently has well established trail tread with few visible impacts along the trail. It is meeting the prescribed partial retention VQO for the visible foreground (660 feet from each side of the trail unless screened by topography.) The modification VQO is prescribed for both the far foreground (660 beyond the first 660 feet) and middleground (anything visible beyond 1,320 feet from each side of the trail.)

Approximately 2.7 miles of Surveyors Ridge Trail is located on top of the Dog River Pipeline. Surveyors Ridge Trail is 12.7 miles in its entirety. The portion of the trail collocated with the pipeline is also an access road for pipeline maintenance. Small portions appear to be a dirt road, but the majority of the trail collocated with the pipeline has grown in quite a bit. There is a lot of vegetative screening and trees have encroached along the edges of the roadway creating screening and shade.

A short portion of the trail follows somewhat parallel to FSR 44. The trail is not visible from FSR 44 due to the screening of trees and vegetation that have grown along the edge of the trail.

Wood Product Emphasis and Special Emphasis Watershed (C1 & B6)

While managed for different purposes, lands under these two management areas share a modification VQO for all distance zones. There has been a significant amount of past timber harvest activity within these management areas, and the effects of harvest activity are often visually evident. This harvest activity has created opportunities for viewing distant peaks in some places, which is noted as a desired condition in the Forest Plan. These harvested stands are generally not visible from the Scenic Viewshed (B2) within the project area due to vegetative screening.

Other human modifications to the landscape include a network of non-motorized trails. There are also unofficial dispersed campsites within these management areas. While human modifications are present within these management areas they remain visually subordinate to the natural landscape, and these areas currently meet the prescribed modification VQO.

3.5.2 Effects Analysis

No Action Alternative

There would be no direct effects as a result of implementing the No Action alternative. An indirect effect from implementing the No Action alternative would be the deterioration of the pipeline to the point that major excavation would need to be done along the pipeline corridor. Heaviest visual impacts of this work would occur along Surveyor's Ridge Trail or Dufur Mill Road Scenic Viewshed. If major repairs were needed under these circumstances, it could be difficult to maintain desired VQOs.

Proposed Action Alternative

Pipeline Installation

Impacts would occur along the existing pipeline. Along the majority of the pipeline corridor, many mature trees and dead wood line the 25 foot right-of-way, which has grown in significantly over the years. The removal of this material would significantly alter the right-of-way. This change would not lead to a deviation from prescribed VQOs in most locations, as the desired VQO is modification. However, where the pipeline overlaps the trail, the prescribed VQO is partial retention. As a mitigation to the Proposed Action, Surveyors Ridge Trail has been rerouted so that the trail no longer overlaps the pipeline right-of-way for 2.7 miles. There is now one location where the trail intersects with the pipeline. This mitigation would reduce the magnitude of these effects and ensure that the Proposed Action remain consistent with prescribed VQOs.

The prescribed VQO of retention would be impacted where the pipeline crosses Dufur Mill Road. Currently, dense vegetation screens the view of the pipeline. Implementation of the project and maintenance of a 25 foot corridor resulting in the removal of a 25 foot band of vegetation perpendicular to the viewshed would have a negative impact on the desired VQO of retention. Visual impacts to the east of the road would be minimized due to topography. West of the road, the landscape is below the road grade, which would make the view of the pipeline corridor more noticeable. According to the Forest Plan, structures and improvements may be provided within scenic viewsheds in order to protect resource values, for administrative purposes, and to accommodate recreational use. The Dog River Pipeline is needed for administrative purposes for the City of The Dalles.

The Proposed Action would affect the scenic integrity of the landscape surrounding the pipeline. There would be a noticeable change in the width of the right-of-way, which would not only occur during implementation, but also be maintained for the lifetime of the pipeline. Throughout the majority of the project area this impact would not lead to a deviation from the prescribed VQO which is modification. For the portion of the project area that intersects with Dufur Mill Road, there would be a deviation from the retention VQO. According to the Forest Plan, structures and improvements may be provided within scenic viewsheds in order to protect resource values, for administrative purposes, and to accommodate recreational use.

Staging Areas

There are five possible staging areas that could be used for staging pipe, sand/gravel, and materials under the Proposed Action. Visual impact from the southern-most staging area along the 4400-11, would not be visible from the Dufur Mill Road due to vegetative and topographic screening. The other two proposed staging areas are located within land use allocations with prescribed VQO of modification, allowing for activities to visually dominate the characteristic landscape. The staging areas would be utilized during implementation and then returned to their previous condition, ensuring that impacts would be short-term.

Cumulative Effects

The items documented in Table 1 were considered when analyzing cumulative effects for visual quality. These items were analyzed as a result of their proximity to the planning area and their potential to have an effect on visual quality. The spatial context of the cumulative effects analysis lies within one mile of any portion of the proposed pipeline replacement.

Under the Proposed Action, these items could have an impact on the planning area. Combined with the Proposed Action, these actions would not deviate from Forest Plan standards.

3.5.3 Consistency Determination

All of the proposed alternatives described in this report would be in compliance with Mt. Hood Forest Plan and the Forest Service Manual.

Table 62. Consistency with Forest Plan Standards and Guidelines.

Standards & Guidelines	Relevant Elements of Proposed Action	Consistency of the Proposed Action with the Forest Plan
FW-586: Sensitivity Level II trails shall have prescribed VQOs of Partial Retention, Modification, and Modification in near foreground, far foreground and middleground distance zones, respectively.	The degree to which the Proposed Action maintains prescribed VQOs.	The Proposed Action would be consistent with the Forest Plan provided mitigations were implemented. Specifically: The Surveyors Ridge Reroute Decision memo reroute which addresses impacts to VQOs.
FW-584 Trail VQOs shall be prescribed for near foreground, far foreground and middleground based on trail sensitivity level. Prescribed trail VQOs apply to both existing trails and planned trails.	The degree to which the Proposed Action maintains prescribed VQOs.	The Proposed Action would be consistent with the Forest Plan provided mitigations were implemented. Specifically: The Surveyors Ridge Reroute Decision memo reroute which addresses impacts to VQOs.
FW-556 The prescribed VQO should be achieved within one year after completion of any project activities.	Activity debris, staging areas, piling, and tree marking.	The Proposed Action would be consistent with the Forest Plan provided mitigations which address project impacts (i.e. equipment disturbance, tree marking, etc.) rehabilitation were implemented.

Standards & Guidelines	Relevant Elements of Proposed Action	Consistency of the Proposed Action with the Forest Plan
FW-552 The VQOs prescribed in management direction represent the minimum level that shall be achieved in long term visual resource management	The degree to which the Proposed Action maintains prescribed VQOs.	This effects analysis addresses this Standard and Guideline.
C1-007 Management activities shall achieve a VQO of Modification as viewed from open roads; local roads and temporary roads are exceptions	The degree to which the Proposed Action maintains prescribed VQOs.	This effects analysis addresses this Standard and Guideline.
B6-011 VQOs accepting less visual quality disturbance shall be applied when B6 Management Areas are located within "designated viewsheds" (Dufur Mill Road) (R PR PR)	The degree to which the Proposed Action maintains prescribed VQOs within the Dufur Mill Road viewshed.	This effects analysis addresses this Standard and Guideline.
B6-010 Management activities shall achieve a VQO of modification from open roads	The degree to which the Proposed Action maintains prescribed VQOs.	This effects analysis addresses this Standard and Guideline.

Standards & Guidelines	Relevant Elements of Proposed Action	Consistency of the Proposed Action with the Forest Plan
B2-012 Management activities shall achieve prescribed VQOs from the identified viewer positions	Proposed activity within the Dufur Mill Road Scenic Viewshed.	The Proposed Action would be consistent with the Forest Plan provided mitigations were implemented. Specifically: • The pipeline corridor would be visually subordinate along FSR 44. As many trees as possible would be retained along the FSR 44 corridor to maintain a visual buffer between the road and the pipeline corridor. • Decks of trees would be visually subordinate along the pipeline corridor adjacent to FSR 44. • Piles would be visually subordinate along the pipeline corridor adjacent to FSR 44. They would be burned within 2 years of contract termination. • Tree stumps will be visually subordinate along the pipeline corridor adjacent to FSR 44. Stump heights will be maintained at heights of 6 inches or less within Foreground (up to ½ mile) and be angled away from the roadway. • Tree paint would not be visible from the roadway along FSR 44.
B2-001: Structures and improvements may be provided to protect resource values, for administrative purposes, and to accommodate recreational use	Installation of a modern pipeline with a 25 foot right-of-way.	The pipeline installation and maintenance of the modern right-of-way corridor would be consistent with the Forest Plan as the pipeline is needed for administrative purposes for The City Of The Dalles.

3.5.4 Summary of Effects

There would be no direct effects to scenic resources under the No Action alternative. The Proposed Action alternative would reduce and even eliminate vegetative screening along a short section of FSR 44 where the pipeline crosses the road within the Dufur Mill Road Scenic Viewshed. This would have a negative effect on VQOs, however, it would not deviate from Forest Plan Standards as structures and improvements may be provided within scenic viewsheds for administrative purposes. The reroute of the Surveyors Ridge Trail 688 would maintain VQOs along the trail corridor. Direct visible human effects within the scenic viewshed would include stumps, staging areas, slash piles and tree marking. The Proposed Action includes mitigations to address these visual effects of actions commensurate with the retention VQO.

The Proposed Action would improve the efficiency of the Dog River Pipeline and maintain a modern right-of-way along the pipeline corridor. The modern right-of-way could be unattractive to some visitors, but others may enjoy it for access for non-motorized recreation. The No Action alternative would not result in any changes to the viewshed or right-of-way corridor.

In the short-term the Proposed Action would have a negative effect on the retention VQO within the Scenic Viewshed (B2) management area. The Proposed Action would not affect VQOs within the Wood Product Emphasis (C1) or Special Emphasis Watershed (B6) management areas. In the long term (10+ years) the No Action alternative would not impact the VQOs for these three management areas. The Proposed Action alternative would maintain VQOs for the Wood Product Emphasis (C1) and Special Emphasis Watershed (B6) management areas, and decrease retention VQOs along the pipeline corridor within the Scenic Viewshed (B2) management area due to the administrative need of The City Of The Dalles. The area of impact to the retention VQO from FSR 44 would be minimal, although it’s impact would last the duration of the maintenance of the pipeline corridor.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6 Wildlife

This section is organized into six sections: *Threatened, Endangered and Proposed Species – Northern Spotted Owl; Northern Spotted Owl Critical Habitat; Region 6 Sensitive Species – Gray Wolf, Fringed Myotis, Western Bumblebee, Johnson's Hairstreak; Management Indicator Species – Deer, Elk, Pileated Woodpecker, American Marten, Wild Turkey, Western Gray Squirrel; Snag and Down Log Associated Species; and Neotropical Migratory Birds*. The existing condition, effects analysis, consistency determination, and summary or effects are discussed for each.

3.6.1 Threatened, Endangered and Proposed Species – Northern Spotted Owl

Existing Condition

There are three historic spotted owl territories that overlap the project boundary. All of these home ranges are currently below the threshold of 40 percent suitable habitat and are below 50 percent suitable habitat within the core area. Surveys have been conducted in the project area since 2010 and one spotted owl was detected in 2011. Follow-up visits did not relocate this owl and no other owls have been found. The historic nesting sites are currently considered unoccupied. A first year male spotted owl was detected during surveys for a project adjacent to the proposed pipeline on two separate occasions in August of 2015. The owl was not detected again in subsequent visits and therefore the status of that owl is unknown.

Effects Analysis

No Action Alternative

There would be no short-term effects to spotted owls under this alternative. In the short-term, the portion of the proposed pipeline that is providing dispersal and suitable habitat would continue to function as dispersal and suitable habitat and snag levels would remain essentially unchanged. In 20 to 30 years, the trees along the proposed pipeline could start to differentiate to varying degrees and show an increase in the levels of snags and down wood as live trees continue to die. The quality of habitat would improve only slightly in some stands while improving more in others depending on site conditions.

Proposed Action Alternative

The proposed project is expected to have disturbance to the spotted owl from all phases of pipeline construction. Specifically the disruption will be from chainsaws and heavy equipment. No spotted owls have been found during surveys. If the potential nest sites are unoccupied, then there would be no effect from disturbance to spotted owls from the proposed activities. If a spotted owl nest is found during surveys, that nest patch would be buffered and timing restrictions would be placed on activities that would take place within the disruption distance as defined in Table 63. Because timing restrictions would be in effect in the event that a nest is found, the disturbance from the Proposed Action **may affect, but is not likely to adversely affect** spotted owls.

Table 63. Disturbance and Disruption Distances for Northern Spotted Owls.

Disturbance Source	No Effect (March 1 – September 30.)	Disturbance Distance Entire Breeding Period (March 1 – September 30). NLAA (not likely to adversely affect)	Disruption Distance[1] Critical Breeding Period (March 1 – July 15). LAA (likely to adversely affect)	Disruption Distance[1] Latter Breeding Period (July 16 – September 30). LAA (likely to adversely affect)
Use of chainsaws	> 0.25 mile	66 yards to 0.25 mile	≤ 65 yards	No Disruption Anticipated
Use of heavy equipment	> 0.25 mile	66 yards to 0.25 mile	≤ 65 yards	No Disruption Anticipated
Hauling on open roads	> 0.25 mile	≤ 0.25 mile	No Disruption Anticipated	No Disruption Anticipated
Blasting	> 1 mile	0.25 mile to 1 mile	≤ 0.25 mile	≤ 100 yards (injury)
Helicopter – Type I[2]	> 0.5 mile	266 yards to 0.5 mile	≤ 265 yards	≤ 100 yards (hovering only)
Helicopter – other[3]	> 0.25 mile	111 yards to 0.25 mi	151 yards to 0.25 mile	≤ 50 yards (hovering only)
Rock crushing		440 yards (0.25 mile)	180 yards	No Disruption Anticipated
Burning	> 1 mile	0.25 mile to 1 mile	≤ 0.25 mile	No Disruption Anticipated

1. Noise distances were developed from a threshold of 92 dB (USFWS 2003). Smoke disturbance distances are based on a FWS white paper (USFWS 2008b). Distances are measured from occupied spotted owl nest tree or fledgling location. If these are not identified, distances are from the edge of nest patch (for both known and potential spotted owl sites.
2. Type I helicopters seat at least 16 people and have a minimum capacity of 5,000 lbs. Both a CH 47 (Chinook) and UH 60 (Blackhawk) are Type I helicopters. Kmax helicopters are considered "other" for the purposes of disturbance. Sound readings from Kmax helicopter logging on the Olympic NF registered 86 dB at 150 yards (Piper 2006).
3. All other helicopters (including Kmax).

