



United States Department of Agriculture
Forest Service

Grasshopper Project

Fisheries and Aquatic Fauna Report

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1.0 Introduction

This report is for the Fisheries and Aquatic Fauna resource to inform the effects analysis for the Grasshopper project. See the Draft Environmental Analysis (EA) which is incorporated by reference for a complete description of proposed activities.

Forest management activities that may alter aquatic habitat or affect individuals or populations of proposed, endangered, threatened, and sensitive fish and aquatic species require a biological evaluation to be completed (FSM 2671.44 and FSM 2670.32) as part of the National Environmental Policy Act (NEPA) process and Endangered Species Act to determine their potential effects on sensitive, threatened or endangered species. The biological evaluation process (FSM 2672.43) is intended to conduct and document analyses necessary to ensure proposed management actions will not likely jeopardize the continued existence or cause adverse modification of habitat for:

- A. Species listed or proposed to be listed as endangered (E) or threatened (T) by the USDI Fish and Wildlife Service or USDC NOAA Fisheries, and their listed or proposed listed critical habitat.

The biological evaluation process (FSM 2672.41) is also intended to conduct and document analyses to ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native plant or contribute to animal species or trends toward Federal listing of any species for:

- B. Species listed as sensitive (S) by USDA-Forest Service Region 6.

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 effects 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 is discussed in the Hydrology specialist report.

2.0 – Analysis Framework

2.1 – Aquatic Habitat Indicators

This specialist report was prepared in accordance with the following guidance and direction: Analytical Process (AP) for Development of Biological Evaluations for Consultation on Federal Actions Affecting Fish Proposed or Listed Under the Endangered Species Act (ESA), within the Northwest Forest Plan Area (Interagency Guidelines, November 2004) (USFWS 1998). Because no ESA listed fish or designated critical habitat (DCH) are present within the Action Area, The Analytical Process was modified, and only the habitat indicators that could be affected by the proposed action alternatives were addressed. The elements of the proposed action were analyzed for potential effects on Region 6 sensitive aquatic species due to changes in the habitat pathways of water quality, habitat elements, flow/hydrology, and watershed conditions. This analysis considered the potential direct and indirect effect of the project elements on each habitat indicator, and then utilized the relevant factors to determine if there was an effect and whether it was measurable, insignificant, discountable, or

beneficial. A summary for each habitat indicator was developed to ascertain whether effects from various elements combine to create adverse effects on any of the indicators.

These effects and those of interrelated or interdependent actions to the proposed action were considered to reach an overall effect determination for this project.

2.2 - Methodology

This biological evaluation (specialist report or effects analysis) utilizes research and relevant monitoring and survey data to provide the context, amount, and duration of potential effects on aquatic resources from the proposed project. The physical science specialist reports on Soils and Hydrology provide the basis for the analysis for effects to aquatic habitat. The analysis method utilized to determine potential impact to fish, amphibians, and aquatic invertebrates, and their associated habitat are listed below.

- 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.
- 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).
- Overlap the known species/habitat locations with the Action Area and determine which species/habitat could be affected by project activities. When species/habitat overlaps with the Action Area; impacts are predicted from proposed project activities to individuals and their associated habitat.
- Field verification for this project was completed in 2018 by Kathryn Arendt, East Zone Supervisory Fish Biologist, and by Rashawn Tama, East Zone Hydrologist, Mt. Hood National Forest.
- Assumptions associated with this methodology are:
 - ◆ Aquatic faunal and habitat survey data utilized is representative of current conditions.
 - ◆ Databases of record (NHD, FACTS, INFRA, etc.) accurately reflect on-the-ground conditions.

Information Sources

The following information sources were used in the writing of this specialist report:

- Mt. Hood Land and Resource Management Plan 1990.
- The Northwest Forest Plan 1994.
- White River Watershed Analysis 1995.
- Threemile Creek Stream Survey 2013.
- Boulder Creek Stream Survey 2002.

- Personal communication with other Forest Service specialists and with Fisheries personnel from the Oregon Department of Fish and Wildlife (ODFW).

3.0 – Analysis of the Alternatives

3.1 – Existing Condition

Action Area

The affected environment, also known as the Action Area, is defined as all areas to be affected directly, indirectly, or cumulatively as a result of the Federal action and not merely the immediate area involved in the action [50 CFR §402.02]. This includes an analysis of how long (short term versus long term) the effects will occur (FSH 1909.15, 152b). For this analysis, the Action Area is defined as all of the land proposed for treatment within the Grasshopper Project boundary to improve forest health, as well as riparian and aquatic habitat areas downstream of treatment where potential effects could occur.

The proposed project is located on National Forest System lands in the Upper Badger Creek, Gate Creek, Rock Creek, Boulder Creek, and Threemile Creek 6th- field (HUC 12¹) watersheds. Forest health treatments are concentrated in the headwaters of Threemile Creek, with only small slivers of treatment crossing the drainage divides into the Gate Creek, Rock Creek, and Upper Badger Creek watersheds. Additionally, a minimal amount of treatment is proposed in the headwaters of Boulder Creek.

Neither of the action alternatives will result in effects to aquatic organisms or their habitat in the Upper Badger Creek, Gate Creek, or Rock Creek watersheds because of the small percentage of aquatic habitat that is within treatment areas, the lack of hydrologic effects to these watersheds, and the fact that stream channels present are all intermittent. The proposed action alternatives could have an effect on aquatic species or habitat in the Threemile Creek watershed. Also, under both action alternatives, there will be localized sedimentation in tributaries to Boulder Creek due to haul activities but impacts to aquatic species and habitat will be negligible.

The Action Area for this project is thus defined as the treatment areas within the Threemile Creek 6th-field watershed, including Threemile Creek downstream to the National Forest Boundary, which is the farthest extent of potential effects from proposed activities. The Action Area also includes the headwaters of the Boulder Creek watershed to 0.5 River Mile (RM) downstream of the confluence with Swamp Creek which is the downstream-most tributary that could be affected by log haul (the maximum distance that sediment would likely move).

A section of the Threemile ditch, diverted from Threemile Creek, is located within the Action Area. The Highland ditch, diverted from Badger Creek, is within the Grasshopper Project Area, but outside of the Action Area. Local, site specific impacts to aquatic species and habitat from proposed project activities could occur at historic ditch crossing locations on Highland ditch if equipment needs to cross the ditch, but Project Design Criteria (PDC) would ensure negligible effects.

¹ Hydrologic Unit Code (HUC) is a classification system by [the United States Geological Survey](https://www.water.usgs.gov/huc/) to assign labels to different sizes of drainage areas. A HUC 12 covers the drainage area for a watershed, typically 10,000 to 40,000 acres in size.

Presence of Proposed, Endangered, or Threatened Species, and Designated Critical Habitat and Essential Fish Habitat

White River Falls, a 90-foot-high waterfall on the White River approximately 18 River Mile (RM) downstream from the Action Area, precludes migration of anadromous fish into the Grasshopper Action Area. Therefore, no listed endangered, threatened or proposed anadromous fish species or their associated DCH are present in the Action Area and the project action alternatives will have No Effect on these species and their DCH will not be adversely modified. Similarly, there will be No Effect on Essential Fish Habitat for coho and Chinook salmon. These species will not be discussed further in this specialist report.

Special Status Sensitive Species and Survey and Manage Species not Present in the Grasshopper Action Area:

Pacific Lamprey, *Entosphenus tridentatus*

Similar to anadromous fish listed under the Endangered Species Act, White River Falls is a barrier to upstream migration of Pacific lamprey, *Entosphenus tridentatus*, listed as a Region 6 Forester's Sensitive Species, and thus they are not present within the Grasshopper Action Area. The action alternatives will have No Impact on Pacific lamprey, and this species will not be discussed further in this specialist report.

