

Evaluation and Findings Report: 401 Water Quality Certification Rock Creek Hydroelectric Project (FERC P-12726)

September 2020

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1. Introduction

The Oregon Department of Environmental Quality (DEQ) prepared this Evaluation and Findings Report in response to an application for water quality certification submitted by Warm Springs Hydro LLC (Warm Springs Hydro) for a new license from the Federal Energy Regulatory Commission (FERC Project P-12726). The purpose of this report is to determine what effects, if any, the proposed Project may have on water quality. As allowed by Section 401 of the Clean Water Act, DEQ may condition the operation of the Project, as necessary, to comply with Oregon water quality standards, applicable portions of the Clean Water Act, and other relevant provisions of state law.

DEQ received the application on December 23, 2019. DEQ has one year from receipt of the application to render a decision on the Warm Springs Hydro's request for water quality certification.

The Rock Creek project is located in the Elkhorn Mountain Range of the Powder River Basin, west of the Baker Valley. The project area is in Baker County Oregon approximately 7 miles west of the City of Haines, Oregon, and is partly on private land and the Wallowa-Whitman National Forest (**Figure 1**).

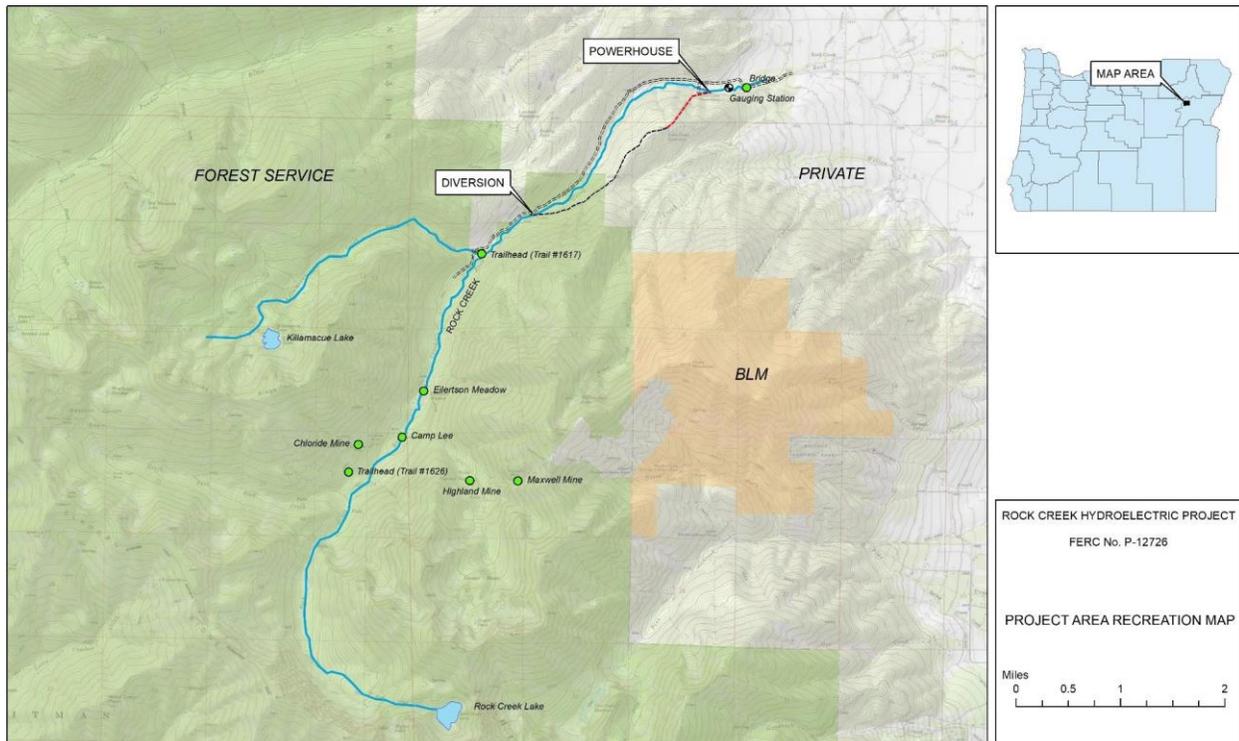


Figure 1. Site vicinity map (Warm Springs Hydro, 2019a)

The Project is located at the site of a historic hydroelectric facility originally constructed in 1904 and operated until 1995 (**Figure 2**). It is proposed as a run-of-river operation with water diverted from Rock Creek and discharged from the powerhouse back to Rock Creek. The proposed new pipeline route generally follows the old wooden flume and steel pipeline route. The new generation capacity is 850 kW and the average annual generation is estimated at 3,900 megawatt-hours (MWh).