Tree removal included in the Proposed Action would be in the form of a 3.4 mile long, 25 foot wide corridor of approximately 10.3 acres. Of these approximate 10.3 acres, roughly 6.1 are in suitable habitat and roughly 4.2 are in dispersal habitat. Within the home ranges, roughly 3.9 acres would be removed from territory 10119P92, roughly 7.8 would be removed from 6035P94, and approximately 4.2 acres would be removed from 6102P90 (Table 64). This habitat removal would not impact the ability of owls to utilize this habitat at the stand scale since the trees that would be removed are spread out across a long narrow corridor rather than in one patch and the function of the habitat within each stand would remain unchanged.

Table 64. Approximate Acres Impacted within Territories.

	1101P92	6035P94	6102P90
Acres Suitable Removed	3.9	5.4	1.2
Acres Dispersal Removed	0	2.4	3.0
Total	3.9	7.8	4.2

Because the portion of the project that removes trees in dispersal habitat is spread over a 1.4 mile length, the Proposed Action would not impact the ability of spotted owls to disperse across the landscape and would not change the function of dispersal habitat at the stand scale. Therefore the removal of approximately 4.2 acres of dispersal habitat **may affect but is not likely to adversely affect** spotted owls. Future nesting opportunities would be reduced by removing large trees and snags within suitable habitat and territories that are currently below threshold levels would have habitat removed, therefore, the removal of approximately 6.1 acres is **likely to adversely affect** spotted owls. Because the tree removal is along a narrow corridor, the function of the habitat within these stands would remain unchanged.

The small mammal species that have been found to increase most after tree removal are not ones that are selectively favored by barred owls more than spotted owls. Based on these studies, the proposed pipeline construction would not be expected to expand the range of barred owls since the function of the habitat at the stand scale would remain unchanged.

Cumulative Effects

Of the projects and activities found in Table 1 timber harvest on federal land (past, present, and reasonably foreseeable) was considered in this cumulative effects analysis because the activities overlap in time and space. There is a potential cumulative impact to suitable habitat from the removal of approximately 6 acres of suitable owl habitat. However, this cumulative impact would be minor because the removal of approximately 6 acres represents 0.2% of the available suitable habitat on the landscape. Additionally, cumulative effects to dispersal habitat would not prevent spotted owls from continuing to forage or disperse throughout the analysis area because the 4.2 acres proposed for removal are minor compared to the stand scale. In conclusion, cumulative effects would be minor because the overall function of the northern spotted owl's habitat at the stand-scale would remain unchanged.

Consistency Determination

Late Successional Reserve (LSR) Assessment

The Regional Ecosystem Office (REO) and the interagency Late-Successional Reserve Work Group has reviewed the Surveyors Ridge Late-Successional Reserve Assessment (Assessment). The REO found that the Assessment provided sufficient framework and context for projects and activities within the LSR,

including the Dog River Pipeline replacement. A memorandum dated July 23, 1997 stated that specific projects described in the Assessment that are consistent with the Standards and Guidelines and the treatment criteria identified are exempted from project-level REO review.

Recovery Actions 10 and 32

The proposed project is consistent with the Northwest Forest Plan and with the Revised Northern Spotted Owl Recovery Plan (USFWS 2011).

- *Recovery Action 10*: Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl populations.
    - The proposed project does not impact the highest quality.
- *Recovery Action 32*: Because spotted owl recovery requires well distributed, older and more structurally complex multi-layered conifer forests on Federal and non-federal lands across its range, land managers should work with the Service to maintain and restore such habitat while allowing for other threats, such as fire and insects, to be addressed by restoration management actions. These high-quality spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees.
    - The proposed project was developed in coordination with the Fish and Wildlife Service (FWS) and does not impact and RA 32 habitat.

Consultation

A formal Programmatic Biological Assessment (BA) that included the Dog River Pipeline replacement was submitted to the FWS for the effects to federally listed species including northern spotted owls. The Biological Opinion on the Effects of Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls within the Willamette Province, FY 2017, proposed by the Mt. Hood National Forest; and Willamette National Forest; on the Northern Spotted Owl and its' Designated Critical Habitat (FWS Reference Number 01EOFW00-2017-F-0045 and 17-14) was received in August 2017.

Summary of Effects

While the proposed project is expected to have disturbance to the spotted owl from all phases of pipeline construction, no spotted owls have been found during surveys. If the potential nest sites are unoccupied, then there would be no effect from disturbance to spotted owls from the proposed activities.

Tree removal **may affect but is not likely to adversely affect** spotted owls. Future nesting opportunities would be reduced by removing large trees and snags within suitable habitat and territories that are currently below threshold levels would have habitat removed, therefore, the removal of approximately 6.1 acres is **likely to adversely affect** spotted owls. Because the tree removal is along a narrow corridor, the function of the habitat within these stands would remain unchanged.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6.2 Northern Spotted Owl Critical Habitat

Existing Condition

Critical Habitat in the Action Area

Of the 10.3 acres of tree removal for the pipeline, 8.8 acres are in critical habitat. Of the 8.8 acres in critical habitat, 3.7 acres are providing only dispersal habitat (Physical or Biological Feature [PBF] 4) and

5.1 acres are providing suitable habitat for spotted owls (PBF 2, 3 and 4). These PBFs in the action area are functioning at a landscape scale and could support up to 8 territories.

Subunit East Cascade North 7

The Proposed Action is within East Cascades North (ECN), subunit ECN 7. Of the 139,983 acres in this unit, approximately 139,865 are located on the Mt. Hood NF. This unit is located in Wasco and Hood River Counties on the east side of the Cascades with a small portion in Clackamas County on the west side of the Cascades. There are approximately 8.8 acres of critical habitat proposed for removal.

There are approximately 58,397 acres of suitable habitat within subunit ECN 7. Based on the amount of habitat and the average home range size for this Province, this subunit could potentially support up to 48 territories. Of these territories, 3 overlap habitat within the action area.

Special management considerations or protections are required in this subunit to address threats from current and past timber harvest, removal or modification of habitat by forest fires and the effects on vegetation from fire exclusion, and competition with barred owls. This subunit is expected to function primarily for demographic support to the overall population, as well as north-south and east-west connectivity between other subunits and critical habitat units.

Effects Analysis

The analysis area for spotted owl critical habitat includes the Dog River Pipeline project boundary and a 1.2 mile buffer to include any territories that may overlap.

No Action Alternative

There would be no short-term effects to spotted owl critical habitat under this alternative. In the short-term, dispersal habitat (Physical or Biological Features [PBF] 4) would continue to function as dispersal habitat and snag levels would remain essentially unchanged. In 20 to 30 years, the stands could start to differentiate to varying degrees and show an increase in the levels of small snags and small down wood. Stands that are functioning as suitable habitat (PBF 2) would continue to function as suitable habitat.

Proposed Action Alternative

Tree removal in critical habitat would be in the form of an approximate 2.9 mile long, 25 foot wide corridor for a total of 8.8 acres. Of the total acres, approximately 5.1 are in suitable habitat (PBFs 2 and 3) and approximately 3.7 acres are in dispersal habitat (PBF 4). This habitat removal would not impact the ability of owls to utilize this habitat at the stand scale since the trees that would be removed are spread out across a long narrow corridor rather than in one patch and the function of the habitat within each stand would remain unchanged.

Because the portion of the project that removes trees in dispersal habitat is spread over a roughly 1.4 mile length, the Proposed Action would not impact the ability of spotted owls to disperse across the landscape and would not change the function of dispersal habitat at the stand scale. Therefore the removal of approximately 3.7 acres of dispersal habitat **may affect but is not likely to adversely affect** spotted owls. Future nesting opportunities would be reduced by removing large trees and snags within suitable habitat and territories that are currently below threshold levels would have some habitat removed, therefore, the removal of approximately 5.1 acres is **likely to adversely affect** spotted owls. Because the tree removal is along a narrow corridor, the function of the habitat within these stands would remain unchanged.

The Proposed Action maintains the PBFs in a manner that meets the life history needs of the spotted owl at the stand-scale, therefore it would not have significant adverse impacts at the subunit or unit scale.

Cumulative Effects

Of the projects and activities found in Table 1 timber harvest on federal land (past, present, and reasonably foreseeable) was considered in this cumulative effects analysis because the activities overlap in time and space.

Timber harvest on federal lands has reduced the amount of suitable and dispersal habitat (PBFs 2, 3, and 4) on the landscape and will continue to do so into the future until these stands grow over time and become habitat again. With less suitable habitat on the landscape, there are fewer opportunities for spotted owls to successfully nest and produce young. The cumulative effects to dispersal habitat would not prevent spotted owls from continuing to forage or disperse throughout the analysis area.

Consistency Determination

The Proposed Action is consistent with the Critical Habitat (CH) Rule that relies on the recommendations laid out by the Recovery Plan for the spotted owl. The proposed project is not considered active forest management, does not impact the function of PBFs at the stand scale, would not impact the ability of owls to exist on the landscape, and would not preclude the recovery of the species.

Consultation

A formal Programmatic Biological Assessment (BA) that included the Dog River Pipeline replacement was submitted to the Fish and Wildlife Service (FWS) for the effects to federally listed species including northern spotted owls and their critical habitat. The Biological Opinion on the Effects of Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls within the Willamette Province, FY 2017, proposed by the Mt. Hood National Forest; and Willamette National Forest; on the Northern Spotted Owl and its' Designated Critical Habitat (FWS Reference Number 01EOFW00-2017-F-0045 and 17-14) was received in August 2017.

Summary of Effects

The habitat removal would not impact the ability of owls to utilize habitat at the stand scale since the trees that would be removed are spread out across a long narrow corridor rather than in one patch resulting in the function of the habitat within each stand to remain unchanged. Therefore the removal of roughly 3.7 acres of dispersal habitat **may affect but is not likely to adversely affect** spotted owls. Future nesting opportunities would be reduced by removing large trees and snags within suitable habitat and territories that are currently below threshold levels would have some habitat removed, therefore, the removal of approximately 5.1 acres is **likely to adversely affect** spotted owls. Because the tree removal is along a narrow corridor, the function of the habitat within these stands would remain unchanged.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6.3 Region 6 Sensitive Species – Gray Wolf, Fringed Myotis, Western Bumblebee, Johnson's Hairstreak

Gray Wolf

Existing Condition

Gray wolves (*Canis lupus*) were reintroduced in the mid-1990s in central Idaho and Yellowstone National Park and then dispersed naturally into Oregon. In 2008 the first wolf pack was confirmed in Oregon on the Umatilla National Forest by Oregon Department of Fish and Wildlife (ODFW) biologists. In May 2001, the FWS delisted wolves in Idaho, Montana, parts of Oregon, Washington, and Utah. In December

2015 the ODFW removed the gray wolf from its endangered species list because the wolf had met the state's population criteria for delisting. Wolves in Oregon west of Hwy 395 remain protected by the federal Endangered Species Act. The FWS is the lead management agency for wolves west of Hwy 395, including those that may be on the Forest.

In March 2015, a male wolf from the Imnaha Pack identified as OR25, moved through the Columbia Basin and southern Blue Mountains before traveling west and spending a number of weeks on the Mt. Hood National Forest. OR25 then traveled south to Klamath County and continues to remain in that area. Because wolves have the ability to disperse over large distances, as in the case of other wolves (OR7 and OR3) that have established territories in southern Oregon, there is the possibility that other undetected wolves have been or may currently be on the Forest. In January, 2018, two wolves were captured on remote sensing cameras in the southeastern portion of the Forest. The breeding status of those wolves is unknown. Since 2018, there have been multiple wolf sightings on the Mt. Hood National Forest.

Effects Analysis

Analysis Area

The analysis area for gray wolves includes the pipeline and a one mile buffer.

No Action Alternative

There would be no increase in human activities in the area and therefore there would be no effect to wolves.

Proposed Action Alternative

No dens or rendezvous sites have been detected on the Forest or within the project area. The possibility of a wolf den or rendezvous site remaining undetected in the vicinity of the project area is extremely unlikely because of the vocal nature of wolf packs and the amount of human activity that takes place on this part of the Forest. Project related activities would increase human presence during implementation and this may cause wolves to temporarily avoid the area. While the Proposed Action may cause wolves to temporarily avoid the area during project implementation, the Proposed Action is not within a mile of any den or rendezvous site and would not disrupt breeding behavior, therefore, the proposed project would have ***no effect*** to gray wolf.

Cumulative Effects

Because there is no effect to gray wolf from the Proposed Action, there are no cumulative effects.