Coastal Cutthroat Trout, *Oncorhynchus clarkii spp. clarkii*

Coastal cutthroat trout have not been detected in Threemile Creek within the boundaries of the Mt. Hood National Forest and their native distribution is west of the Deschutes watershed. There are not present within the White River basin (J. Seals, personal communication 2021). Because they are not present within the Grasshopper Action Area, the action alternatives will have No Impact on coastal cutthroat trout and this species will not be discussed further in this specialist report.

Scott's Apatanian Caddisfly, *Allomyia scotti*

Scott's apatanian caddisfly habitat includes cold high-elevation glacially-fed seeps and springs with abundant wiry moss (Wanner and Arendt 2015). It is associated with higher altitudes with the lower end of its elevation range listed as 3500 feet. There are no glacially-fed seeps and springs within the Grasshopper planning area. Additionally, Forest Service monitoring data collected in 1993 and 1994 showed that the weekly average maximum stream temperature exceeded 18° C in Threemile Creek, and thus conditions are too warm for this insect whose larval life-history stage has been found in waters with temperatures ranging between 2 to 6° C (USDA 1995), (Wanner and Arendt 2015). Due to lack of appropriate habitat, it is assumed that this species is not present in the Grasshopper Action Area. The action alternatives will have No Impact on Scott's Apatanian caddisfly, and this species will not be discussed further in this specialist report.

A caddisfly, *Farula constricta*

Farula constricta are associated with cold high-gradient spring-fed creeks around talus slopes at the base of waterfalls (Hietala-Henschell 2018). Individuals have been sampled in the Columbia River Gorge National Scenic area in Multnomah and Hood River Counties. Due to a lack of appropriate habitat within the Grasshopper Action Area and its distance from known populations, it is assumed that A caddisfly is not present in the Grasshopper Action Area. The action alternatives will have No Impact on A caddisfly and this species will not be discussed further in this specialist report.

A caddisfly, *Neothremma prolata*

Neothremma prolata is associated with cool to cold high-gradient spring-fed creeks around talus slopes at the base of waterfalls (Fallon 2017). It has only been sampled from two creeks within the Columbia River Gorge National Scenic area; it has not been documented on the Mt Hood National Forest but is suspected to be on the forest near verified sites. The Grasshopper Action Area has neither the habitat required by this species nor the required proximity to known populations, therefore, it is assumed that A caddisfly is not present in the Grasshopper Action Area. The action alternatives will have No Impact on A caddisfly and this species will not be discussed further in this specialist report.

Special Status Sensitive Species and Survey and Manage Species Present in the Grasshopper Action Area:

Species listed as Sensitive on the Region 6 Regional Forester's Special Status list that are or may be present in the Grasshopper Action Area are Inland Columbia Basin Redband Trout, *Oncorhynchus mykiss* spp. *gairdneri*, Cope's Giant Salamander, *Dicamptodon copei*, and Rocky Mountain Dusksnail, (*Colligyrus greggi*), also called the Columbia Dusksnail (*Lyogyrus* n. sp. 1).

There are also two Survey and Manage Species as outlined by Forest Service et al. 2001 that may be present within the Action Area: Rocky Mountain Dusksnail, (*Colligyrus greggi*), also called the Columbia Dusksnail (*Lyogyrus* n. sp. 1), and the Basalt Juga, *Juga* sp. nov. (*Basalt*) (Table 1).

Table 1. Presence of Region 6 Regional Forester’s Special Status Sensitive and Survey and Manage Species within the Grasshopper Action Area

Scientific Name	Common Name	Forest Presence	Action Area Presence
Sensitive Species			
<i>Entosphenus tridentatus</i>	Pacific lamprey	Documented	No
<i>Oncorhynchus clarkii spp. clarkii</i>	Coastal cutthroat trout	Documented	No
<i>Onchorynchus mykiss spp. gairdneri</i>	Inland Columbia Basin redband trout - resident	Documented	Yes
<i>Dicamptodon copei</i>	Cope’s giant salamander	Documented	Yes
<i>Colligyrus greggi</i>	Rocky Mountain duskysnail (also called the Columbia duskysnail)	Documented	Assumed
<i>Allomyia scotti</i>	Scott’s apatanian caddisfly	Documented	No
<i>Farula constricta</i>	A caddisfly	No	No
<i>Neothremma prolata</i>	A caddisfly	No	No
Survey and Manage Species			
<i>Colligyrus greggi</i>	Rocky Mountain duskysnail (also called the Columbia duskysnail)	Documented	Assumed
<i>Juga sp. nov. (Basalt)</i>	Basalt juga	Documented	Assumed

Inland Columbia Basin Redband Trout, *Oncorhynchus mykiss* spp. *gairdneri*

Inland Columbia Basin redband trout (redband trout) are present throughout the White River 5th Field Watershed and are present in Threemile Creek and in Boulder Creek within the Grasshopper Action Area (Figure 1). The Threemile Creek ditch, used for irrigation, is within the Grasshopper Action Area. The ditch does not have a fish screen at its diversion headgate and therefore redband trout are assumed to be present in the ditch.