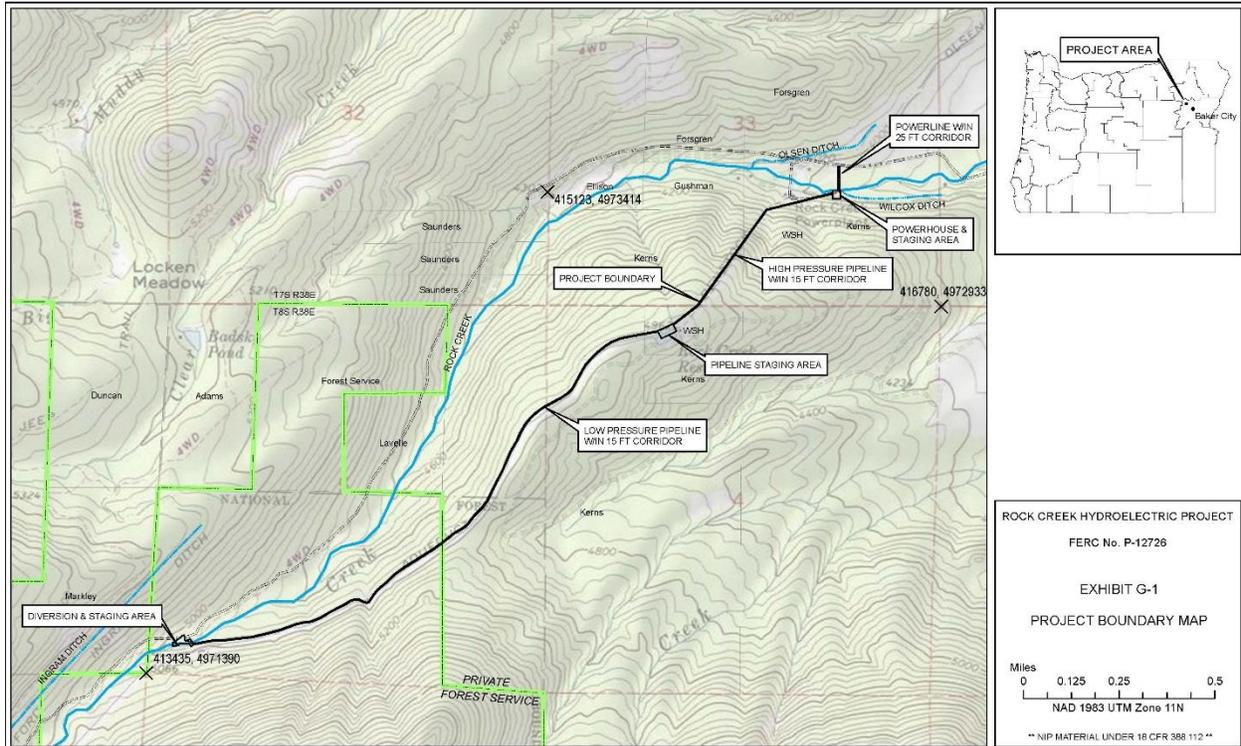


Figure 2. Layout of historic Rock Creek power plant, diversion and pipeline (Warm Springs Hydro, 2019b)

2. Requirements for Certification

2.1 Applicable Federal and State Law

Warm Springs Hydro LLC has applied to the Federal Energy Regulatory Commission (FERC) for a license for a new hydroelectric facility on Rock Creek in Baker County, Oregon. Section 401 of the Federal Clean Water Act requires that an applicant for a federal permit or license to conduct any activity which may result in any discharge into navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates. The state water pollution control agency having jurisdiction over the navigable waters must certify that the project will comply with the applicable provisions of sections 301, 302, 303, 306, and 307 of the Clean Water Act.

The Oregon Department of Environmental Quality (DEQ) has jurisdiction for issuing a §401 Water Quality Certification in the State of Oregon. In order for DEQ to issue a 401 certification, the Applicant (Warm Springs Hydro LLC) must ensure that any actions of project development and operations comply

with the water quality standards set forth in OAR Chapter 340, division 041 as well as the applicable provisions of sections 301, 302, 303, 306, and 307 of the Clean Water Act.

Federal Requirements

Sections 301, 302, 303, 306, and 307 of the Federal Clean Water Act: These sections prescribe effluent limitations, water quality related effluent limitations, water quality standards and implementation plans, national standards of performance for new sources, and toxic and pretreatment effluent standards.