Consistency Determination

The Following Mt. Hood National Forest Land and Resource Management Plan Standards and Guidelines that apply to the Proposed Action alternative and would be met:

- FW-174: Habitat for threatened, endangered, and sensitive species has been identified and managed in accordance with the ESA (1973), the Oregon ESA (1987), and FSM 2670.
- FW 177 & 178: Consultation with the USFWS shall occur on each program activity or project that the Forest Service determines may affect threatened or endangered species. Consultation shall be completed before any decision is made on the proposed project.

Consultation

- Because there is no effect to gray wolf from the Proposed Action, consultation is not required for this species.

Summary of Effects

There is no effect to the gray wolf because no dens or rendezvous sites have been detected on the Forest or within the project area.

Fringed Myotis

Existing Condition

The most common habitats in which the Fringed Myotis has been found are oak, pinyon, and juniper woodlands or ponderosa pine and Douglas-fir forest at middle elevations (O'Farrell and Studier 1980, Cockrum et al. 1996, Wilson and Ruff 1999, Ellison et al. 2004). This species is mostly found in dry habitats where open areas are interspersed with mature forests, creating complex mosaics with ample edges and abundant snags. Suitable roosting sites are an important habitat component, the availability of which can determine population sizes and distributions (Humphrey 1975, Kunz 1982). Abundance of large snags and low canopy cover allows more thermal heating of roosts, easier flight access to roosts, and the ability to readily switch roosts, for predator avoidance, or to find more suitable microclimates (Lewis 1995, Weller 2000). Some studies have suggested that fringed myotis consume mostly beetles (Rainey and Pierson 1996), but others in the Pacific Northwest have suggested mainly moths (Whitaker et al. 1977). Anecdotal information supports a diet largely of beetles and moths (Turner and Jones 1968, Arizona Game and Fish Department 1997). The loss of habitat through conversion and degradation is a major threat to this species. Second to loss of forested habitat is the loss of stand structural complexity, which supports both foraging and roosting activities. Disturbances of native vegetation can enhance the spread of invasive plant species, which may further disrupt insect diversity and densities. Other threats include recreational caving, rock climbing, commercial mining and quarrying of roost habitat. Pesticide use and environmental contaminants may reduce prey availability and bioaccumulate in bats. White-nose Syndrome (WNS) has recently arrived in the northwest. Given that many *Myotis* species have been severely impacted in the eastern United States, WNS could negatively affect fringed myotis as well. Threats to this species are enhanced by its patchy distribution and general low abundances.

Effects Analysis

No Action Alternative

Under the No Action alternative, fringed myotis roosting and foraging habitat would not be impacted. There are no hibernacula or mines in the analysis area. The No Action alternative would have approximately 125 more snags for roosting since this species roosts in snags larger than 11 inches DBH and none would be cut for the pipeline replacement.

Proposed Action Alternative

The Proposed Action would have no impact on maternity colonies or hibernacula since caves and mines are not in the project area. Some roost trees would be removed, including 125 snags larger than 11 inches DBH. Tree removal under the Proposed Action would benefit fringed myotis only slightly by opening the canopy along the pipeline which would improve foraging habitat. Large snags in the adjacent stands would continue to provide roosting habitat. Even though some roosting snags would be removed for pipeline construction, foraging habitat would be slightly improved and roosting habitat would still be provided adjacent to the pipeline, therefore the Proposed Action **may impact individuals or habitat, but**

will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Cumulative Effects

Of the projects and activities found in Table 1 timber harvest on federal land (past, present, and reasonably foreseeable), and The Dalles Watershed Phase I and II Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space.

There are no known mines or caves that would provide for maternity colonies or hibernacula, therefore there are no cumulative effects to these structures. The Dalles Watershed Phase I and II would benefit the fringed myotis by increasing the potential for larger trees on the landscape and opening the canopy which provides foraging. Past timber harvest on federal land that targeted large ponderosa pine has reduced the number of large ponderosa pine which would become the large snags needed for roosting habitat.

Summary of Effects

Some roosting snags would be removed for pipeline construction, foraging habitat would be slightly improved and roosting habitat would still be provided adjacent to the pipeline, therefore the Proposed Action **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.**

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

Western Bumblebee

Existing Condition

Surveys for Western bumblebees were conducted by the Xerces Society on the Forest in 2013 and by Forest Service biologists in 2015. A total of 34 locations were surveyed in 2013 and Western bumble bees were located at 8 of these locations. In 2015, 24 locations were surveyed and bumble bees were detected at 8 locations, 6 of which were previously unreported locations for this species. In 2016, 23 locations were surveyed and Western bumblebees were documented at 6 of these sites. Five of the six sites were new locations for this species. One of the new locations found was in the meadow adjacent to Bear Springs Campground and previous detections were made adjacent to the project area at Little Crater Lake and Jackpot Meadow.

Effects Analysis

The analysis area for Western bumblebee includes the Dog River Pipeline Project boundary.

No Action Alternative

Under the No Action alternative, there would be no direct impacts to bumble bee nesting, foraging, and over-wintering habitat. There would be fewer flowering plants for foraging under this alternative in the long-term since canopies along the pipeline would remain unchanged and less sunlight would reach the forest floor which is required for the growth of most nectar plants.

Proposed Action Alternative

The proposed project may temporarily impact flowering plants during pipeline construction. Reducing this food source would reduce the ability of foraging bees to find nectar at these sites which is a required food source for young bees. It is expected that these shrubs would regenerate within a few years and that the bumblebees would have other nectar plants available adjacent to the proposed pipeline.

The proposed project may temporarily impact nest sites if these nests are located within abandoned bird nests or other structures above ground. Pipeline construction activities could reduce the number of nests available in the short-term and therefore reduce the number of bumblebees that this area could support. Nest sites would increase within a few years after construction. The temporary reduction in flowering shrubs and nesting sites **may impact individuals but will not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species**.

The total number of acres impacted would not exceed 10.3 acres since that is the total area of the footprint of the pipeline. While the number of bees in the analysis area may be slightly reduced, this reduction would be temporary as flowering shrubs and nest sites increase within a few years after treatments.

Because bumblebees can forage for nectar on a variety of flowering plants, the area adjacent to the pipeline would continue to provide a food source. These portions of the watershed would also continue to provide for nesting and hibernating habitat. The adjacent untreated areas would allow for bumblebees to recolonize the impacted acres within the treatment area as foraging and nesting habitat return. Between 2 and 10 years after treatments, there would be an increase in flowering plants for foraging compared to the No Action alternative since the area along the pipeline would be more open and more sunlight would reach the forest floor which is required for the growth of most nectar plants.

Cumulative Effects

Of the projects and activities found in Table 1 timber harvest on federal land (past, present, and reasonably foreseeable), road decommissioning and road closures, trail construction and maintenance, pre-commercial thinning, and The Dalles Watershed Phase I and II Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space.

Projects that may increase or improve foraging habitat in the long-term include road closures, and pre-commercial thinning. While weed treatments may benefit bumblebees by improving habitat for native flowering plants, bees can be indirectly harmed when the flowers that they normally use for foraging are removed by the application of broad-spectrum herbicides. Depending on the prescription and the condition of the stand before treatments, timber harvest may increase or decrease the amount of foraging habitat available. Trail construction and maintenance reduces the amount of foraging and nesting habitat.

Habitat alterations including those that could destroy, fragment, alter, degrade or reduce the food supply produced by flowers as well as destruction of nest sites and hibernation sites for overwintering queens, such as abandoned rodent burrows and bird nests, adversely affect these bees. Large scale ground disturbing activities alter landscapes and habitat required by bumble bees by removing flowering food sources, disturbing nest sites and altering the vegetation community. The size of bumble bee populations diminish and inbreeding becomes more common as habitats become fragmented. This in turn, decreases the genetic diversity and increases the risk of population decline.

While the projects analyzed under cumulative effects may have impacts to individual bumble bees, the main threats to this species are agriculture and urban development, livestock grazing, and broad scale insecticide application (Thorp et al. 2008). These kinds of activities are not included in the Proposed Action. Because some of the proposed activities increase or improve habitat while others may decrease it, the impacts would likely be beneficial and detrimental at the same time, and populations of this species would still persist in the analysis area.

Consistency Determination

The Proposed Action alternative is consistent with the following Standards and Guidelines for sensitive species: (1) FW-174: Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act (1973), the Oregon Endangered Species Act (1987), and FSM 2670; and, (2) FW-175: habitat for threatened, endangered and sensitive plants and animals shall be protected or improved.

Summary of Effects

The temporary reduction in flowering shrubs and nesting sites may impact individuals, but will not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

Johnson's Hairstreak

Existing Condition

Johnson's hairstreak occurs within coniferous forests which contain the mistletoes of the genus *Arceuthobium*, commonly referred to as dwarf mistletoe. These plants are highly specialized and are known to occur on a number of different conifers (Schmitt and Spiegel 2008). Larsen et al. (1995) states that old-growth and late successional second growth forests provide the best habitat for this butterfly, although younger forests where dwarf mistletoe is present also supports *C. johnsoni* populations. All sightings in both Washington and Oregon have been in coniferous forests. Ecoregions where this species occurs in Oregon, as determined by the Oregon Biodiversity Information Center include the Ochoco, Blue and Wallowa Mountains, Coast Range, East Cascades, Klamath Mountains, West Cascades and the Willamette Valley. Larvae can be found feeding on dwarf mistletoe (Opler and Wright 1999). Caterpillars feed on all exposed plant parts and secrete a sugary solution which is used by ants that in turn protect the caterpillar from predators. Caterpillars can be found on host leaves April-October (Allen et al. 2005). Nectar of flowers in several families from numerous genera including *Actostophylos, Ceanothus, Cornus,* dandelion, *Fragaria, Rorippa* and *Spraguea* is consumed by adult butterflies who obtain additional moisture by visiting mud puddles (Shields 1965). Due to their habitat associations and tendency to reside in the forest canopy, these butterflies are not often encountered. The main threats to this species are the reduction of old-growth, insecticide use, and application of herbicides to flowering plants that are nectar sources.

Effects Analysis

Analysis Area

The analysis area for Johnson's hair streak includes the Dog River Pipeline project boundary.

No Action Alternative

Under the No Action alternative, there would be no direct impacts to Johnson's hair streak larval and foraging habitat. There would be fewer flowering plants for foraging under this alternative in the long-term since canopies would remain closed and less sunlight would reach the forest floor which is required for the growth of most nectar plants.

Proposed Action Alternative

The Proposed Action could impact the larval stage of Johnson's hairstreak by removing large trees with mistletoe. Mistletoe brooms may also be removed where it is a ladder fuel component. Trees with mistletoe would not be directly targeted by this project and would continue to be present throughout the planning area. Mature forest structure would also remain within treated and adjacent untreated stands.

The proposed project may temporarily impact flowering plants during road maintenance, road construction, fuels treatments, and timber harvest activities. Reducing this food source would reduce the ability of foraging butterflies to find nectar at these sites which. It is expected that these flowers and shrubs would regenerate within a few years and that the butterflies would have other nectar plants available within the project area.

While the number of Johnson's hairstreak in the project area may be slightly reduced, this reduction would be temporary as flowering shrubs increase within a few years after treatments. Because these butterflies can forage for nectar on a variety of flowering plants, the untreated portions of the planning area would continue to provide a food source. These untreated portions of the planning area and many of the treated stands would continue to provide mistletoe for caterpillar habitat. The Proposed Action **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.**

Cumulative Effects

Of the projects and activities found in Table 1 timber harvest on federal land (past, present, and reasonably foreseeable), pre-commercial thinning, road decommissioning and road closures, trail construction and maintenance, The Dalles Fuels Treatments Phase I and II, The Dalles Watershed Fuel Reduction, were considered in this cumulative effects analysis because the activities overlap in time and space.

Projects that may increase or improve foraging habitat in the long-term include plantation thinning, road closures, pre-commercial thinning, and noxious weed treatments. While weed treatments may benefit butterflies by improving habitat for native flowering plants, butterflies can be indirectly harmed when the flowers that they normally use for foraging are removed by the application of broad-spectrum herbicides.

Depending on the prescription and the condition of the stand before treatments, timber harvest may increase or decrease the amount of foraging habitat available. Trail maintenance removes flowing plants but at the same time maintains edges that promote the growth of flowering plants and shrubs.

Consistency Determination

The Proposed Action alternative is consistent with the following Standards and Guidelines for sensitive species: (1) FW-174: Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act (1973), the Oregon Endangered Species Act (1987), and FSM 2670; and, (2) FW-175: habitat for threatened, endangered and sensitive plants and animals shall be protected or improved.

Summary of Effects

The Proposed Action **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.** While the number of Johnson's hairstreak in the project area may be slightly reduced, this reduction would be temporary as flowering shrubs increase within a few years after treatments. These butterflies can forage for nectar on a variety of flowering plants, the untreated portions of the planning area would continue to provide a food source.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6.4 Management Indicator Species – Deer, Elk, Pileated Woodpecker, American Marten, Wild Turkey, Western Gray Squirrel

Deer and Elk

Existing Condition

The project area supports elk and deer for most of the year. Elk cows and calves are in the western portion of the watershed from early spring though late fall. Black-tailed deer are common and relatively abundant

in the spring, summer, and fall within the western portion of the planning area. The eastern portion of the planning area is identified in the Mt. Hood LRMP as inventoried winter range, most of which is in B10 Land Use Allocation. A number of deer and elk spend the winter there depending on snow accumulation. Deer are less likely to be there during periods of heavy snowfall as they are less able to move through deep snow. Forage is available in the planning area, but is generally of low quality due to the lack of un-forested areas. With the reduction in regeneration timber harvest, the Forest now has abundant optimal and thermal cover, but openings for forage are becoming scarce. There are approximately 69,226 acres of early-seral habitat on the Forest. This level is declining over time at mid and lower elevations since plantations have grown dense with trees that shade out forage. There are few dry meadows in the planning area, and forage habitat improvement for elk is limited.