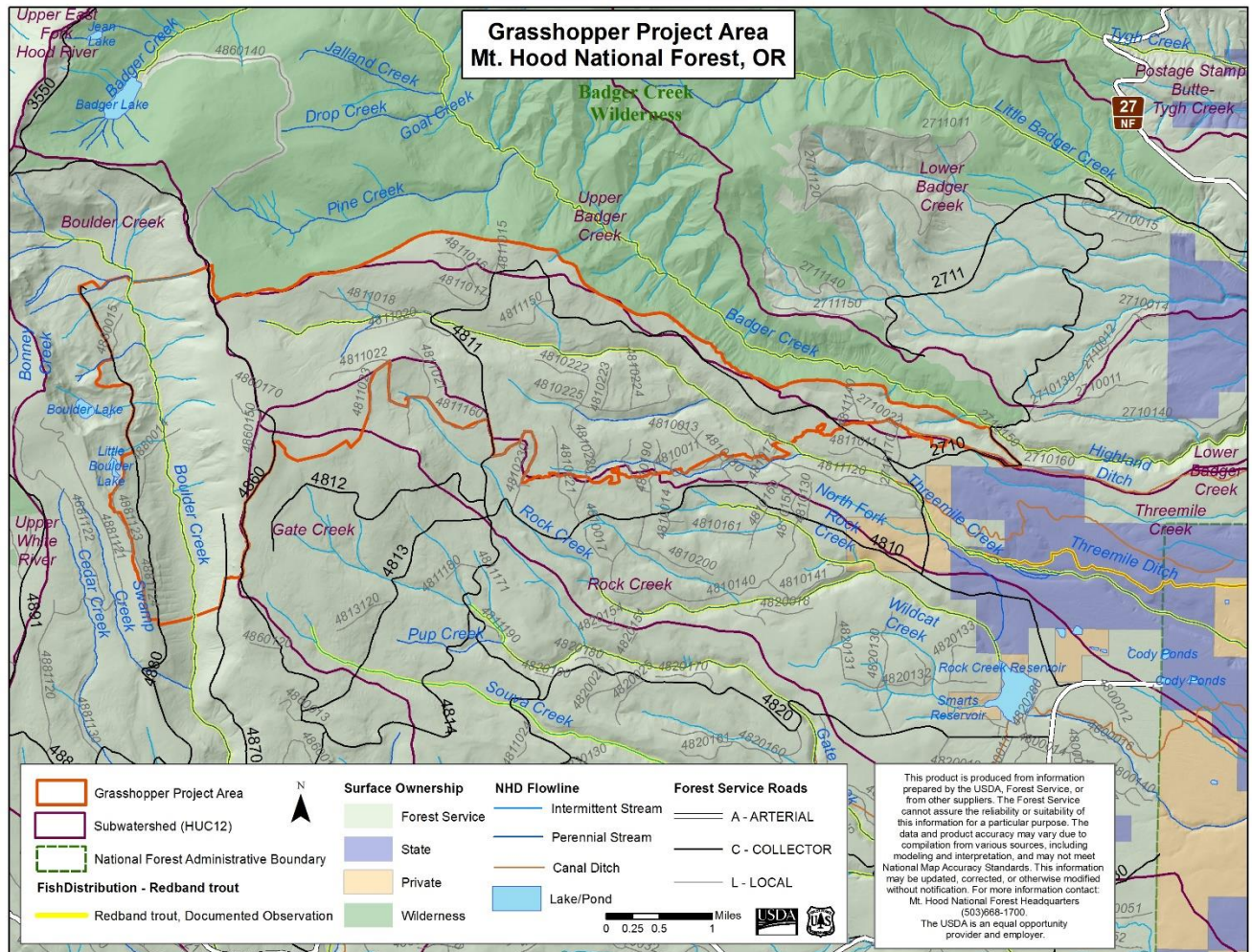


Figure 1. Redband trout distribution within the proximity of the Grasshopper Planning Area.

Redband trout populations in the White River watershed are genetically distinct from those in the Deschutes River and are unique among other redband trout populations east of the Cascades (Currens et. al 1990). Protection of the genetic integrity of endemic redband trout in the Gate, Jordan, and upper Rock-Threemile subwatersheds was identified as the highest priority for fisheries management in White River Subbasin (USDA 1995). Spawning of redband trout occurs in the spring, fry emergence from the gravel normally occurs by the middle of July but depends on water temperature and exact time of spawning. Redband trout prefer water temperatures from 50 to 57 °F (10 to 14 °C) but have been found actively feeding at temperatures up to 77 °F (25 °C) in high desert streams of Oregon and have survived in waters up to 82 °F (28 °C) (Currens et. al 1990).

Cope's Giant Salamander, *Dicamptodon copei*

Cope's giant salamanders have been surveyed in the upper White River drainage, including in Badger Creek (Oregon Biodiversity Information Center 2020). They are likely to be present in perennial tributaries to the White River and were detected in Boulder Creek. They were also likely to be present in unscreened irrigation ditches in the White River watershed (Mt. Hood National Forest, unpublished data; K. Arendt, personal communication 2021), including Threemile ditch. Thus, Cope's giant salamanders are present within the Grasshopper Action Area.

As juveniles, and often into adulthood, Cope's giant salamander habitat is restricted to cool perennial streams with coarse substrate. Though most individuals of these species have a fully aquatic life-history into reproductive age, some adults metamorphosize into terrestrial forms and can be found in riparian areas of perennial streams (Foster and Olson 2014).

Rocky Mountain Dusksnail, (*Colligyryus greggi*), also called the Columbia Dusksnail (*Lyogyryus n. sp. 1*)

This species of aquatic mollusk is listed as a Sensitive Species for Region 6 and is also considered a Survey and Manage species in the Northwest Forest Plan. The mollusk has been found across the Mt. Hood National Forest during surveys conducted over the past several years (Mt. Hood National Forest, unpublished data). Habitat requirements for this species are cold, well oxygenated springs, seeps, and small streams, preferring areas without aquatic macrophytes (Furnish and Monthey 1998). There may be suitable habitat present within the Grasshopper Action Area; they are therefore assumed to be present.

Basalt Juga, *Juga sp. nov. (Basalt)*

This species of aquatic mollusk is considered a Survey and Manage species in the Northwest Forest Plan. Their habitat requirements are similar to that of the Rocky Mountain dusksnail (Furnish and Monthey 1998). Several samples of Juga snails collected during a 2015 forest-wide survey effort have been confirmed as Basalt Juga, including specimens from the White River subbasin and Fifteenmile Creek watershed (Mt. Hood National Forest, unpublished data). They are not believed to reside in waters other than those in the Columbia River basin. Since the Grasshopper Action Area is close to known populations and suitable habitat is present, they are assumed to be present.

Existing Habitat Condition

The reach of Threemile Creek within the Grasshopper Action Area extends from approximately RM 9.5 – 19.2 (from the National Forest Boundary to the headwaters). A Forest Service Level II Stream Survey was completed in 2013 on Threemile Creek from RM 12.0 – 19.2 (from just downstream of Forest Road 4811 to the headwaters). The reach of Threemile Creek from approximately RM 9.5 – 12.0 is within the White River State Game Management Area, and although specific data is not available, habitat within this reach is assumed to be in similar condition to the reach upstream within the Mt. Hood National Forest.

The reach of Boulder Creek within the Action Area extends from approximately RM 5.75 – 10.0 (from 0.5 RM downstream of the confluence with Swamp Creek which is the downstream-most tributary potentially affected by log haul to the confluence with the perennial tributary that is located in Unit

260 near the headwaters. A Forest Service Level II Stream Survey was completed in 2002 on Boulder Creek from RM 0.0 to 11.4 (from the confluence with White River to the headwaters).

Aquatic habitat conditions within the Action Area vary depending on the location, water source, land management activities, and natural events such as floods and fire. The Action Area has been altered by past logging practices, water diversions, large wildfires as well as fire suppression, recreation activities, road construction and maintenance, and livestock grazing. 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.

Under both action alternatives, treatments within the Riparian Reserves² of Threemile Creek and Boulder Creek include pre-commercial thinning in plantations (sapling thinning), commercial thinning in plantations, Variable Density Thinning (VDT) from below, and fuels treatments which may include one of the following or a combination of the following: underburning, mechanical and/or hand pile burning, jackpot burning, swamper burning, lop and scattering (where fuel loading is below the targeted tons per acre), masticating, or biomass collection. Biomass collection would include machine piling and removal of materials. All other streams in the Threemile Creek Action Area are intermittent or ephemeral. Proposed activities under either alternative provides no causal mechanism to affect the following habitat indicators: chemical contaminants/nutrients, change in stream drainage network, width to depth ratio, streambank condition, floodplain connectivity, pool quantity and quality, off-channel habitat, refugia, habitat access/physical barriers, road density and location, and disturbance history. Since these indicators would be maintained during project implementation, they will not be further addressed in this specialist report. The only habitat indicators that could be affected by the action alternatives are water temperature, sediment, turbidity and substrate, change in peak/base flows, large wood frequency and recruitment, and riparian reserves.

The narrative below describes the existing condition of aquatic species habitat for relevant indicators in the Threemile Creek and Boulder Creek watersheds within the Grasshopper Action Area as it relates to Mt. Hood Forest Plan and Northwest Forest Plan standards and guidelines. Because the only activity proposed near tributaries to Boulder Creek would be commercial thinning in plantations on less than 18 acres and log haul, the only indicator that could be affected by the action alternatives would be sediment, turbidity, and substrate, and thus it will be the only indicator assessed for Boulder Creek.

² Riparian reserve widths include two site potential tree height along fish bearing streams, or within one site potential tree height along any non-fish bearing intermittent streams, seeps, ponds, or wetlands less than 1 acre. Buffers are measured from the edge of the bankfull channel on both sides of the stream (or water's edge in the case of a pond or wetland). Buffers would be expanded to include slope breaks where appropriate. The inner riparian is defined as the area within a Riparian Reserve that is within 100 feet of a stream. Thus, the inner riparian includes the 60-foot buffers on perennial streams and the 30-foot buffers on intermittent or ephemeral streams where no treatment with the exception of prescribed fire would occur.