State Requirements

Oregon Administrative Rules (OAR) 340-041 and 340-048-0005 to 340-048-0050: These rules were adopted by the Environmental Quality Commission (EQC) to prescribe the state's water quality standards (OAR 340-041) and procedures for receiving, evaluating, and taking final action upon a §401-certification application (OAR 340-048). The rules include requirements for general information such as the location and characteristics of the project, as well as confirmation that the project complies with appropriate local land use plans and any other requirements of state law that have a direct or indirect relationship to water quality.

ORS 468B.040: This state statute prescribes procedural requirements and findings with which DEQ must comply as it makes a decision on a § 401-certification application. This statute makes reference to the federal law requirements, state water quality rules, and other requirements of state law regarding hydroelectric projects.

ORS 197.180(1): This statute requires state agency actions to be consistent with acknowledged land use plans and implementing regulations, or if a plan is not acknowledged, compatible with state land use goals. Findings must support the state agency action.

ORS 543A: This statute establishes procedures among state agencies in the reauthorization of federally licensed hydroelectric projects, including state certification of water quality.

Information which must be included in an application for §401 certification is presented in OAR 340-048-0020(2). The application together with information provided during public comment and interagency coordination is essential to support the following determinations to be made by DEQ pursuant to §401 of the Federal Clean Water Act and state law:

- A determination whether to issue or deny certification.
- Determination of conditions appropriate to include in any granted certificate.
- Preparation of findings as required by ORS 468B.040 and ORS 197.180(1).

3. Summary of Application

3.1 Applicant Information

3.1.1 Name and Address of Applicant

Warm Springs Hydro LLC
1032 Grandview Drive
Ivins, UT 84738
(435) 429-1878

3.1.2 Name and Address of Applicant's Authorized Representative

Nicholas E. Josten
GeoSense
2742 Saint Charles Ave.
Idaho Falls, ID 83404
(208)528-6152

3.1.3 Documents Filed in Support of §401 Application

Warm Springs Hydro LLC has filed the following key documents in support of its §401 certification application for the licensing of the Project:

Application for Certification Pursuant to Section 401 of the Federal Clean Water Act for the Rock Creek Hydroelectric Project, FERC No. 12726, Warm Springs Hydro LLC, December 2019.

Application for a Minor Water Project, for Rock Creek Hydroelectric Project, FERC No. 12726, Warm Springs Hydro LLC, March 2019

Rock Creek Temperature Modeling Report, SPF Engineering, March 2020.

Rock Creek Hydroelectric Project (FERC No. 12726) 2017 Updated Study Report, Warm Springs Hydro LLC, February 2017.

3.2 Waters of the State

3.2.1 Waters Affected by the Project

The Powder Basin contains tributaries of the Snake River located in northeastern Oregon, and is divided into three subbasins: Powder River (4th Field HUC 17050203), Brownlee (4th Field HUC 17050201), and Burnt River (4th Field HUC 1705202). The three subbasins total approximately 3,500 square miles. Elevations in range from approximately 1,700 feet at the mouth of Pine Creek in the Brownlee Subbasin, to over 9,000 feet in the Wallowa and Elkhorn Mountain ranges.

The Powder River has headwater areas in the Elkhorn Mountains west of Baker City near the town of Sumpter, where Cracker Creek and McCully Fork join to form the Powder River. It flows north through the Baker Valley, and then southeast through the Keating Valley and reaches Brownlee Reservoir on the Snake River near the town of Richland. The total length of the Powder River is approximately 144 miles. Major tributaries include the North Powder River and Eagle Creek. Rock Creek flows from the Elkhorn Mountains in a westerly direction and joins the Powder River in the Baker Valley (**Figure 3**).