High road densities lead to harassment of elk herds. Harassed elk move more often than elk left alone and use of habitat decreases as road density increases (Witmer 1985). It is also recognized that elk within or moving through areas of high open-road densities move longer distances; often several miles per day.

Effects Analysis

Analysis Area

The analysis area for deer and elk is the East Fork Hood River Watershed.

No Action Alternative

Disturbance from human presence and activities within the planning area would remain the same as the current levels.

Proposed Action Alternative

Pipeline construction activities could potentially disturb and temporarily displace animals in the area at the time of implementation. Project activities would not all be occurring at the same time, but in a few places at any one time. The potential disturbance is predicted to be small in scale, temporary in nature and only impact a few individuals. There would be no increase in the long-term harassment of deer and elk and the project is not expected to cause a measurable reduction or increase in the current local population size for either deer or elk.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), road decommissioning and road closures, pre-commercial thinning, The Dalles Watershed Phase I and II Fuel Reduction, and The Dalles Watershed Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space.

Cover is not considered a limiting factor for deer and elk in the analysis area because much of the Forest’s lands are providing cover and very little forage opportunities. The optimum cover forage ratio is 60 percent forage and 40 percent cover (Thomas, 1979). Forage availability is more of a limiting factor on the Forest, but is more available off-Forest as a result of regeneration harvest on private lands. Cumulatively, there would be a small increase in forage and a small decrease in cover which would move the forage to cover ratio towards the optimum ratio.

An increase in human presence from developed and dispersed campsites would modify behaviors and may cause some avoidance behaviors by both deer and elk. Deer are expected to be more tolerant of recreation, while elk are less, and may move out of areas at certain times of the year. However, seasonal closures on roads and trails are implemented in the areas for winter range, and for reasons of trail stability. Trails would impact deer and elk but are not anticipated to impact populations.

Consistency Determination

This analysis is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area." The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. A Forest wide analysis was completed and is incorporated by reference. Viable populations of all the Management Indicator Species in this BE would be maintained at the Forest-scale.

Open road densities under the Proposed Action would be reduced. However, the Forest Plan Standard of 2.5 miles per square mile of open roads for inventoried summer range (FW-208) would not be met. The Forest Plan Standard for open road densities within B10 and inventoried winter range would continue meeting the Forest Plan Standard of 1.5 (B10) and 2.0 (inventoried winter range) miles per square mile.

Summary of Effects

An increase in human presence from developed and dispersed campsites would modify behaviors and may cause some avoidance behaviors by both deer and elk. However, seasonal closures on roads and trails are implemented in the areas for winter range, and for reasons of trail stability. Trails would impact deer and elk but are not anticipated to impact populations.

Pileated Woodpecker

Existing Condition

The pileated woodpecker was chosen as a management indicator species because of its need for large snags, large amounts of down woody material, and large defective trees for nesting, roosting and foraging. Large snags and decadent trees are important habitat components for pileated woodpeckers (Hartwig et al. 2004, Mellen et al. 1992). The association with late seral stages comes from the need for large-diameter snags or living trees with decay for nest and roost sites, large-diameter trees and logs for foraging on ants and other arthropods, and a dense canopy to provide cover from predators. Because ants are the main diet for pileated woodpeckers, large diameter snags and logs with some decay are selected for foraging because carpenter ants inhabit these sites. Given the amount of habitat available, there may be up to 10 home ranges in the project area when considering unmanaged stands as habitat.

Effects Analysis

Analysis Area

The analysis area for the pileated woodpecker includes the area within the project boundary. The Northwest Forest Plan directs the B5 pileated woodpecker/American marten areas to return to their underlying land allocation in Matrix lands except where needed to assure habitat and dispersal for the guilds of species represented by the pileated woodpecker and marten. The Forest assessed the relative importance of individual B5 areas in contributing to late seral forest conditions at the watershed landscape level. Based on that assessment, the Forest recommended that certain B5 areas be returned to the underlying land allocation and that individual watershed analysis take a closer look at the remaining B5 areas. There is no B5 in the Analysis Area.

No Action Alternative

There would be no short-term effects to pileated woodpecker habitat under this alternative. In the short-term, large trees and snag levels would remain essentially unchanged. In 20 to 30 years, more snags are likely to be added along the pipeline.

Proposed Action Alternative

Pipeline construction would impact habitat by removing large trees and snags which would reduce the amount of nesting and foraging trees available for up to one pair of pileated woodpeckers. This impact would be long-term since trees would not be allowed to grow back along the pipeline.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), and The Dalles Watershed Phase I and II Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space. Past timber harvest on federal lands has reduced the amount of habitat in the analysis area. Habitat for this species has continued to increase over time across the Forest but the analysis area would likely provide less habitat than other areas of the Forest due to past and present timber harvest.

Consistency Determination

This analysis is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area." The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. A Forest wide analysis was completed and is incorporated by reference. Viable populations of all the Management Indicator Species in this BE would be maintained at the Forest-scale.

Summary of Effects

Pipeline construction would impact habitat by removing large trees and snags which would reduce the amount of nesting and foraging trees available for up to one pair of pileated woodpeckers. This impact would be long-term since trees would not be allowed to grow back along the pipeline.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

American Marten

Existing Condition

In the western United States, the American marten's distribution is fragmented. Home ranges vary from 1 to 4.5 square miles for males and from 0.4 to 3.6 square miles for females (Simon 1980, Zielinski et al. 1997). Martens prey on vertebrates smaller and larger than themselves, eat carrion, and forage for bird eggs, insects, and fruits (Martin 1994). American martens are closely associated with forested habitats with complex physical structure near the ground. Use of non-forested habitats by martens increases in summer and includes meadows and small harvest units near forest edges, as well as areas above the tree line in western mountains (Buskirk and Ruggiero 1994). Activities such as timber harvest and road construction that fragment, dissect, and isolate habitats are the largest threats to marten. Fragmented habitats attract habitat generalist predators like the great-horned owl, coyote, and bobcat which can all prey on marten. In addition, fragmentation eliminates the connectivity and creates isolated individuals and populations which are more susceptible to extirpation.

Effects Analysis

Analysis Area

The analysis area for the American martin includes the area within the project boundary. The Northwest Forest Plan directs the B5 pileated woodpecker/American marten areas to return to their underlying land allocation in Matrix lands except where needed to assure habitat and dispersal for the guilds of species represented by the pileated woodpecker and marten. The Forest assessed the relative importance of individual B5 areas in contributing to late seral forest conditions at the watershed landscape level. Based on that assessment, the Forest recommended that certain B5 areas be returned to the underlying land allocation and that individual watershed analysis take a closer look at the remaining B5 areas. There is no B5 in the Analysis Area.

No Action Alternative

There would be no short-term effects to American marten under this alternative. In the short-term, habitat and snag levels would remain essentially unchanged. In 20 to 30 years, more snags are likely to be added along the pipeline.

Proposed Action Alternative

Pipeline construction would impact marten habitat by removing large trees and snags which would reduce the amount of denning and foraging trees available. This impact would be long-term since trees would not be allowed to grow back along the pipeline.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), and The Dalles Watershed Phase I and II Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space.

Past timber harvest on federal lands has reduced the amount of habitat in the analysis area. Habitat for this species has continued to increase over time across the Forest but the analysis area would likely provide less habitat than other areas of the Forest due to past and present timber harvest.

Consistency Determination

This analysis is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to “maintain viable populations of existing native and desired non-native vertebrate species in the planning area.” The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. A Forest wide analysis was completed and is incorporated by reference. Viable populations of all the Management Indicator Species in this BE would be maintained at the Forest-scale.

The Forest wide Standards and Guidelines would be met for B5 American marten land allocation. At least 160 acres of mature and/or old growth forest habitat shall be maintained within each 320 acre Management Area for American marten (B5-010). Snags are discussed below under “Snag and Down Log Associated Species.”

Summary of Effects

Pipeline construction would impact marten habitat by removing large trees and snags which would reduce the amount of denning and foraging trees available. This impact would be long-term since trees would not be allowed to grow back along the pipeline.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

Wild Turkey and Gray Squirrel

Existing Condition

Wild Turkey

The wild turkey is a management indicator species for the ponderosa pine-Oregon white oak vegetation association of the Forest. Two subspecies of wild turkeys (Merriam's and Rio Grande) are found on the Forest. Turkeys feed on acorns, conifer seed, insects, and grass/forbs and nest on the ground hidden by grass or shrubs. Turkeys roost on the ground and in large diameter (> 14 inch dbh) ponderosa pine and Douglas-fir generally on slopes greater than 30 percent and within 0.5 miles of a food source.

Western Gray Squirrel

The western gray squirrel is also a management indicator species for the ponderosa pine-Oregon white oak association of the Forest. Western gray squirrels need a mix of mast-producing trees to provide food, cover, and nesting sites in their habitat. The ecological range of the western gray squirrel includes a variety of habitat types within mixed conifer and oak forests. High tree species diversity is a common component of western gray squirrel habitat and contributes to habitat quality (Linders, 2000). Gray squirrel have been documented in the planning area and there is both wintering and nesting habitat.

Effects Analysis

Analysis Area

The analysis area for wild turkey and Western gray squirrels includes the area that lies within the project boundary.

No Action Alternative

Under the No Action alternative, there would be no change to forage and hiding cover for wild turkey. Western gray squirrel would continue to have an abundance of nesting habitat and mycorrhizal fungi for foraging.

Proposed Action Alternative

The Proposed Action would have little impact to wild turkey since the pipeline construction would minimally open stands and provide some suitable foraging, nesting, brood-rearing, and roosting cover. Pipeline construction would open the forest canopy in places and provide a combination of open, mature, mast-producing forests and shrubs, and species of varying ages and sizes that would create a mix of habitats. Because the pipeline is so narrow, this increase would be minimal. The stands adjacent to the pipeline would maintain patches of forested habitat that would serve as travel corridors.

The Proposed Action would have both negative and beneficial impacts to western gray squirrels. Reduction of canopy cover and disturbance of the litter layer during construction may reduce soil moisture resulting in lower mychorrhizal fungi production, which is an important food source for this species. Western gray squirrels would continue to forage in the stands adjacent to the pipeline and would also nest in adjacent conifer stands with higher canopy cover. The Proposed Action would not be expected to reduce the number of Western gray squirrels that the planning area could support because tree removal for the pipeline adjacent to uncut stands would continue to provide conditions suitable for both foraging and nesting.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), and The Dalles Watershed Phase I and II Fuel Reduction were considered in this cumulative effects analysis because the activities overlap in time and space. These projects would have a combination of beneficial and negative impacts to wild turkey and western gray squirrel. Timber harvest and thinning have reduced the canopy cover which reduces nesting habitat for western gray squirrel but may also increase pine seed production for foraging.

Consistency Determination

This analysis is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to "maintain viable populations of existing native and desired non-native vertebrate species in the planning area." The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. A Forest wide analysis was completed and is incorporated by reference. Viable populations of all the Management Indicator Species in this BE would be maintained at the Forest-scale.

Summary of Effects

The Proposed Action would have little impact to wild turkey since the pipeline construction would minimally open stands and provide some suitable foraging, nesting, brood-rearing, and roosting cover. The Proposed Action would not be expected to reduce the number of Western gray squirrels that the planning area could support because tree removal for the pipeline adjacent to uncut stands would continue to provide conditions suitable for both foraging and nesting.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6.5 Snag and Down Log Associated Species

Existing Condition

Snags

Currently, 63.3 percent of the East Fork Hood River Watershed contains no large snags in eastside mixed conifer compared to the historic condition of 34.6 percent. The only category where current levels exceed historical conditions is in 0-2 large snags per acre. Currently, 16.7 percent of the watershed has between 0 and 2 snags per acre and historically that number was 14.2. This Watershed is deficient in high concentrations of snags with 8.1 percent of the area with 10 or more snags per acre historically and 3.9 percent currently.

Down Wood

While current and reference conditions of large down logs in eastside mixed conifer are comparable, there are some differences. Historically, 14.0 percent of the White River Watershed had 2 to 4 percent cover of large down logs compared to 6.8 percent currently. Under historic conditions, none of the watershed had greater than 12 percent cover and currently 6.9 percent of the watershed has greater than 12 percent cover.

Effects Analysis

The analysis area includes the White River Watershed. The Pipeline falls within the habitat type identified in DecAID as Eastside Mixed Conifer with vegetation condition types of small/medium trees and large trees.

No Action Alternative

In the short-term, portions of the pipeline that go through plantations would provide low amounts of down wood cover. Most areas would be below 6.5 percent cover of down wood and therefore be below the 30 percent tolerance level for wildlife habitat. However, some of the pipeline would likely have at least 3 percent of down wood comprised of classes 1 thru 4 and therefore would meet the 30 percent tolerance level for natural down wood conditions, as indicated by DecAID inventory data from unharvested plots.

In the next 20 to 30 years, these stands would begin to experience increased stand density and start to become increasingly more susceptible to damaging agents such as insects and diseases. These natural processes would recruit new snags and down logs, mainly from the smaller intermediate and suppressed trees.

Proposed Action Alternative

The proposed action would involve the removal of trees and dead wood within a 25-foot corridor. Approximately 438 live trees ranging in size from 6” to 48” dbh that will be removed. Of these 438 trees, roughly 12 are larger than 24” dbh, 170 are between 12” and 14” inches, and the remaining trees are 11” and smaller. In addition to the live trees approximately 198 standing dead trees would be cut. Of these, over half are between 11” and 20” inches, roughly 3 are over 30” dbh, 22 between 20” to 30”, with the remainder under 11” dbh. Some of the live trees proposed for cutting would have eventually become snags and down wood. The total acre of trees and snags proposed for cutting is 10.3 acres. The Watershed is 102,016 acres and the proposed acres removed represents 0.01. Assuming that 20 percent of the live trees would eventually become snags in the next 50 years, the potential amount of snags lost from the proposed pipeline would not exceed 0.005 percent of the Watershed which is not measurable at a meaningful scale and the comparison of reference and current conditions for down logs and snags would remain unchanged. The project design criteria that requires 5 percent of the largest trees to be left on site, increasing the amount of large down wood in the planning area.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), road decommissioning and road closures, and trail maintenance and relocation were considered in this cumulative effects analysis because the activities overlap in time and space.