3.1.1 – Aquatic Habitat Indicator 1

Temperature

Threemile Creek water quality has been impaired when stream temperatures have occasionally exceeded state standards. Forest Service monitoring data collected in 1993 and 1994 showed weekly average maximum stream temperature exceeded 18 degrees C, the established standard for the designated beneficial use of anadromous fish passage and salmonid fish rearing (USDA 1995). Subsequent data collected by the Forest Service over the course of 14 summer seasons from 1996 through 2019 (data was not collected all years) show that 7-day average maximum stream temperatures near the forest boundary (at the downstream extent of the Grasshopper Action Area) typically stay below 16 degrees C; 2013 was the only year where stream temperature reached or exceeded 18 degrees C (Table 2). Analysis of the data from 2013 suggest that stream dewatering may have been responsible for the elevated stream temperatures.

Table 2. Highest 7-Day Average Maximum Stream Temperatures (Degrees Celsius) in Threemile Creek at RM 12.0, 1993 – 2007 (only the years when data was collected are shown)

Year	Water Temperature (Degrees C)
1993	18.0 – 19.8
1994	18.0 – 19.8
1995	16.6
1996	15.9
1997	14.8
1998	16.6
1999	14.4
2006	14.3
2007	16.5

As described above, redband trout prefer water temperatures from 50 to 57 °F (10 to 14 °C) but have been found actively feeding at temperatures up to 77 °F (25 °C) in high desert streams of Oregon and have survived in waters up to 82 °F (28 °C). Thus, average seven-day maximum water temperatures in Threemile Creek during the summer months are higher than the preferred temperature range for redband trout.

Coastal giant salamanders have a critical temperature threshold of 29.1°C. Critical temperature is the temperature at which the animal would soon perish if not quickly removed to a lower temperature. Amphibians with aquatic life histories have evolved in and inhabit small- to moderate-sized streams in the Pacific Northwest. Streams with intact riparian overstory typically have summer stream temperatures ranging from 15 to 19 °C, with a mean of 16.7 °C. From available stream temperature

data, Threemile Creek appears to have habitat conditions that are favorable for Cope's giant salamanders. Furthermore, Cope's giant salamanders may be tolerant of a broad range of stream temperatures. Nevertheless, elevated or more variable stream temperatures will affect life-history characteristics such as growth rates, movement, and egg incubation, with unknown effects on Cope's giant salamander populations across their range (Foster and Olson 2014).

Estimated stream shading in Threemile Creek averaged 55% based on solar pathfinder surveys (USDA 2013). Consistent with the Gradient Nearest Neighbor (GNN) forest structure dataset, as described in the Hydrology specialist report, canopy cover in riparian reserves stands is considered extensive. On approximately 15 percent of the riparian area, where previous regeneration timber harvest has occurred a mix of early-seral stand conditions is limiting the effectiveness of streamside shade.

Baseline determination is: *Functioning at Risk*

3.1.2 – Aquatic Habitat Indicator 2

Sediment, Turbidity & Substrate

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 LRMP (Forest Plan) states that spawning habitat shall maintain less than 20 percent fine sediments less than 2 millimeters (FW-096).

Similarly, Foster and Olson (2014) reported sedimentation reduced *Dicamptodon* refugia and foraging habitat, by filling interstitial spaces in stream substrates, and burying cobbles and boulders. Such infilling could expose salamanders to predators and may potentially pre-dispose salamanders to desiccation during low- or zero-flow periods, or conversely, displacement during high flows. For example, the abundance of Cope's giant salamanders was found to be reduced in sub-watersheds with high road and drainage densities, suggesting sensitivity to chronic fine sediment input to stream channels. Using substrate embeddedness as a surrogate for fine sediment loading, the probability of detection of Coastal giant salamanders was significantly reduced when embeddedness was >75.5%. At the finest spatial scale (2-m sample unit), occurrence of all lotic amphibians including Coastal giants was negatively associated with fine sediment. Furthermore, the need for coarse substrates in stream channel habitat should not be understated; cobble and larger rocks play a role in the reproductive activities of both species of giant salamanders as well as for clutch and ovipositioning.

The limited data available related to instream sediment conditions in Threemile Creek indicate that sediment levels are within the natural range of variability (2013 Stream Survey and 2019 field visits). In the 2013 Level II Stream Survey, Threemile Creek met sediment LRMP standards FW-097 and FW-099 in all three stream reaches (all reaches are within the Grasshopper Action Area). However, one pebble count in Reach 1 was at the upper limit of acceptability (25% fines <6mm). This section of Reach 1 is located in a beaver complex area and is expected to naturally have higher load levels of fine sediment.

While Forest Service system road density within the Threemile Creek watershed, calculated between 2.0 and 2.5 miles per square mile, is slightly higher than desired conditions, the vast majority of roads are in upland areas and are hydrologically disconnected from streams. Therefore, the road system is

not thought to contribute meaningfully to the sediment load in Threemile Creek. The primary sources of road related sediment likely occur at unpaved road crossings over perennial streams, although only one such crossing, the 4811 road crossing in the headwaters of Threemile Creek, is noteworthy. There are no developed recreation areas or trails within riparian areas of Threemile Creek. Dispersed camping and recreation use in riparian areas exists in a few isolated locations and those locations likely contribute only short-term, localized increases in sediment delivery to streams.

In the 2002 Level II Stream Survey, Boulder Creek met sediment LRMP standards FW-097 and FW-099 in the two stream reaches that are within the Grasshopper Action Area. In reach 4 (RM 5.75 – 10.75), very coarse gravels (45-64 mm) and sands (<2 mm) accounted for 11% and 10% respectively of the total pebble count. In reach 5 (RM 10.75 – 11.4), sands (<2 mm) and small cobbles (64-90 mm) accounted for 15% and 12% respectively of the total count (USDA 2002).

Given that levels of fine sediments are within an acceptable range in both Threemile Creek and Boulder Creek within the Action Area, substrate embeddedness is not likely an issue for aquatic species habitat.

Forest Road 4880 has three unpaved road crossings over perennial tributaries to Boulder Creek within the Action Area.

Baseline determination is: *Properly Functioning*

3.1.3 – Aquatic Habitat Indicator 3

Peak and Base Flows

Peak streamflows in the Threemile Creek watershed are influenced by geo-physical characteristics of the basin, local climatic conditions, and interannual weather variability (Hydrologist Specialist Report 2021). Additionally, historic wildfire activity and anthropogenic influences from grazing, timber harvest, and roads may, at times, influence hydrologic processes, including peak streamflows. Currently, the magnitude of regularly occurring peak flow events (e.g., 2-year flood events) is likely different from the natural range of variability while infrequent peak flow events (e.g., 100-year flood events) are similar to historical natural conditions. The removal of upland downed wood and instream large wood, channelization of stream corridors, removal of beaver, and created openings from forest management activities and off-forest agriculture have all contributed to speeding the concentration of streamflows, thereby increasing regularly occurring peak flows (USDA 1995).

The Hydrology specialist report describes that the approximate aggregate recovery percentage (ARP) value for the Threemile Creek 6th field watershed is calculated to be approximately 80% and concludes that this extent of Watershed Impact Areas (WIAs) is considered low to moderate and is likely to maintain peak flow regimes within their natural range of variability.

The Hydrology specialist report also states that while road density on Forest Service lands in the Threemile watershed is between 2.0 and 2.5 miles per square mile, existing roads have a low degree of interaction with the stream network, and therefore the potential impact of existing roads on peak streamflow in Threemile is considered low.

Base streamflows in the Threemile Creek watershed have been influenced by timber harvest, road construction, and water withdrawals for off-forest irrigation. Of these factors, water withdrawals have

had the most significant impact on base flows as evidenced by complete dewatering of the creek in some years (USDA 1995).

Baseline determination is: *Functioning at Risk*

3.1.4- Aquatic Habitat Indicator 4

Large Wood Frequency and Recruitment

Densities of woody debris (large wood) >12" in diameter and >35' long did not meet LRMP Standards and Guidelines in any of the three reaches surveyed in Threemile Creek in 2013. However, woody debris and debris jams (defined as a complex of wood with 3 or more pieces) were found to be a major source of cover for fish. Wood became more abundant as the survey approached the headwaters (USDA 2013). Anecdotal observations by the Forest Service aquatics team of the Riparian Reserves within proposed treatment units during the summer of 2019 support the remote sensing data and confirmed healthy quantities of downed wood, potential for abundant recruitment of large wood, and robust streamside shade. Short-term large wood recruitment is limited because most trees are not yet of an age and/or size to fall in great numbers on their own. The riparian forest within the Action Area continues to recover from historic riparian logging and wood recruitment potential should continue to improve over time.

Large wood plays an important role in stream ecosystems. Large wood modifies both hydrologic, sediment and nutrient transport by slowing, storing, and redirecting stream water, sediments, and particulate organic matter (Montgomery et al. 2003). Additionally, large wood creates and enhances stream habitat for fish, other vertebrates, and invertebrates by providing physical cover, pools, backwaters, secondary channels, and creating stream flow refugia. Having adequate levels of large wood is critical for healthy streams in forested ecosystems.

Foster and Olson (2014) referenced studies that found positive correlations for population densities for California and Coastal giant salamanders with down wood, riparian vegetation, cobble, gravel and woody debris substrate.

Baseline determination is: *Functioning at Risk*

3.1.5- Aquatic Habitat Indicator 5

Riparian Reserves

As described in the Hydrology specialist report, data from stand exams and the most recent GNN Structure dataset provided by the Landscape Ecology, Modeling, Mapping & Analysis (LEMMA) collaborative research group show riparian reserve forest stands within proposed treatment units are currently dominated by mid-seral characteristics, in a stem exclusion phase of development. These stands lack the structural diversity and large tree component associated with late seral multi-storied forests which are an important aspect for achieving Aquatic Conservation Strategy objectives.

Although it has been over 25 years since the document was completed, the White River Watershed Analysis quantified the percentage of managed and unmanaged acres with low, medium, and high potential for large wood recruitment within Riparian Reserves of the Threemile Creek watershed.

Findings concluded that 9% of managed acres and 42% percent of unmanaged acres within Riparian Reserves had a high potential for large wood recruitment. Upper Rock Creek, Threemile, and Gate creek subwatersheds within the 1973 Rocky Burn area were found to have moderate-high percentages (20-74%) of riparian acres in early seral conifer/brush with low recruitment potential. Timber salvage activity after the burn removed short-term large wood recruitment potential (USDA 1995).

The Watershed Analysis also states that the Rock-Threemile watershed contains many stands that could be manipulated back towards the “typical Old Growth structure type” relatively quickly. The forest stand types (“Cathedral and Late Seral Parklike”) are dependent on frequent, low intensity disturbance. The lack of Old Growth in these two watersheds is primarily due to the lack of this type of disturbance. Both watersheds have stands dominated by older trees, but the structure type is not one considered stable over the long-term for the Transition and Eastside Zones (USDA 1995).

The Threemile Creek stream survey estimated average stream shading at 55% (USDA 2013).

Table 3 depicts the existing condition of the Riparian Reserves in each of the units proposed for treatment. The following indicators were evaluated in terms of whether they met or didn’t meet Forest Standards or Professional Standards for down wood, snags, instream large wood, large wood (channel forming pieces), stand species composition, and stand structural diversity. See the Methodology section of the Silviculture specialist report, and the Existing Condition sections of this report and the Wildlife specialist report for descriptions of Forest Standards and Professional Standards (e.g. protocols, standard error, statistical measurement accuracy, and standard deviation limits).

Table 3. Unit-Specific Purpose for Riparian Reserve (RR) Thinning Treatment*

X = Not meeting Forest Standard or Professional Standard

Units	Acres	RR Acres	Riparian Treatment Purpose					
			Down Wood	Snags	Instream Large Wood	Large Wood Channel Forming Pieces	Species Composition	Structural Diversity
1	264	3		X			X	X
2	120	5					X	X
4	22	1						X
7	30	12					X	X
9	9	2					X	X
10	136	1		X			X	X
11	21	1		X			X	X
13	78	44						X
16	10	2	X	X	X	X	X	X
17	19	5	X	X	X	X	X	X
23	60	17					X	X
34	8	4	X	X	X	X	X	X
35	12	4	X	X	X	X	X	X
40	8	4	X	X	X	X	X	X
42	25	6					X	X
43	18	1	X	X	X	X	X	X
53	11	2	X	X	X	X	X	X
55	6	1	X	X	X	X	X	X
75	26	1						X
86	44	5	X	X	X	X	X	X
88	13	3	X	X	X	X	X	X
91	11	3						X
92	9	3	X	X	X	X	X	X
98	58	1	X	X	X	X	X	X
99	17	2	X	X	X	X	X	X
102	20	5	X	X	X	X	X	X
103	7	5	X	X	X	X	X	X
112	10	1	X	X	X	X	X	X
113	17	3	X	X	X	X	X	X
114	19	3	X	X	X	X	X	X
115	28	3	X	X	X	X	X	X
123	11	4	X	X	X	X	X	X
131	18	1	X	X	X	X	X	X
135	38	9		X			X	X
136	9	2	X	X	X	X	X	X
138	10	2	X	X	X	X	X	X
139	14	4	X	X	X	X	X	X

Table 3. Unit-Specific Purpose for Riparian Thinning Treatment (Continued)

X = Not meeting Forest Standard or Professional Standard

Units	Acres	RR Acres	Riparian Treatment Purpose					
			Down Wood	Snags	Instream Large Wood	Large Wood Channel Forming Pieces	Species Composition	Structural Diversity
147	25	3						X
149	15	3						
150	145	63					X	X
159	114	13						X
166	16	7	X	X	X	X	X	X
168	27	12						X
182	36	1		X				X
187	66	3					X	X
193	56	40					X	X
203	25	5						X
208	43	32		X				X
210	49	9		X			X	X
211	21	17					X	X
222	32	13		X			X	X
228	44	3	X	X				X
231	46	23					X	X
232	31	28		X			X	X
235	8	7		X			X	X
251	49	15		X			X	X
260	17	13	X	X	X	X	X	X
261	29	5	X	X	X	X	X	X

All acres are approximate and exclude no-cut buffers.

Baseline determination is: *Functioning at Risk*

Table 4. Summary of Resource Indicators and Measures for the Existing Condition that may be affected by the Action Alternatives.

Indicator	Environmental Baseline Condition		
	Properly Functioning	Functioning at Risk	Not Properly Functioning
Temperature		X	
Sediment, Turbidity and Substrate	X		
Change in Peak/Base Flows		X	
Large wood Frequency and Recruitment		X	
Riparian Reserves		X	

3.2 –Environmental Consequences

No Action Alternative

In the No Action alternative, none of the proposed projects would be implemented and there would be no immediate effect to aquatic habitat or species. There would be no direct short-term changes in hydrologic processes affecting water quantity or water quality. Existing patterns of stand growth in Riparian Reserves would continue trending in the same direction. However, an increased risk of fine sediment input to area streams would be due primarily to roads not being maintained/repared, and thus the chance for erosion and subsequent sedimentation would be greater. If proposed silvicultural treatments did not occur, forested riparian stands would have smaller and shorter trees and, eventually, fewer live trees per acre but more snags. Although increased levels of down wood in the short-term would likely occur, the small size of the down material would decay quickly and not provide the same habitat benefit as larger wood, especially in larger streams.

In the long-term, Riparian Reserves would be threatened by the spread of insect and disease and susceptibility to wildfire. While difficult to quantify, this increased risk is important to note as a threat to aquatic habitat and species under the No Action alternative.