It is not likely that private lands would provide snags and downed wood in the foreseeable future. Other timber harvest activities on Forest Service land would improve structural diversity by initiating a new age class and by creating openings. Thinning would also have an indirect impact by releasing the green retention trees. These retention trees would later become the large diameter snags and downed wood. Blocks of unharvested habitat would provide large snags and down wood while the treated areas of the watershed move toward the mature forest state. The adjacent untreated areas would allow for snag and down wood-dependent species to recolonize habitat as snags and down wood increase in the treated areas.

Consistency Determination

FW-219 and FW-223 indicate that stands should have 6 logs per acre in decomposition class 1, 2, and 3 and that they should be at least 20 inches in diameter and greater than 20 feet in length. However, FW-225 and FW-226 indicate that smaller size logs may be retained if the stand is too young to have 20 inch trees. Under the Proposed Action, logs representing the largest tree diameter class would be retained, maintaining compliance.

Summary of Effects

The proposed acres removed represents 0.01 percent of the East Fork Hood River Watershed which is 102,016 acres. Assuming that 20 percent of the live trees would eventually become snags in the next 50

years, the potential amount of snags lost from the proposed pipeline would not exceed 0.005 percent of the Watershed which is not measurable at a meaningful scale.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.6.6 Neotropical Migratory Birds

Existing Condition

Close to 30 species of migratory birds occur on the Barlow and Hood River Districts, some of which are present within the project area during the breeding season. Some species favor habitat with late-successional characteristics, such as the hermit thrush and brown creeper, while others favor early-successional habitat such as the Nashville warbler or the Williamson's sapsucker. Other species like the white headed woodpecker and pygmy nuthatch utilize open ponderosa pine habitat. Sandhill crane nest in Camas Prairie in the open meadow when it is flooded in the spring and early summer.

Effects Analysis

The analysis area for migratory birds includes areas within the boundary of the Proposed Action.

No Action Alternative

There would be no habitat alteration under this alternative. Stand conditions and the composition of migratory bird species dependent on these stands would remain unchanged.

Proposed Action Alternative

Research has demonstrated that timber removal enhances habitat for a number of migratory species and provides habitat for some species that are rare or absent in un-thinned stands (Hagar and Friesen 2009). However, some species of migratory birds have been shown to decline following thinning. The effects of tree removal would most likely have a combination of positive, neutral, and negative impacts on migratory bird use depending on which species are present. The species that may benefit from tree removal in the analysis area include the olive-sided flycatcher, Williamson's sapsucker, and chipping sparrow. The species that may be negatively impacted by tree removal include the brown creeper, Swainson's thrush, and hermit warbler. Because the trees to be removed are in a linear pattern along the pipeline, the effects to migratory bird species would be difficult to measure since the habitat at the stand scale would remain unchanged.

Cumulative Effects

Of the projects and activities found in Table 1, timber harvest on federal land (past, present, and reasonably foreseeable), road decommissioning and road closures, The Dalles Watershed Phase I and II Fuel Reduction, and The Dalles Watershed fuel reduction were considered in this cumulative effects analysis because the activities overlap in time and space.

Open habitat that would be created could be beneficial for early seral species like the olive-sided flycatcher, white-headed woodpecker and Williamson's sapsucker. The Swainson's thrush and brown creeper would be negatively impacted by habitat removal. The cumulative effects of timber harvest activities are similar to the effects of the Proposed Action and would have a combination of positive, neutral, and negative impacts on migratory birds.

Consistency Determination

The Proposed Action is consistent with Executive Order 13186 (66 Fed. Reg. 3853, January 17, 2001) "Responsibilities of Federal Agencies to Protect Migratory Birds." This Executive Order directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. This Executive Order also requires federal agencies to develop Memorandum of Understandings (MOU) with the FWS to conserve birds including taking steps to restore and enhance habitat, prevent or abate pollution affecting birds, and incorporating migratory bird conservation into agency planning processes whenever possible. The Bureau of Land Management and U.S. Forest Service have both completed, and are currently implementing, their respective MOU's with the FWS.

Summary of Effects

The effects of tree removal would most likely have a combination of positive, neutral, and negative impacts on migratory bird use depending on which species are present. Because the trees to be removed are in a linear pattern along the pipeline, the effects to migratory bird species would be difficult to measure since the habitat at the stand scale would remain unchanged.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.7 Botany

3.7.1 Existing Condition

This project is located in an area which has been managed in the past. Some large legacy trees remain, but it is predominantly second-growth Douglas-fir, with a shrub component of oceanspray (*Holodiscus discolor)* and wild rose (*Rosa gymnocarpa)* among others. There is a healthy diversity of understory forbs and grasses within this area, especially within forest openings. The trees and shrubs have been thinned along the road systems to maintain a fuel break, and now support a dense grass and forb community. Along the pipeline itself there are several small, wetland habitats. These have been determined to be naturally created sites (see the Fisheries report for more information) which could provide potential habitat for certain bryophyte species. Only one species was known from within this project area, and no new sites were found during project surveys.

Shistostega pennata

The goblin-moss, *Shistostega pennata*, is listed as a Class A species on the 2001 ROD. It used to be on the Regional Forester's Sensitive species list, but has been removed and does not have a state ranking with the Oregon Natural Heritage Program. There is one historic site for the goblin-moss within Brook's Meadow creek near the project area. There is one point along this creek where the pipeline and access will cross. Surveys at this site did not find any specimens. The goblin-moss is an ephemeral species which often colonizes mineral soil, most often within the root mass of recently downed trees. These sites are most common in moist areas, or sites such as caves or riparian areas which stay moist. As this bare, mineral soil becomes colonized by other bryophytes and plants after the first year, the goblin-moss will fade out (Harpel and Helliwell 2005).

3.7.2 Effects Analysis

No Action Alternative

Under the No Action alternative, no activities involving the pipe replacement, and all associated ground-disturbance, repair and maintenance would occur. There would be no impact to sensitive vascular plants, bryophytes, lichens and fungi.

Proposed Action Alternative

The Proposed Action includes ground-disturbing activities associated with removing the old, existing pipe and replacing it and other infrastructure. There is also planned, regular maintenance along this pipeline. This work will remove existing vegetation and create early seral habitats along the pipeline.

There are no current sites for sensitive vascular plants, bryophytes, lichens and fungi within this project area, so there will be no impact to any of these species.

Cumulative Effects

There are no sensitive species known from this area, resulting in no cumulative effects to consider within this report.

3.7.3 Consistency Determination

Forest Service Policy

The No Action alternative and the Proposed Action alternative are consistent with the following Forest Service Standards FSM 2672.1 - Sensitive Species Management and FSM 2670.22(2) - "Maintain viable populations of all native and desired non-native wildlife, fish and plant species in habitats distributed throughout their geographic range on National Forest System lands."

Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) Direction

The No Action alternative and the Proposed Action alternative are consistent with the following Forestwide Standards; FW-148, 149 and 150, FW-162, FW-174, FW-175 – "Habitat for threatened, endangered, and sensitive plants and animals shall be protected and/or improved, and FW-176.

2001 Survey and Manage Record of Decision

The No Action alternative and the Proposed Action alternative are consistent with the survey protocols 2001 Survey and Manage Record of Decision. All botany surveys included consideration of botanical species in Table C-3 of the 2001 Survey and Manage Record of Decision.

National Forest Management Act (NFMA) Implementing Regulations

The No Action alternative and the Proposed Action alternative are consistent with regulations 36 CFR 219.19 and The 1983 USDA Departmental Regulation 9500-4.

3.7.4 Summary of Effects

The Proposed Action would have no impact on sensitive vascular plants, bryophytes, lichens and fungi because there are no sensitive vascular plants, bryophytes, lichens and fungi within this project area.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.8 Invasive Plant Species

3.8.1 Existing Condition

The project area is located within a previously managed area. The area has a healthy growth of native shrubs, grasses and forbs which prevents the establishment of invasive species. The 1700 road is maintained as a fuel break, and is also heavily utilized for travel and recreation. This route has been used many times in the past several years as a haul route for timber sales. Because of these activities, this road and nearby landings or trailheads have been regularly surveyed and managed for invasive weeds for many years. The 1700-014 road runs parallel to the existing pipeline, and is used primarily for pipeline maintenance and not for regular travel. The target invasive species, or "noxious weeds" identified by the Oregon Department of Agriculture (ODA) that are known to occur within or adjacent to the project area are spotted and diffuse knapweed, bull thistle and St. Johnswort. There are only sparse populations of each within the project area.

3.8.2 Effects Analysis

No Action Alternative

The No Action alternative would have no effects which would increase or introduce invasive weed populations. None of the planned activities would take place, and no ground disturbance would occur. Vectors which are currently present would continue to have the potential for invasive species introduction and spread.

Proposed Action Alternative

The Proposed Action would remove old pipeline, replace it and other infrastructure, and would provide maintenance along this new line. These ground-disturbing activities would create favorable conditions for invasive species establishment from new or current populations and seed source. As part of the project, pipes and gravel/sand materials will be stockpiled at four different sites off the 1700 road and 4400-011 road. These stockpiles will be in open, previously disturbed areas which have been approved for use. Introduction of new weed species or infestations can occur through this material and its use during the project implementation. Machinery also has the potential to bring in new weed seeds or particles, or transport it from neighboring infestations.

Project Design Criteria associated with the Proposed Action would provide mitigation for the introduction of new weed species, and would prevent the spread of current invasive species into areas without infestation as well as to other areas of the forest. This prevention would occur through the cleaning of equipment, use of weed-free materials, and restoration with native seed. Machinery would be washed prior to its arrival on forest land. There are only small infestations near the project area, but those haul routes, landings and known sites within the project area would be treated prior to implementation.

The level of risk for the introduction or spread of noxious weeds is moderate and based on the following: known weeds in/and or adjacent (~ 100 feet) to the project area, in moderate quantities (Moderate density/acre), no more than four of vectors 1 - 8 present in the immediate project area, project operation activities not able to avoid weed populations.

Long term treatments are not proposed as part of this project, and would be conducted under a separate program and NEPA document (FEIS Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River National Scenic Area in Oregon including Forest Plan Amendment #16.

Cumulative Effects

The area analyzed for cumulative effects was within the Dog River 6th field subwatershed, with a focus on the travel ways within and associated with the project. Of the projects and activities found in Table 1, road decommissioning and road closures, The Dalles Watershed Phase I and II Fuel Reduction, The Dalles Watershed fuel reduction, trail maintenance and relocation, were considered in this cumulative effects analysis because the activities overlap in time and space.

These projects overlap in space and some overlap in time. The use of the 1700 road system and nearby trails for project haul routes and travel has a continued risk for invasive species introduction. Project Design Criteria, as discussed above, would mitigate for the introduction and spread of invasive species. Under the 2008 Site-Specific Invasive Plant Treatment EIS, roadside populations would be treated regularly depending on the need and level of infestation. These combined actions would lower the risk of invasive species introduction within the project area. This additional road maintenance would be addressed separately through the FEIS Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River National Scenic Area in Oregon including Forest Plan Amendment #16.

3.8.3 Consistency Determination

Forest Service Manual (FSM) 2900 Invasive Species Management direction requires the determination of "the risk of invasive species introduction or spread as part of the project planning and analysis process for proposed actions, especially for ground disturbing and site altering activities, and public use activities" (FSM 2904.08, #8)

FSM 2900 also states, "Ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas" (FSM 2903).

The identification of management and prevention is also consistent with the Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River Gorge National Scenic Area in Oregon FEIS/ROD (2008).

Northwest Forest Plan Direction:

- FW-299 - "Noxious weed control projects shall comply with Region Six "Managing Competing and Unwanted Vegetation" FEIS, Record of Decision (1988), and Mediated Agreement (1989)."

- FW-300 - "Plants that have been identified as pests by the State Department of Agriculture shall be controlled as described in the Mt. Hood National Forest Noxious Weed Implementation Plan."

- FW-301 - "Implementation of control measures should adhere to the following priorities:
  - Prevention
  - Early treatment
  - Maintenance
  - Correction
  - No action (per Vegetation Management FEIS, Record of Decision 1988, and Mediated Agreement 1989)"
  - B2-056 – "Vegetation management adjacent to major travel routes or recreation sites shall be consistent with the Northwest Region (R6) "Management of Competing and Unwanted Vegetation" FEIS, Record of Decision (1988) and Mediated Agreement (1989)"

3.8.4 Summary of Effects

The Proposed Action would have a moderate risk of weed introduction. The pipe removal and replacement activities would create disturbed conditions for invasive species growth, and the equipment may introduce seeds or propagules from nearby roadside sources. Mitigations are proposed to reduce the risk of invasive species introduction and spread.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.9 Recreation

3.9.1 Existing Condition

Recreational activities occur within and adjacent to the project area. The area is popular for dispersed recreation, including hunting and camping. A popular non-motorized trail system is located along The Dog River Pipeline as well as in the adjacent area. The following existing conditions within the planning area will be examined: the Recreation Opportunity Spectrum, dispersed recreation, and trails.