3.2.1 - Direct and Indirect Effects of the Action Alternatives

Direct Effects

Alternative 1

Direct effects are those that occur during project implementation; in this case actions such as timber harvest, log-haul operations, fuels treatments and prescribed burning. To directly impact aquatic species/habitat 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. Direct habitat effects are possible but depend on the activity. For example, removal of vegetation directly adjacent to a stream can immediately reduce cover and shade, which might cause fish to alter their use of that area.

Under both action alternatives, the only treatments that could have a direct effect on aquatic species or habitat within the Riparian Reserves of Threemile Creek would be pre-commercial thinning (sapling thinning) and underburning. The proposed action alternatives would include sapling thin treatment that could occur up to the edge of the stream bank on approximately 35 acres within the primary shade zone of Riparian Reserve stands in 11 separate units. No ground-based equipment would operate within 100 feet of the stream, and only hand treatment could occur up to the edge of the stream bank on up to 0.6 miles of stream. Not all of the trees immediately next to the bank would be felled on the 0.6 miles with hand treatments. There is a slight chance that hand treatment of trees near the stream margin would cause an aquatic organism to startle or would remove stream cover, thus also causing an aquatic organism to move. Underburning could also cause aquatic organisms to move. Thus, the action alternatives have the potential to directly affect aquatic organisms, but the amount of habitat impacted and thus the number of individuals affected would be minimal.

An exception to the above discussion is in units where skyline logging corridors would cross the Threemile Creek stream channel. In these skyline corridors felled trees could land in the stream channel causing aquatic fauna disturbance, injury, or possibly death. The number of trees to be felled into channels is unknown (if any) and the risk of direct effects is low, especially death of individuals, but not completely discountable.

There would be no direct effects to aquatic species or habitat in the Boulder Creek watershed because there is no treatment proposed on or near the stream banks and because no underburning is proposed.

The proposed action **May Impact Individuals or Habitat (MIIH) for Region 6 sensitive species present but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.**

Alternative 2

The shelterwood treatments under Alternative 2 would occur well away from Riparian Reserves and other hydrologically connected areas of the watershed. Thus, the direct effects of Alternative 2 on aquatic organisms and their habitat would be identical to Alternative 1. The proposed action **May Impact Individuals or Habitat (MIIH) for Region 6 sensitive species present but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.**

Indirect Effects

Indirect effects are effects caused by or resulting from the proposed actions, are later in time, and are reasonably certain to occur.

Aquatic Habitat Indicator 1

Temperature

Alternative 1

As described in the Hydrology specialist report, the Proposed Action would include commercial plantation thinning, VDT from below and sapling thin treatments on less than 400 acres of Riparian Reserves stands. With the exception of 11 sapling thin units (specified in PDC), no treatments would occur in the primary shade zone of streams and wetland areas. Sapling thin units with the potential to impact the primary shade zone would occur on up to 0.6 miles of stream along Threemile Creek, and the Hydrology specialist report concludes that the proposed thinning would have no measurable effect on water temperature. In the long-term, there would be indirect benefits to these riparian stands because of improved health and vigor of the remaining trees and the associated accelerated improvement in streamside shade conditions after project implementation. However, because the accelerated improvement occurs on such a small percentage of the riparian area, benefits of this action would not affect stream temperature.

Thus, the proposed action **will have no effect on stream temperature** and there will be **no impact** on Region 6 sensitive species habitat or habitat.

Alternative 2

The shelterwood treatments under Alternative 2 would occur well away from Riparian Reserves and other hydrologically connected areas of the watershed. Thus, the effect of the proposed action would be identical to Alternative 1. The proposed action **will have no effect on stream temperature** and there will be **no impact** on Region 6 sensitive species habitat or habitat.

Aquatic Habitat Indicator 2

Sediment, Turbidity & Substrate

Alternative 1

The Hydrology specialist report concludes that activities included in the proposed action, including the use of unpaved road crossings for log haul and other heavy equipment, the rehabilitation of some roads for access to specific units, and the construction of temporary roads would result in minor, localized sediment entering waterways. However, the implementation of PDC would ensure that these quantities of sediment would be minor and would be of short duration. Also, because no mechanical equipment would be operated within 100 feet of streams and waterways and there would be no-cut buffers of 30 to 60 feet on all streams except for 0.6 mile of channels within sapling thinning (done by hand-felling), there would be no effect on sediment delivery to streams.

The Hydrology specialist report also concludes that in the long-term, there would be minor, although immeasurable, indirect benefits as a result of road maintenance work that would occur in conjunction with the proposed action.

The proposed action **will result in a discountable effect on sediment, turbidity, and substrate** that has **no impact** on Region 6 sensitive species habitat or habitat.

Alternative 2

The shelterwood treatments under Alternative 2 would occur well away from Riparian Reserves and other hydrologically connected areas of the watershed. Thus, the effect of the proposed action would be identical to Alternative 1. The proposed action **will result in a discountable effect on sediment, turbidity, and substrate** that has **no impact** on Region 6 sensitive species habitat or habitat.

Aquatic Habitat Indicator 3

Peak and Base Flows

Alternative 1

There are several primary pathways that could change flows in the Grasshopper Action Area: changes in canopy cover from logging and fuels treatments and an increase in the stream-drainage network from new roads, temp roads, and landings.

As described in the Hydrology specialist report, the Proposed Action would result in new WIAs on approximately five percent of the watershed area, but would retain sufficient overstory canopy cover, on average, for stands to maintain most of their hydrologic effectiveness. The increase in WIAs has the potential to cause small increases in the magnitude of intra-annual peak flows (e.g. return interval less than one year), however such increases would be miniscule to immeasurable.

In addition, the Hydrology specialist report concludes that on approximately 1,100 acres, roughly five percent of total watershed area, post-treatment canopy cover would be slightly less than established thresholds (MHNH 1998) and would therefore be classified as WIAs. However, due to continuing growth post treatment within these thinned stands, they would become fully hydrologically recovered in 30-50 years depending on plant community types and would no longer be considered WIAs. More information about stand recovery is available in the Silviculture specialist report.

Similarly, the Hydrology specialist report concludes that proposed road decommissioning and the construction and use of temporary road segments to facilitate tree removal would have no impact on hydrologic processes in the watershed and these activities would not result in measurable impacts to peak flow magnitude and timing or base flow conditions. Temporary roads would be obliterated immediately following use and no new temporary roads would be constructed in Riparian Reserves.

The proposed action does not include any elements that would affect water withdrawals from Threemile Creek.

While canopy cover will be reduced in the Action Area, the scope and intensity of treatment is insufficient to cause measurable effect on hydrologic condition in the Action Area. The proposed

action **will result in discountable effect to peak/base flows** and there will be **no impact** on Region 6 sensitive species or habitat.

Alternative 2

Under Alternative 2, there would be approximately 150 acres of shelterwood treatments in the Threemile Creek watershed. This amounts to less than one percent of the total watershed area. The Hydrology specialist report concludes that the geographic extent of the treatments would represent such a small percentage of the watershed that hydrologic impacts would be imperceptible.

All of the other effects to peak/base flows would be the same as Alternative 1. The proposed action for Alternative 2 **will result in discountable effect to peak/base flows** and there will be **no impact** on Region 6 sensitive species or habitat.

Aquatic Habitat Indicator 4

Large Wood Frequency and Recruitment

Alternative 1

All of the Riparian Reserve treatment areas are located adjacent to streams with minimum protection no-cut buffers of 60 feet for perennial streams and 30 feet along intermittent streams and a 40- 50% canopy cover retention in the treated portion of the riparian stands. Thinning these stands would be beneficial by reducing competition and accelerating growth of the remaining trees. All Western Red Cedar would be retained, regardless of diameter.