Recreation Opportunity Spectrum (ROS)

The majority of the proposed project falls within the ROS setting identified in the Forest Plan as: Roaded Modified. Recreation experiences and opportunities in these areas often depend on vehicular access off the primary routes via secondary roads. Camping experiences are relatively primitive, with few on-site facilities provided, requiring some self-reliance and use of primitive outdoor skills.

A small portion of the project falls within the Roaded Natural ROS setting. This portion of the project is not a high use recreation area. Roaded National ROS settings provide for areas characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of man. These evidences usually harmonize with the natural environment. Interaction between users may be low to moderate but with evidence of other users prevalent. Resource modification practices are evident but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and the design of facilities.

Dispersed Recreation

Dispersed recreation use may occur throughout the project area. Dispersed recreation in the vicinity of the proposed pipeline replacement may include camping, hunting, berry picking, mushroom picking, and driving for pleasure. Other incidental recreational use may occur as well.

Trails

There are numerous popular trails along FSRs 44 and 17. Surveyors Ridge Trail 688 is popular for hikers, horseback riders and mountain bikers. The trail winds through forested areas, open areas and along Surveyors Ridge where it provides views of Mt. Hood and the surrounding valley. The trail is located on top of the Dog River Pipeline for approximately 2.7 miles. This section of the trail is also an access road, but portions of it have grown in significantly over the years making it look more like a trail than a road.

Surveyors Ridge Trail 688 connects with other popular trails in the area which provide large loops for nonmotorized recreationists to connect. Surveyors Ridge connects directly to The Super Connector, Dog River Trail 675 and Cooks Meadows Trail 639. Many mountain bikers enjoy riding several trails in one day, and Surveyors Ridge is often a popular choice for both locals and visitors who have heard about the views the trail offers.

FSRs 44 and 17 are snowmobile trails during the winter. The roads are closed November 15 through March 15 and may be groomed for snowmobiles December 1 through April 1. A local snowmobile club performs the grooming under a road use permit with the Mt. Hood National Forest.

Table 65. Trails within Project Area.

Trail Name and Number	Permitted Use	Approximate Length (Miles)
Surveyors Ridge 688	Pack and Saddle, Bike, Hike	13.0
Dog River 675	Bike, Hike	5.3
Cooks Meadow 639	Pack and Saddle, Bike, Hike	3.0

3.9.2 Effects Analysis

No Action Alternative

There would be no direct or indirect effects from the No Action alternative. Taking the No Action alternative would have no impact to the ROS spectrum, dispersed recreation, or trails.

Proposed Action Alternative

Recreation Opportunity Spectrum (ROS)

The pipeline replacement would not have a detrimental impact on the Roaded Modified ROS or Roaded Natural ROS. In both ROS settings motorized use is evident. Project completion could bring more routine maintenance utilizing vehicles along the pipeline right-of-way. This activity would be consistent with these ROS settings, as well as the presence of a modern, roaded right-of-way.

Dispersed Recreation

The proposed project could have some impacts to dispersed recreation. During project implementation, forest visitors could see and hear construction along the pipeline right-of-way and the proposed staging areas. This impact would be temporary and only occur during project implementation.

Another effect would be the presence of a modern right-of-way with the completion of the project. The new right-of-way would look different from the existing right-of-way and have substantially less vegetation shading it. Some visitors may enjoy the new right-of-way, and use it for non-motorized recreation. Others may miss the old right-of-way which was not visible from the roadway and was well shaded and had vegetation encroaching upon in in areas.

Visitors who enjoy driving for pleasure would see the right-of-way corridor where it crosses FSR 17. The right-of-way would be the most visible from the west side of the road. Some visitors may not appreciate the change in scenery from the road, although it will impact the view for less than 100 linear feet along the road.

Trails

Sections of the Surveyors Ridge Trail 688 would be closed during implementation. A 2.7 mile section of the trail overlaps with the existing right-of-way. This section of trail would be substantially different once the pipeline is replaced as the right-of-way which is currently covered with native surface and shaded by vegetation would be disturbed to replace the existing pipeline and resurfaced with aggregate and widened to 25 feet. To mitigate this impact, a trail has been constructed connecting the Super Connector trail directly to Surveyors Ridge Trail 688. This action will allow visitors to use the Super Connector Trail to directly access the Surveyors Ridge Trail and bypass the section of trail where the pipeline replacement would take place. A reroute was also completed to allow visitors to stay on a primitive trail and avoid the sections of existing trail where it would be impacted by the pipeline project, except at one intersection.

Some visitors might prefer using the pipeline right-of-way once it becomes a modern right-of-way. They might enjoy easy access along the corridor. Others may be disappointed that what they perceived to be a trail and not a right-of-way looks and feels more like a road. There would likely be a period during construction when there wouldn’t be trail access to the unimpacted section of Surveyors Ridge trail from the Dog River and Cooks Meadow Trails. Some visitors may not utilize the trail system for this reason. However, this would be temporary. All changes to the system would be posted at pertinent trail heads, on pertinent websites and released to the public ahead of time, so visitors could plan accordingly.

It is unlikely that the Dog River Pipeline replacement would have an impact on groomed snowmobile trails in the vicinity of the project.

Cumulative Effects

Of the projects and activities found in Table 1, the items below were considered when analyzing cumulative effects for recreation. These items were analyzed as a result of their proximity to the planning area and their potential to have an effect on recreation within the planning area. The spatial context of the cumulative effects analysis lies within one mile of any portion of the proposed pipeline replacement. Under the Proposed Action, these items could have an impact on the planning area. Combined with the Proposed Action, these actions would not deviate from Forest Plan standards.

Trail Maintenance

No cumulative effects would occur. The affected portion of Surveyors Ridge Trail would be closed and the portion of the trail overlapping the pipeline right-of-way would be permanently impacted, but project design criteria would mitigate any long term impacts after the project was complete by rerouting the trail to provide a similar, somewhat primitive trail experience. Over time, potential hazard tree removal along trails could open up scenic views near the project area. This could improve views of Mount Hood as well as other unique natural features within the planning area.

Hazardous Fuels Reduction

No cumulative effects would occur. The projects would occur in close proximity, and trail closures would occur due to each project. However, they would not be likely to be implemented at the same time. Furthermore, the Surveyors Ridge Trail reroute would help mitigate impacts of closure of the Dog River Trail which would occur during the implementation of the fuels reduction.

Road decommissioning and road closures

No cumulative effects would occur. Road closures within and adjacent to the project could eliminate access to dispersed campsites and other dispersed recreation use like berry picking. There are already a minimal number of roads in the vicinity. Any closures would be minimal and would have a small impact on access for dispersed recreation. Over time, potential hazard tree removal along roads could open up scenic views near the project area. This could improve views of Mount Hood as well as other unique natural features within the planning area.

3.9.3 Consistency Determination

Table 66 lists the Standards and Guidelines from the Forest Plan pertinent to the No Action alternative and the Proposed Action alternative.

Table 66. Consistency with Forest Plan Standards and Guidelines.

Standards & Guidelines	Relevant Element of Proposed Action	Does the Proposed Action Meet Standard as currently designed?	Data Used for Analysis
FW-451/458: Forest Management activities with the potential to adversely impact trails and associated facilities and dispersed recreation sites shall include measures to minimize impacts and provide for protection and/or restoration of the impacted trails, sites, facilities, and structures.	Installation of a modern pipeline and modern right-of-way in the same location as the Surveyors Ridge trail.	Yes	Surveyors Ridge Trail Reroute Decision Memo.
FW-460: Trail systems shall be designed, located, managed, and maintained to consider user's needs and other resource objectives	Installation of a modern pipeline and modern right-of-way in the same location as the Surveyors Ridge trail.	Yes	Surveyors Ridge Trail Reroute Decision Memo.
FW-452/463: Designated trails, trailheads, associated facilities, and dispersed recreation sites impacted and/or adversely affected by management activities, shall be rehabilitated, restored, and/or relocated.	Installation of a modern pipeline and modern right-of-way in the same location as the Surveyors Ridge trail, and closure of portions of the trail system.	Yes	Surveyors Ridge Trail Reroute Decision Memo.
B2-001: Structures and improvements may be provided to protect resource values, for administrative purposes, and to accommodate recreational use	Pipeline installation is needed for administrative purposes for The City Of The Dalles	Yes	Proposed Action discusses need for improving the existing pipeline.
B2-005: A trail system should be developed and designated to disperse recreational use and provide a range of difficulty levels.	Pipeline will have an impact on trail system. Separate decision mitigates	Yes	Surveyors Ridge Trail Reroute Decision Memo.

Standards & Guidelines	Relevant Element of Proposed Action	Does the Proposed Action Meet Standard as currently designed?	Data Used for Analysis
	impacts to trail system.		
B6-003,004,005: The development of new or expansion of existing recreation sites, facilities and trails may occur, but should avoid or protect sensitive watershed lands. These sites, facilities and trails shall not be permitted in The Dalles Watershed.	Pipeline will have an impact on trail system. Separate decision mitigates impacts to trail system.	Yes	Surveyors Ridge Trail Reroute Decision Memo.
C1-001: Dispersed recreation opportunities shall be provided and encouraged. Hiking and trail use, driving for pleasure, hunting, wildlife viewing, berry picking, cross-country skiing, the use of off-road vehicles, and cultural resource interpretation are examples of possible activities.	Installation of a modern pipeline and modern right-of-way in the same location as the Surveyors Ridge trail.	Yes	Surveyors Ridge Trail Reroute Decision Memo.

3.9.4 Summary of Effects

Recreation Opportunity Spectrum (ROS)

There would be no direct effects to the two ROS settings identified within the planning area under the No Action alternative or the Proposed Action alternative. Regardless of the course of action, the ROS settings would remain the same, and recreational opportunities within the settings would remain the same.

Dispersed Recreation

There would be no direct or indirect effects to dispersed recreation under the No Action alternative. Under the Proposed Action alternative there may be some impacts to dispersed recreation during project implementation if visitors are unable to access areas they would like to visit. Construction sights and sounds could also have a negative impact on someone's experience in the vicinity of the project if they are seeking solitude and quiet, however, this would be temporary. The new modern right-of-way could be perceived either positively or negatively by visitors depending on visitor perspective.

Trails

The Proposed Action alternative would impact the trail system in the vicinity of the project. Surveyors Ridge trail would be the most directly impacted as a 2.7 mile section of the trail overlaps with the right-of-way. This segment of trail would be permanently modified by the project. A reroute of the trail will mitigate concerns related to the change in the condition of the trail itself by continuing to provide a

semiprimitive trail experience and continuing to connect Surveyors Ridge trail to the other trails along the FSR 44 corridor.

A segment of trail bypassing the construction will be constructed prior to implementation of the pipeline replacement, which would provide continuity for the majority of the trail system. The full reroute would not be completed until the entire pipeline replacement was completed, so there would be an impact in the short term. In the long term, the system would remain intact.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.10 Cultural Resources

3.10.1 Existing Condition

Very few archaeological surveys or excavations have been conducted in the area, and little is known about the prehistory of the area. Nearby peeled cedar trees suggest that huckleberries and other plant resources were probably gathered, along with hunting forays for deer, elk and other wildlife. Expansive vistas of Mt. Hood were probably enjoyed for recreational and spiritual pursuits; a few rock cairns and rock features have been located overlooking the East Fork Hood River and the mountain. Some of the current hiking trails and roads likely follow earlier Indian trails, especially the 4410 and 4420 roads, and possibly the 1700 and 1720 roads.

Although there are no known Traditional Cultural Properties known to exist near the project area, stacked rock features and lithic scatters within a few hundred meters of the project location indicate a varied and intensive use of the area. A projectile point recovered from the 4420 site (661NA0184) appears similar to the Eastgate type and suggests that the area was utilized at least 2500 years ago (Perino 1985).

Dog River Aqueduct

The Dog River Aqueduct is considered individually eligible for inclusion on the National Register of Historic Places. The Dog River Aqueduct (661EA0031) is largely intact as it was constructed in 1913-1914, with the exception of at least two areas repaired with steel pipe or terra cotta pipe. The feature also exhibits a high degree of engineering skills, with all of the labor conducted using hand tools. Features associated with the aqueduct include a total of eight rocked pressure valves, seven rocked culverts, the log stringer bridge crossing over Meadow Creek, scattered clay tiles, gauging stations, and a concrete access box. A portion of the pipeline was replaced with steel pipe during a previous failure in 1944. Today, pipeline maintenance consists of driving wooden wedges beneath the steel bands to tighten the seams and replacing deteriorated segments.

Dog River Head Works Log Cabin

The Dog River Head Works Log Cabin (661EA0073) is considered eligible for inclusion on the National Register of Historic Places as contributing elements to the historic district. It was constructed in 1904, is believed to be the oldest structure at the head works. The cabin has played a key role in the development and installation of the aqueduct. The cabin has experienced some modifications, is leaning into a hillslope, and is partially deteriorated, but is still largely intact.

Dog River Head Works Cabin and Wood Shed

The Head Works Cabin is considered eligible for inclusion on the National Register of Historic Places as contributing elements to the historic district. The cabin portion of the Dog River Head Works Cabin and Wood Shed (661EA0074) was constructed in 1922 in the Mill Creek area and later moved to the head

works. The structure has always functioned as the headquarters for the head works, and appears to be unmodified. According to Keyser, the cabin was constructed in 1922 on City of The Dalles property on Lower Mill Creek, and later moved (no date) to its current location. The cabin has always served as patrol and maintenance headquarters for City Water Works staff.

The Wood Shed component of the Dog River Head Works Cabin and Wood Shed (661EA0074) was constructed in the 1940s by Tobe Payne, and moved to its current location in 1969 (Unpublished manuscript; William Keyser August 27, 1980). The Wood Shed lies outside of the Period of Significance for the Dog River Head Works.

Dog River Diversion Cabin

The Dog River Diversion Cabin (661EA0075) is considered individually eligible for inclusion on the National Register of Historic Places. It was constructed between 1910 and 1920 (exact date unknown) during the installation of the pipeline. The structure is unique because of the “US” stamping exhibited on the ends of each log; this stamping shows early cooperation between the City of The Dalles and the US Forest Service in the management of the watershed.

Brooks Meadow Pipeline

The site was initially documented in 1990 by Kirk Metzger as part of the Dog River Aqueduct, FS number 666EA0031. For the purpose of this analysis the Brookes Meadow Pipeline is documented as FS number 666EA0298, separate from the Dog River Pipeline. The site consists of a water transmission pipeline.

The Dog River Telephone Line

The Dog River Telephone line (661EA0350) consists of 12 trees with the remains of a telephone line along both sides FSR 4400-011. The telephone line remains consist of brown and white split-tree ceramic insulators or wire mountings. The trees are immediately adjacent to the road. The insulators are mounted on the trees at various heights. A 1916 Oregon National Forest Map shows a telephone system running north from a guard station at Brooks Meadow, which may have connected to the Dog River Telephone Line. The telephone line was probably installed to monitor conditions at the head gate works for the Dog River Aqueduct (Pipeline) and was most likely installed when the Dog River Head Works Cabin (661EA0074) was placed at the head works in 1922.

The Dalles Water Supply Ditch

The water Supply Ditch (661EA0351) is considered individually eligible for inclusion on the National Register of Historic Places. The intact portions of the ditch are a good example of early efforts by local communities to begin to manipulate and manage resources on Federal lands determined to be vital for their survival. The site is a linear feature that extends north from the bank of Dog River for approximately 2.18 miles. The ditch measures up to 16 feet wide and up to 5 feet in depth. The ditch begins on the east bank of Dog River about 3,143 feet upstream from the dam and diversion at the current headworks for the Dog River Aqueduct. No diversion remains at the point where the ditch leaves Dog River.

The Dog River Diversion and Impoundments

The Dog River Diversion and Impoundments is considered eligible for inclusion on the National Register of Historic Places as contributing elements to the historic district. This site is comprised of two small dams on the Dog River; an upper dam and a lower dam. The upper dam consists of concreate and is located approximately 78 feet upstream from the lower dam. There are two modern gauging stations at the site. The lower dam is located at the Head Gate Cabin, and consists of a complex structure designed to impound and divert waters from Dog River into the Dog River Aqueduct. There is a spillway at the east

end of the dam. The aqueduct intake is beneath the Dog River Diversion Cabin (661EA0075), and consists of a 'pond' partially enclosed by concrete walls. There is a covered grate in front of the intake. Modern metal steps and railings lead up the north face of the dam, where a walkway constructed of boards leads to a metal sluice gate.

The Dog River Diversion and Impoundments (661EA0364) has been significantly modified through the years. The modifications include the addition of concrete abutments, the addition of walkways, the modification of the intake, the addition of modern steps, the addition of a sluice gate, and the addition of modern hand rails. The appearance of the dam has changed dramatically from the same structure photographed in 1923. The feature does not retain suitable integrity to be considered individually eligible for inclusion in the National Register of Historic Places; however, the feature can be considered as a contributing element to the Dog River Head Works historic district.

3.10.2 Effects Analysis

No Action Alternative

By not replacing the pipeline, Heritage Resources would continue to persist in their existing condition. The resources would be affected by decay, natural forces, and continued maintenance to the pipeline and associated infrastructure.

Proposed Action Alternative

To determine the effects of the Proposed Action, it is necessary to assess the significance, or eligibility for inclusion in the National Register of Historic Places, for each of the historic properties potentially affected by the Proposed Action.

Dog River Aqueduct

It is expected that although the historic pipeline would be left intact, most if not all of the associated features would most likely be obliterated during the installation of the new pipeline. The setting of the pipeline would be affected by the removal of trees and equipment maneuvering. However, the effects on the setting would only be temporary as the exposed slopes would be stabilized and it is expected that conifer trees would quickly restock in a natural process. Although the proposal calls for leaving the historic pipeline intact and functioning through the replacement process, the old pipeline will no longer carry water once the new pipeline is operational. Without constant exposure to water, it is expected that the historic pipeline will rapidly deteriorate. The Dog River Aqueduct is a buried artifact; replacing the pipe would have no impact on the visual character or historic nature of the pipeline; however, the visual setting would be disrupted temporarily. Interpretive opportunities would not be affected by the replacement of the buried pipeline. The Dog River Aqueduct has been fully documented. An interpretive sign explaining the history of the aqueduct would be erected along the Surveyors Ridge Trail. The Proposed Action would have **no adverse effect** on the Dog River Aqueduct. The project will have **no adverse effect** on the Dog River Head Works historic district.

Dog River Head Works Log Cabin

The proposed replacement of the Dog River Aqueduct would occur about 30 feet to the west of and adjacent to the cabin. Equipment maneuvering would occur along Forest Service Road 4400-011 adjacent to the cabin. The cabin would not be directly affected by the proposed project. However, the setting of the cabin would be affected by the removal of some of the vegetation between the road and the pipeline. However, the effects on the setting would only be temporary as the exposed slopes would be stabilized and it is expected that conifer trees would quickly restock in a natural process. There would be no indirect effects to the cabin. The proposed project would have **no adverse effect** to the Dog River Head Works

Log Cabin (661EA0073). The project will have **no adverse effect** on the Dog River Head Works historic district.

Dog River Head Works Cabin and Wood Shed

The proposed replacement of the Dog River Aqueduct would occur about 30 feet to the west of the cabin, where the pipeline is situated beneath Forest Service Road 4400-011. The setting includes a small graveled parking area to the south of the cabin. There would be no direct or indirect effects to the cabin or the wood shed. The proposed project would have **no effect** to the Dog River Head Works Cabin and Wood Shed (661EA0074). The project will have **no adverse effect** on the Dog River Head Works historic district.

Dog River Diversion Cabin

The replacement of the Dog River Aqueduct would involve modifications to the intake, situated beneath the cabin. The intake has been modified and no longer retains any historic character. The cabin would remain in its current location; there are no plans to modify, move, or change the cabin. There would be no direct or indirect effects to the cabin. The proposed project would have **no effect** to the Dog River Diversion Cabin (661EA0075). The project will have **no adverse effect** on the Dog River Head Works historic district.

Brooks Meadow Pipeline

The replacement of the Dog River Aqueduct would involve use of Forest Service Road 1700-014 adjacent to and above the southern portion of the Brooks Meadow Pipeline. The southern portion of the Brooks Meadow Pipeline lies near the 25-foot wide maintenance/access corridor required for the pipeline replacement and would likely be impacted by the project. The northern portion of the pipeline above the crossing of Forest Service Road 1700-014 over Meadow Creek would remain unaffected by the project. It has been determined that the pipeline does not contribute to the NRHP eligibility of the Dog River Head Works historic district, and is not individually eligible for inclusion on the NRHP. There would be no indirect effects to the pipeline. The Brooks Meadow Pipeline is considered to be ineligible for inclusion in the NRHP, both as an individual resource and as a contributing element to the Dog River Head Works historic district. The proposed project would have **no effect** to the Brooks Meadow Pipeline (661EA0293) or to the historic district.

Dog River Telephone Line

The Dog River Telephone Line lies adjacent to Forest Service Road 4400-011 and within the 25-foot wide corridor for equipment maneuvering. The telephone line would likely be impacted by the project; many of the trees containing insulators are dead or dying, and would be removed as hazard trees. Other trees containing insulators may be obstacles to equipment maneuvering and would be removed. There would be no indirect effects to the telephone line. The Dog River Telephone Line is considered to be ineligible for inclusion in the NRHP, both as an individual resource and as a contributing element to the Dog River Head Works historic district. The proposed project would have **no effect** to the Dog River Telephone Line (661EA0350) or to the historic district.

The Dalles Water Supply Ditch

The ditch lies outside of any of the proposed areas affected by the project. The Dalles Water Supply Ditch would not be directly or indirectly affected by the project. There would be **no effect** to the Dalles Water Supply Ditch (661EA0351).

Dog River Diversion and Impoundments

A fish screen is scheduled to be installed as part of the project. The structure would measure about 40 feet long and 20 feet wide. The structure would connect to the existing dam and extend upstream for 40 feet, and extend into the stream 20 feet from the diversion intake gate. The fish screen would be added to the main diversion as described above. The addition of the fish screen would be a permanent attachment and visual change to the impoundment. There would be no indirect effects to the Dog River Diversion and Impoundments (661EA0364). The proposed project would have **no adverse effect** to the Dog River Diversion and Impoundments (661EA0364). The project will have **no adverse effect** on the Dog River Head Works historic district.

Cumulative Effects

For heritage resources, any effects are limited to site specific locations. Any cumulative effects would also be limited to heritage resources situated within proposed areas of ground disturbance. It has been determined that the project as proposed would have no adverse effect on heritage resources. All projects shown in Table 1, were considered for cumulative effects; however, none of the proposed projects involve heritage resources situated within the proposed project areas. There are no known projects that would overlap with the current project area in the foreseeable future, therefore there would be no cumulative effects for heritage resources as a result of implementing any of the action alternatives. The consultation for the Heritage Resource Survey results and recommendations for the project have been completed in accordance with the 2004 PA and submitted to the Oregon SHPO for review; the results of the SHPO review are pending.

3.10.3 Consistency Determination

The project would not adversely impact any significant heritage resources. Based on the proposed protective measures, the project meets the criteria in the Programmatic Agreement for “No Historic Properties Adversely Affected” determination.

This action is consistent with Forest Plan goals to protect important heritage resources. Heritage resource inventories were conducted in compliance with the 2004 PA during the project planning stage (FW-598, FW-600, FW-610, FW-602 and FW-606), the field survey results were fully documented (FS-608). Heritage resources potentially affected by the project activities have been evaluated for inclusion on the NRHP (FW-612), and the potential effects to heritage resources from the proposed projects have been assessed (FW-609, FW-610). All records and documents concerning heritage resources for the project are kept on file at the Hood River Ranger District, Mt. Hood National Forest (FW-626).

3.10.4 Summary of Effects

Under the Proposed Action, the City of The Dalles proposes to replace the entire length of the Dog River Aqueduct and add a fish screen to the lower impoundment at the intake. Pipe, gravel, and equipment would be staged at as many as three storage areas. A complete (100%) survey of the entire project area revealed a collection of features and structures comprise the Dog River Head Works historic district, shown in Table 67.

Table 67. Dog River Head Works Historic District

Forest Service Temporary Number	Name	Description
661EA0031	Dog River Aqueduct	Historic wood pipeline
661EA0073	Dog River Head Works Log Cabin	Historic cabin
661EA0074	Dog River Head Works Cabin and Woodshed	Historic structures
661EA0075	Dog River Diversion Cabin	Historic Cabin
661EA0293	Brooks Meadow Pipeline	Historic wood/steel pipeline
661EA0350	Dog River Telephone Line	Historic telephone line
661EA0351	The Dalles Water Supply Ditch	Historic Ditch
661EA0364	Dog River Diversion and Impoundments	Historic dams, intake

The historic district was determined to be eligible for inclusion on the National Register of Historic Places (NRHP) based on NRHP Criterion A with a Period of Significance of 1887 to 1922. Properties determined to be individually significant and eligible for inclusion on the NRHP include the Dog River Aqueduct (661EA0031), the Dog River Diversion Cabin (661EA0075), and The Dalles Water Supply Ditch (661EA0351). Properties determined to be eligible for inclusion in the NRHP as contributing elements to the historic district include the Dog River Head Works Log Cabin (661EA0073), the cabin portion of the Dog River Head Works Cabin and Wood Shed (661EA0074), and the Dog River Diversion and Impoundments (661EA0364). Properties determined to be ineligible for inclusion on the NRHP and also non-contributing elements of the historic district include the Brooks Meadow Pipeline (661EA0293) and the Dog River Telephone Line (661EA0350). No protective measures are required or recommended for ineligible properties.

For each of the properties documented during the survey, it was determined that the project would have the effects listed in Table 68.

Table 68. Summary of Effects, Dog River Head Works

Temporary Number	Site Name	Eligibility	Determination of Effect	Description of Effects
661EA0031	Dog River Aqueduct	Individually Significant	No Adverse Effect	Property is below ground, no visual effects to historic character. Property has been fully documented. An interpretive sign will be installed. Most of associated features expected to be obliterated. Property is part of municipal water source with upgrades, maintenance expected. Upgrade required to avoid detrimental potential effects of failure. An interpretive sign explaining the aqueduct history would be installed. Setting affected by 25-foot wide installation corridor would be temporary; vegetation expected to restock naturally.

Temporary Number	Site Name	Eligibility	Determination of Effect	Description of Effects
661EA0073	Dog River Head Works Log Cabin	Contributing element - moved from original location	No Adverse Effect	Setting of cabin affected by 25-foot wide installation corridor would be temporary; vegetation expected to restock naturally.
661EA0074	Dog River Head Works Cabin and Wood Shed	Cabin is contributing element- moved from original location. Wood Shed is outside of Period of Significance	No Effect	Setting is already open and would remain unchanged. Cabin would not be impacted by pipeline replacement
661EA0075	Dog River Diversion Cabin	Individually Significant	No Effect	Intake would be modified, but cabin would be left unmodified and intact.
661EA0293	Brooks Meadow Pipeline	Non-eligible	No Effect	Property determined to be ineligible
661EA0350	Dog River Telephone Line	Non-eligible	No Effect	Property determined to be ineligible
661EA0351	The Dalles Water Supply Ditch	Individually Significant	No Effect	The property lies outside of any activity areas associated with this project.
661EA0364	Dog River Diversion and Impoundments	Contributing element-has been significantly modified	No Adverse Effect	The lower dam has already been significantly modified. The addition of a fish screen would be consistent in scope and scale with previous modifications. No historic materials would be removed.