Proposed silvicultural treatment outside protection buffers in Riparian Reserve would reduce the trees per acre and thus reduce the total number of trees available as potential down wood in the short term, however improved health and growing conditions for remaining trees would improve the overall quality of wood recruitment for the larger size classes, thus meeting large wood recruitment objectives more effectively in the long term.

In the short term, in-stream large wood could be reduced within the treatment units but would result in higher quality wood recruitment over the long term.

Because trees within the Riparian Reserves would grow larger and would also grow more quickly, recruitment of large wood to the floodplain and the stream channel would increase over the long term.

The proposed action **will result in a long-term beneficial effect to large wood frequency and recruitment** and thus there would be a **beneficial impact** to Region 6 sensitive species and habitat.

Alternative 2

The proposed treatments for Riparian Reserves under Alternative 2 are identical to those proposed for Alternative 1. Therefore, the effects on large wood frequency and recruitment for Alternative 2 would be identical to Alternative 1.

The proposed action **will result in a long-term beneficial effect to large wood frequency and recruitment** and thus there would be a **beneficial impact** to Region 6 sensitive species and habitat.

Aquatic Habitat Indicator 5

Riparian Reserves

Alternative 1

The primary goals of the Riparian Reserve treatments include improving species composition, enhancing structural diversity, and improving future quality of downed wood and in-stream large wood. Proposed treatments would remove understory competition where appropriate to allow for new age classes of trees to establish and would also allow for growing space and nutrient availability to the remaining trees. Ultimately the stands would be healthier and more resilient to large scale disturbance impacts.

As described in the Hydrology specialist report, riparian conditions and function in the Threemile Creek Action Area would improve over the long-term as a result of the proposed treatments. While there would be a minor short-term negative impact to the available recruitment of downed woody material, there would be a long-term benefit as tree growth would be accelerated, ultimately providing more abundant recruitment in the larger size classes (over 30") that are currently underrepresented. The VDT and sapling thin treatments being proposed in the outer riparian zone would hasten the development of structural complexity in stands that are currently silviculturally stagnant (see Silviculture specialist report). These treatments would contribute to accelerated achievement of Aquatic Conservation Strategy objectives. The direct and indirect effects of thinning these stands would be beneficial by reducing competition and accelerating growth of the remaining trees. Thinning treatments in the outer riparian zone would occur on approximately 40 percent of the riparian reserve network within the Threemile Creek portion of the Grasshopper planning area. This amounts to less than 25 percent of total riparian reserve network on FS managed lands within the Threemile Creek subwatershed.

PDC would maintain the condition of the inner riparian reserves. With the exception of prescribed fire which may crawl into the inner riparian zone, there would be a 60-foot protection (no-entry) buffer on the main channel (perennial) of Threemile Creek, and a 30-foot protection buffer on intermittent tributaries. Thus, the inner riparian would remain undisturbed. Protection buffers would serve to maintain current shade conditions, maintain small wood recruitment, maintain snags for standing and down wood recruitment, and protect all waterbodies from sediment generated from proposed action activities. Where commercial plantation thinning and VDT would be applied within Riparian Reserves, trees would not be cut within the protection buffers. To avoid impacts to soil and prevent sediment delivery to waterbodies, no mechanized equipment would operate within 100 feet of any waterbody. To prevent reduction in stream-shade and minimize large wood recruitment loss within riparian reserves where vegetation management will occur, a minimum of 40-50% canopy cover would be maintained.

The proposed action **will result in a long-term beneficial effect to Riparian Reserves** and thus there would be a **beneficial impact** to Region 6 sensitive species and habitat.

Alternative 2

The proposed treatments for Riparian Reserves under Alternative 2 are identical to those proposed for Alternative 1. Therefore, the effects on Riparian Reserves for Alternative 2 would be identical to Alternative 1.

The proposed action **will result in a long-term beneficial effect to Riparian Reserves** and thus there would be a **beneficial impact** to Region 6 sensitive species and habitat.

Inventoried Roadless Areas (IRA) and the Mt. Hood National Recreation Area (NRA)

The Grasshopper Project proposes to treat approximately 272 acres designated as an IRA. These acres are in upland forested areas that are disconnected hydrologically from Threemile Creek and Boulder Creek. The proposed action, when implemented with the specified project design criteria, will have no direct effect on water quality. Indirect effects would occur as a consequence of changes in canopy which, in turn, impacts snowpack accumulation and melt patterns as well as rain-on-snow processes. However, these indirect effects would be negligible and immeasurable. Thus, the proposed treatment within the IRA within the Grasshopper Project Action Area would have **no impact to Region 6 sensitive species or habitat**. Sapling and commercial plantation thinning activities are proposed for some portions of the Mt. Hood National Recreation Area (NRA). The Omnibus Public Land Management Act of 2009 established the Mt. Hood NRA within the planning area (Public Law 111.11.) Activities would not degrade the protection, preservation, and enhancement of values for which the NRA was established including values associated with fish. Aquatic fauna and habitat within the NRA would be protected with PDC as in other areas. For more information about IRAs and the Mt. Hood NRA, see section 2.3 of the EA.

3.2.2 - Cumulative Effects

Cumulative effects are impacts on the environment that result from the incremental impact of an action when it is added to other past, ongoing, and reasonably foreseeable future actions. A cumulative effects analysis for each resource considers activities relevant to the resource which overlap in time and space. If proposed activities would have little or no effect on a given resource element, a more detailed cumulative effects analysis is not necessary because there are no effects to cumulate. The interdisciplinary team listed projects and activities that should be considered in the cumulative effects analysis. This information is included in the project record. The items documented in the table below were considered when analyzing cumulative effects for aquatic fauna and habitat.

Table 5. Summary of Past, Present, and Reasonably Foreseeable Future Actions which may Contribute to Cumulative Effects to Aquatic Fauna and Habitat.

Past Activities

Project: Grasshopper burn (wildfire)	
Potential Effects	Canopy cover, sediment
Overlap in Time?	No
Overlap in Space?	Yes
Measurable Cumulative Effect?	No
Extent, Detectable?	It has been over 25 years since the Grasshopper burn. The fire footprint is a small area, and vegetation is recovering. Not detectable.
Aquatic Species or Stream Habitat Effects	NA
Project: Past timber harvests on Mt. Hood National Forest System (NFS) lands and adjacent lands under other ownership	
Potential Effects	Canopy cover, sediment, large wood frequency and recruitment, Riparian Reserves
Overlap in Time?	No
Overlap in Space?	Yes
Measurable Cumulative Effect?	Minor
Extent, Detectable?	Past timber harvest in the Grasshopper Project Action Area occurred on a small extent of the watershed. Projects are completed and Forest stands are recovering. None of the actions proposed in this EA would directly remove large wood in any stream. Indirect effects, associated with slight reductions in large wood recruitment potential, could result in localized reduction in recruitment within the units which are treating riparian reserves in Threemile Creek. This may result in less large wood recruitment and thus less in stream wood for the next 50 years or more within those reaches.
Aquatic Species or Stream Habitat Effects	A reduction of large wood recruitment could result in fewer pools because one of the major roughness elements that forms and maintains habitat is large wood. Some impact is possible in terms of habitat to resident trout, salamanders, and aquatic invertebrates in reaches of Threemile Creek.

Project: Road decommissioning and road closures	
Potential Effects	Sediment, peak and base flows
Overlap in Time?	No
Overlap in Space?	Yes
Measurable Cumulative Effect?	No
Extent, Detectable?	There would be a minor restorative action with road decommissioning activities in this EA.
Aquatic Species or Stream Habitat Effects	NA
Project: Permitted grazing use	
Potential Effects	Sediment
Overlap in Time?	No
Overlap in Space?	Yes
Measurable Cumulative Effect?	No
Extent, Detectable?	There was a moderate extent of grazing within the Action Area in the past, and there is no current grazing activity. Riparian areas are recovering.
Aquatic Species or Stream Habitat Effects	NA
Project: Sapling thinning Timber Stand Improvement (TSI) CE 2010 and TSI change of condition	
Potential Effects	Sediment, peak and base flows
Overlap in Time?	No
Overlap in Space?	Yes
Measurable Cumulative Effect?	No
Extent, Detectable?	The thinning activities were all completed more than 100 feet from streams, so sedimentation is negligible. Thinning was completed in a small extent of the Action Area.
Aquatic Species or Stream Habitat Effects	NA

Project: Fuels reduction	
Potential Effects	Sediment
Overlap in Time?	No
Overlap in Space?	Yes
Measurable Cumulative Effect?	No
Extent, Detectable?	Fuels reduction activities were implemented on a small extent of the Grasshopper Action Area and sedimentation effects were negligible.
Aquatic Species or Stream Habitat Effects	NA
Project: Aquatic restoration	
Potential Effects	Sediment
Overlap in Time?	No
Overlap in Space?	Yes
Measurable Cumulative Effect?	No
Extent, Detectable?	The only aquatic restoration project that would have a cumulative effect is an aquatic organism passage (AOP) project in Threemile Creek at the 4811 lower road crossing (2020). Sedimentation associated with this project was temporary (only during implementation), and thus there is no cumulative effect.
Aquatic Species or Stream Habitat Effects	NA

Ongoing Activities

Project: White River Fire recovery	
Potential Effects	Canopy cover, sediment
Overlap in Time?	Yes
Overlap in Space?	No
Measurable Cumulative Effect?	No
Extent, Detectable?	Activities associated with recovery from the White River Fire (2020) are not located within the Grasshopper Action Area.
Aquatic Species or Stream Habitat Effects	NA
Project: TSI and fuels reduction	
Potential Effects	Sediment
Overlap in Time?	Yes
Overlap in Space?	Yes
Measurable Cumulative Effect?	No
Extent, Detectable?	The thinning activities are all completed more than 100 feet from streams, so sedimentation is negligible. Thinning is completed in a small extent of the Action Area. Similarly, fuels reduction activities were implemented on a small extent of the Grasshopper Action Area and sedimentation effects are negligible.
Aquatic Species or Stream Habitat Effects	NA

Project: Maintenance of irrigation infrastructure (e.g., diversions and ditches)	
Potential Effects	Sediment, peak and base flows
Overlap in Time?	Yes
Overlap in Space?	No
Measurable Cumulative Effect?	No
Extent, Detectable?	The Threemile Ditch diversion is located outside (downstream) of the Grasshopper Project Area, but within the Action Area. There will be negligible effects to sediment and peak and base flows from the proposed action alternatives, so there is no cumulative effect.
Aquatic Species or Stream Habitat Effects	NA
Project: Off-Highway Vehicle (OHV) trail system	
Potential Effects	Sediment, peak and base flows
Overlap in Time?	Yes
Overlap in Space?	No (slight)
Measurable Cumulative Effect?	No
Extent, Detectable?	There are short segments of trails within the Action Area, but they are not hydrologically connected to streams. Thus, there would be no cumulative effect.
Aquatic Species or Stream Habitat Effects	NA

Project: Recreation (non-OHV)	
Potential Effects	Sediment
Overlap in Time?	Yes
Overlap in Space?	Yes
Measurable Cumulative Effect?	No
Extent, Detectable?	The extent of recreation impacts to aquatic habitat and species is minor. Most activity is outside of the Riparian Reserves.
Aquatic Species or Stream Habitat Effects	NA
Project: Aquatic Restoration	
Potential Effects	Sediment, large wood frequency and recruitment, Riparian Reserves
Overlap in Time?	No
Overlap in Space?	Yes
Measurable Cumulative Effect?	No
Extent, Detectable?	Ongoing aquatic restoration projects could include in-stream large wood placement, AOP projects, and road decommissioning. Sedimentation associated with each of these projects is temporary (only during implementation), and thus there is no cumulative effect.
Aquatic Species or Stream Habitat Effects	NA

Future Activities

Project: TSI and fuels reduction	
Potential Effects	Sediment
Overlap in Time?	Yes
Overlap in Space?	Yes
Measurable Cumulative Effect?	No
Extent, Detectable?	The thinning activities will all be completed more than 100 feet from streams, so sedimentation is negligible. Thinning is completed in a small extent of the Action Area. Similarly, fuels reduction activities will be implemented on a small extent of the Grasshopper Action Area and sedimentation effects are negligible.
Aquatic Species or Stream Habitat Effects	NA

Cumulative Effects Summary

Large Wood Frequency and Recruitment – The only cumulative effect of the proposed action alternatives would be slight reductions in large wood recruitment potential, resulting in localized reduction in recruitment along Threemile Creek which may result in less in-stream wood for the next 50 years or more within those reaches. This slight reduction in in-stream wood could impact habitat for resident redband rainbow trout, salamanders, and aquatic macroinvertebrates. None of the actions proposed in this EA would directly reduce existing levels of large wood in any stream.

3.2.3 - Degree to Which the Purpose and Need for Action is Met

This report has described how the action alternatives meet the purpose and need of the Grasshopper project described, in part as, “Enhance and restore forest diversity, structure, and species composition including pine/oak habitat and riparian reserves”. Table 6 summarizes the effect of the proposed action alternatives on habitat indicators in the Grasshopper Project Action Area. The condition of all indicators will be maintained, except for large wood frequency and recruitment and Riparian Reserves, which will be slightly restored or enhanced over the long-term.

Table 6. Change in Effect to Habitat Indicators which Compares the Proposed Action to the Existing Condition.

Habitat Indicator	Existing Condition	Action Alternatives (Alternatives 1 and 2)
Temperature	Functioning at Risk	Maintain
Sediment, Turbidity and Substrate	Properly Functioning	Maintain
Change in Peak/Base Flows	Functioning at Risk	Maintain
Large Wood Frequency and Recruitment	Functioning at Risk	Enhance
Riparian Reserves	Functioning at Risk	Enhance

3.2.4 - Degree to Which the Alternatives Address the Issues

The No Action alternative would not address the issues identified in the purpose and need. Both Action Alternatives would hasten the development of late-seral structural diversity and complexity in a meaningful and measurable way.

3.3 - Consistency with Management Direction

Land and Resource Management Plan (LRMP)

The Mt. Hood National Forest Plan and the Northwest Forest Plan provide guidance for projects in the form of standards and guidelines. 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).
Documentation of ACS consistency can be found in the project record and on the project website.

3.4 – Summary of Effects

Effect Determination for Forest Service Region 6 Regional Forester’s Sensitive Species and Survey and Manage Species

For all species present or suspected to be present, the project may impact individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species (MIIH) (Table 7).

Table 7. The Grasshopper Project Effects Determination Summary for Region 6 Regional Forester’s Sensitive Species and Survey and Manage Species Present in the Action Area.

Scientific Name	Common Name	Effects of Action
Sensitive Species		
<i>Onchorynchus mykiss spp. gairdneri</i>	Inland Columbia Basin redband trout - resident	MIIH
<i>Dicamptodon copei</i>	Cope’s giant salamander	MIIH
<i>Colligyrus greggi</i>	Rocky Mountain duskysnail (also called the Columbia duskysnail)	MIIH
Survey and Manage Species		
<i>Colligyrus greggi</i>	Rocky Mountain duskysnail (also called the Columbia duskysnail)	MIIH
<i>Juga sp. nov. (Basalt)</i>	Basalt juga	MIIH

MIIH = May impact individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.

Table 6 summarizes the effect of the proposed action alternatives on habitat indicators in the Grasshopper Project Action Area.

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