Additional information regarding this resource can be found in the full specialist report which is incorporated by reference and available in the project record.

3.11 Climate Change

3.11.1 Existing Condition

The Council on Environmental Quality has identified that climate change is a particularly complex challenge given its global nature and the inherent interrelationships among its sources, causation, mechanisms of action, and impacts. Projects and programs with a Federal nexus requiring the disclosure of environmental impacts under NEPA have the potential to either affect the amount of greenhouse gases (GHGs) in the atmosphere or to be affected by climate change.

There has been growing concern and interest over the effects of climate change on National Forests and their current status as a carbon sink. Evidence suggesting that the correlation between an increase in average global temperatures and the extent of forest lands impacted annually is compelling. The size, frequency and duration of drought, wildfire, and insect/disease outbreaks has been trending to increase over the last several decades. It is believed that the role of these events has had a notable effect on the carbon cycle in the forested ecosystems across the Nation.

This project involves the replacement of an aging water conveyance pipeline with a new one. It was not specifically intended to mitigate or respond to potential climate change. The project is not considered to be an action that would be categorized as a primary contributor to local, regional, or global greenhouse gas emissions. Forested land will not be converted into a developed or agricultural condition. The extent of tree removal would be limited to the construction corridor and minimized to that which is only necessary for the replacement of the existing pipeline. Since the project's footprint of disturbance would be comparatively very small in the regional or global context, this analysis will not attempt to quantify carbon emission or sequestration. This section will address however, aspects of the project that may affect carbon emission or sequestration at the local scale.

Tree removal, along with forest health and growth issues are discussed in Section 3.1, Vegetation Resources.

3.11.2 Effects Analysis

It is anticipated that for either alternative, the City of The Dalles would participate in climate change adaptation strategies being developed by the State, including those that would be executed by the OWRD and the Oregon Health Authority (OHA) for municipal and drinking water suppliers. The Oregon Climate Change Adaptation Framework (Kershner 2010), and the Oregon Climate Assessment Reports prepared by the Oregon Climate Change Institute (OCCI), have identified future water supplies and availability as a priority for focused development of adaptation strategies.

They have recognized implications of expected risks and adaptive capacity, to ascertain priorities and the need for potential near-term actions and long-range preparedness. Core to forecasted changes and water management adaptation is timing of response, authority for implementation, intergovernmental coordination, and community empowerment.

As with all municipalities, if warranted the City could be invoked in the future to implement a mandated response by State authority, which might alter their municipal water management and operations. Such actions would be expected to occur irrespective of pipeline replacement or provisions of their special use permit with the Mt. Hood National Forest. As with current regulation, any planning or future actions that would address or respond to climate change adaptation and the management of municipal water supplies would be regulated by the State. The development of an Integrated Water Resources Strategy is already well underway by the OWRD.

As a requirement of State regulation, the City already has in place a Water Management Conservation Plan (CTD 2014). In it are measures for increasing water use efficiency, reducing waste, and response strategies to shortages. The plan would be in effect with, or without a new pipeline.

No Action Alternative

As no vegetative manipulation would occur and pipeline construction would take place, the current carbon sequestration rates locally would remain unchanged and no additional carbon would be released into the atmosphere. The No Action alternative would not result in carbon emissions from vehicles or burning and would result in the retention of relatively slow growing trees. The mortality that results would be retained on site (see Sections 3.1, Vegetation Resources and 3.6, Wildlife for more details).

Proposed Action Alternative

This project is not likely to have direct localized effects on climate. By its very nature, the discussion of a project's effect on climate change is indirect and cumulative because the effects occur at a different time and place, and because the scale of the discussion is global. Since it is not reasonable to measure a project's global impact, the discussion here focuses on key elements of forest management discussed in the scientific literature.

For this proposal, the following actions have the potential to affect carbon emissions or sequestration:

- Fossil fuel would be used by equipment such as saws, tractors, skyline yarders and log trucks. It would be possible for some of this equipment to use biofuels if available and priced competitively.
- Some of the slash and debris resulting from clearing adjacent to the construction corridor would be burned on site or utilized locally for restoration projects. Slash and debris burning would release carbon into the atmosphere, while utilization of some of the debris would retain it for sequestration.

Cumulative Effects

The Proposed Action would result in some carbon emissions and some carbon sequestration. Effects of pipeline construction would be localized and of short-duration. Its effect cumulatively would be considered minute by comparison to regional scale carbon exchanges. See Section 3.1, Vegetation Resources, for a discussion of forest health and resiliency.

3.12 Congressionally Designated Areas

Congressionally designated areas include Wilderness, Wild and Scenic Rivers, and Inventoried Roadless Areas. None exist in the project area.

A portion of the East Fork of Hood River was added to the National Wild and Scenic Rivers System by the Omnibus Public Land Management Act of 2009 (Public Law 111-11). This portion is west of the project area. The Outstandingly Remarkable Values (ORVs) for the East Fork Hood River Wild and Scenic River segment include wildlife, recreation, and botany. As the ORVs exist outside any proposed treatment areas there would be no adverse effect to the ORVs for which the river segment was added to the National Wild and Scenic River System.

3.13 Environmental Justice and Civil Rights

On February 11, 1994, President Clinton issued the Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898). This order directs agencies to identify and address disproportionately high and adverse human health or environmental effects of projects on certain populations. In accordance with this order, the proposed

activities have been reviewed to determine if they would result in disproportionately high and adverse human and environmental effects on minorities and low-income populations.

The communities of Mt. Hood/Parkdale, Odell and Hood River are less than 20 miles of the planning area. The communities of Dufur and The Dalles are less than 20 miles to the east / northeast of the planning area. Other communities that may have an interest in the proposal would include Sandy, Gresham and Portland to the West.

No disproportionate impacts to consumers, civil rights, minority groups, and women are expected from this project. Commercial thinning work would be implemented by contracts with private businesses. Project contracting for the project's activities would use approved management direction to protect the rights of these private companies.

The Dog River Pipeline Replacement planning area is located on usual and accustomed land for the Confederated Tribes of Warm Springs (as is all of the Mt. Hood National Forest). The Treaty of 1855 granted the Confederated Tribes of the Warm Springs (CTWS) the right of "usual and accustomed" gathering of traditional native plants and "special interest" use. According to the Ethnographic Study of the Mt. Hood National Forest (French et al. 1995), no traditional use areas have been identified in this planning area. No activities are proposed that would preclude any granted rights.

Because this project does not propose to increase, or reduce the amount or type of activities that occur on the forest, the proposal to implement this project is not expected to have any negative effect on special forest product gatherers.

3.14 Other Required Disclosures

3.14.1 Conflicts with Plans, Policies or Other Jurisdictions

This project would not conflict with any plans or policies of other jurisdictions. This project would not conflict with any other policies, regulations, or laws, including the Clean Water Act (see Section 3.3), Endangered Species Act (see Sections 3.4, 3.6, and 3.7), National Historic Preservation Act (see Section 3.13) and Clean Air Act (see Section 3.15). Other potential conflicts with plans, policies, or other jurisdictions are discussed below.

3.14.2 Floodplains and Wetlands

There are no jurisdictional floodplains or wetlands within the project area as per Executive Order 11988. There would be very limited impacts to non-jurisdictional floodplains or wetlands from this project. Due to the steepness of the topography, small stream size and confined nature of streams in this area, floodplain width is fairly limited. More detailed information on wetlands and floodplains are discussed in Section 3.3 (Hydrology), and 3.4 (Fisheries). Due to the PDCs and BMPs which are aimed at minimizing the impacts to wetlands and floodplains, there would be minimal direct and indirect effects. The proposed Action would be consistent with Section 404 of the Clean Water Act (CWA).

3.14.3 Air Quality

The proposed action associated with the Dog River Pipeline replacement has the potential to affect air quality: burning slash, exhaust generated by vehicles, equipment, chainsaws and helicopters and dust created by vehicles that drive on aggregate surface and native surface roads.

Summary - The following sections show that the proposed action complies with direction in the Forest Plan (as amended) and that activity fuels would be managed appropriately to minimize fire hazard while

also minimizing effects to resources. The timing and quantity of smoke created by pile burning and broadcast burning would be managed to minimize air quality impacts.

3.14.3.1 Existing Conditions

Fine particulates less than PM2.5 (2.5 micrometers in diameter) cause reductions in visibility due to absorption and scattering of light by suspended particles. Almost all smoke particles from wildfire and prescribed fire, residential wood stoves and fireplaces, industrial boilers, field burning, diesel combustion, and other combustion processes can be characterized as fine particulates, primarily PM2.5 (ODEQ 2014). These small particulates can be inhaled and cause respiratory problems, especially in smoke sensitive portions of the population, such as the young, elderly, or those predisposed to respiratory ailments. Particles can accumulate in the respiratory system and aggravate health problem such as asthma.

Oregon Department of Environmental Quality classifies Class I Areas as "certain wilderness areas designated by Congress as federal Class I Areas that are subject to visibility protection under the Environmental Protection Agency's Regional Haze Rule and the federal Clean Air Act"(ODEQ 2014).

The closest communities to the project area are the City of The Dalles, Parkdale, Odell, and the City of Dufur. Winds in this area can blow in different directions potentially affecting these communities.

3.14.3.2 Direct, Indirect and Cumulative Effects

The burning of slash piles would typically be implemented during fall when favorable smoke dispersal conditions are expected. Pile burning prescribed fires are primarily conducted when the ground is frozen or saturated, reducing the potential of smoldering and creeping into adjacent fuels. Prescribed burning would occur when the weather conditions would minimize visibility effects to Class I airsheds.

Cumulatively, this project uses similar techniques and timing as other projects in the Mt. Hood National Forest. While it is not known what year treatments would occur in or when piles would be available for burning, prescribed burning of various projects would occur spread over several years and at appropriate times of the year which would result in less air quality impact compared to wildfire. Air quality throughout Oregon can be affected by wildfire. Projects that reduce the likely size or intensity of wildfire have the effect of reducing overall air quality impact.

Cumulative effects of the proposed action when added to other fuel reduction projects and the impacts of wildfire and of fire suppression tactics would not be substantial.

3.14.3.3 Forest Plan Standards and Guidelines

The project is consistent with FW-039 to 053 because smoke would be minimized.

The Oregon Smoke Management Plan, which is administered by the Oregon State Forester, regulates the amount of forestry related burning that can be done at any one time. The amount of burning that can occur on any one day depends upon the specific type of burning, the tons of fuel loading to be ignited, and the atmospheric conditions available to promote particulate matter mixing and transportation of smoke away from sensitive areas. Through compliance and cooperation in the implementation of the Oregon Smoke Management Plan, the Proposed Action would comply with the following laws and regulations.

- The Federal Clean Air Act (CAA) is the primary legal basis for air quality regulations across the country.
- Oregon Smoke Management Plan, OS477.013, as administered by Oregon Department of Forestry
- Oregon State Implementation Plan (The Federal Clean Air Act Implementation Plan)

- Oregon Administrative Rules OAR 629-0048-0001: Smoke Management Rules
- Oregon Visibility Protection Plan for Class I Areas, OAR 340-200-0040, section 5.2
- Forest Service Best Smoke Management Practices 2012
- Forest Service Manual 2500-Watershed and Air Management, Chapter 2580-Air Resource Management - The project would minimize the impacts on air quality through compliance and cooperation with Federal, state and local air regulations to prevent significant adverse effects of air pollutants, mitigation of adverse impacts form prescribed fire on air resources though the application of Best Smoke Management Practices, and protection of air quality related values within Class I areas.

3.14.4 Treaty Resources and Reserved Indian Rights

No impacts on American Indian social, economic, or subsistence rights are anticipated. No impacts are anticipated related to the American Indian Religious Freedom Act. The Confederated Tribes of Warm Springs was contacted in reference to this Proposed Action.

3.14.5 Prime Farmlands, Rangelands, and Forestlands

None of the alternatives would have an adverse impact to the productivity of farmland, rangeland, or forestland because none were identified in the project area.

3.14.6 Potential or Unusual Expenditures of Energy

The No Action alternative would not require any expenditure of fuel or energy. The Proposed Action would require expenditures of fuel for workers to access the planning area, use power equipment, and to utilize the logging systems, and installation of the pipeline. Overall, the Proposed Action would not result in any unusual expenditure of fuel.

3.14.7 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that are forever lost and cannot be reversed. Irretrievable commitments of resources are considered to be those that are lost for a period of time and, in time, can be replaced. The use of rock for road surfacing and pipeline placement is an irreversible resource commitment.

3.14.8 Conflicts with Plans, Policies, or Other Jurisdictions

NEPA at 40 CRF 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with . . . other environmental review lands and executive orders.”

Based on information received during scoping, informal consultation meetings, and analysis in the EA, none of the alternative under consideration would conflict with the plans or policies of other jurisdictions, including the Confederated Tribes of Warm Springs. This project would not conflict with any other policies and regulations or laws, including the Clean Water Act, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, National Historic Preservation Act, and Clean Air Act.

Chapter 4 – Consultation and Coordination

The Forest Service consulted with federal, state, and local agencies and Tribes during the development of this assessment.

4.1 Federal, State and Local Agencies

- U.S. Fish and Wildlife Service
- NOAA National Marine Fisheries Service
- Oregon Historic Preservation Office
- Oregon Department of Fish and Wildlife
- Oregon Water Resources Department
- The City of the Dalles

4.2 Tribes

- Confederated Tribes of Warm Springs

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