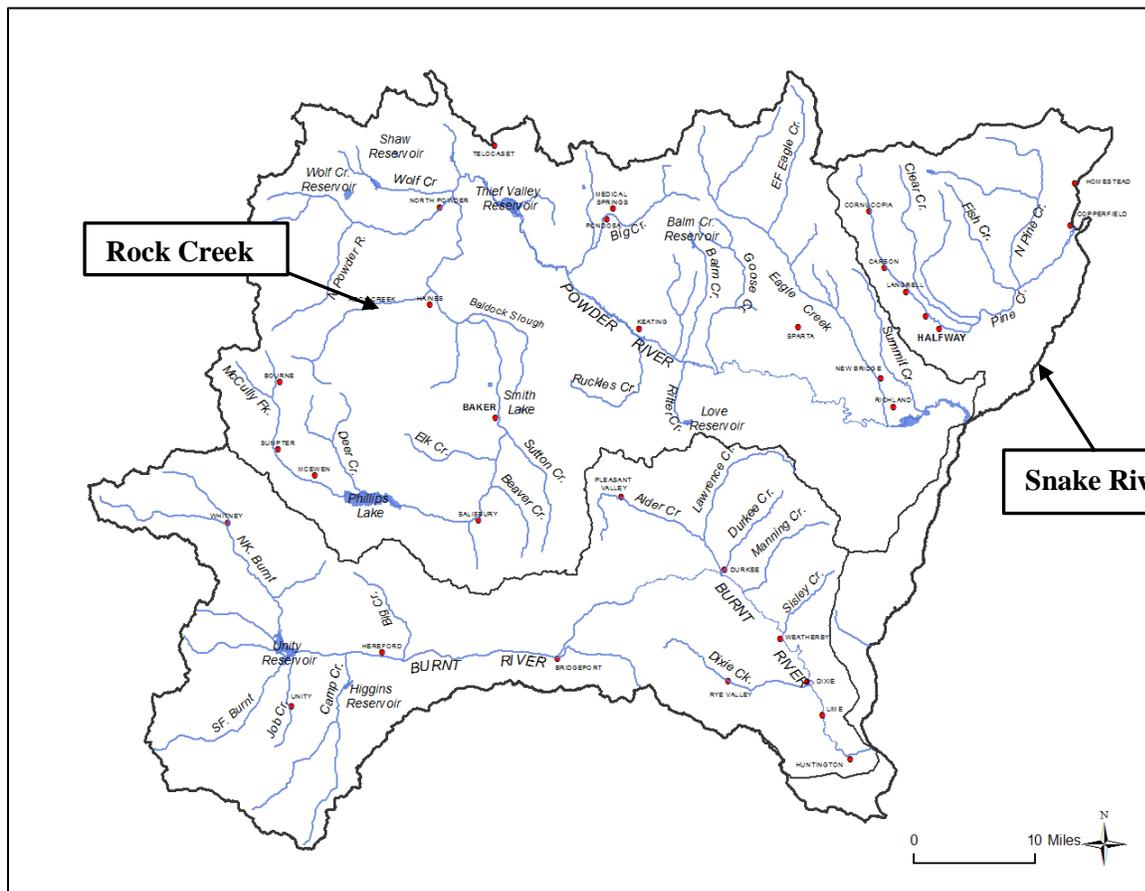


Figure 3.

The proposed diversion dam on Rock Creek is at the location of the original diversion for the historic Powerhouse (**Figure 2**). A new penstock will carry the diverted water from the dam approximately 2.3 miles to the new powerhouse, which is located adjacent to the historic powerhouse. The proposed new powerhouse will discharge directly to Rock Creek.

3.2.2 Water Rights

The Oregon Water Resources Department (OWRD) has stated that the Project has a valid Oregon Water Right Certificate No. 4120 that was developed by the original owners of the Rock Creek hydroelectric project. That right is currently leased instream under lease IL-108 that is set to terminate December 31, 2020. This right allows the diversion of 13 cfs from Rock Creek for power generation and has a priority date of April 11, 1902. The validity of the water right has been challenged by an environmental advocacy group called Waterwatch of Oregon and is currently before the Oregon Court of Appeals.

3.2.3 Beneficial Uses

Designated beneficial uses for the Powder River and its tributaries (including Rock Creek) are given in OAR-041-0260, Table 260A and apply to all waters within the Project area (**Table 1**).

Table 1. Designated Beneficial uses of the Powder River and Tributaries

Beneficial Uses	All Basin Waters
Public Domestic Water Supply ¹	X
Private Domestic Water Supply ¹	X
Industrial Water Supply	X
Irrigation	X
Livestock Watering	X
Fish & Aquatic Life ²	X
Wildlife and Hunting	X
Fishing	X
Boating	X
Water Contact Recreation	X
Aesthetic Quality	X
Hydro Power	
Commercial Navigation & Transportation	

¹ With adequate pretreatment (filtration and disinfection) and natural quality to meet drinking water standards.

² See also OAR-041-Figure 260A for fish use designations for this basin.

3.2.4 Fisheries in the Powder Basin

Fishery resources have changed dramatically in the Powder Basin in the last 50-100 years. Anadromous fish (fish that migrate to the ocean, such as salmon and steelhead) were eliminated from a majority of the Powder Subbasin by the construction of the Thief Valley Dam on the lower Powder River (RM 70) in 1932. Anadromous fish were eliminated from the rest of the Powder Basin and upstream Snake River tributaries after the construction of Brownlee, Oxbow, and Hells Canyon Dams on the Snake River in the late 1950s and 1960s.

Redband Trout and Bull Trout were identified as important aquatic species in the Powder River Subbasin report (NWPC, 2004). They are also some of the most sensitive aquatic species in the Powder Basin and therefore their habitat is one of the most sensitive beneficial water uses. Redband Trout are present in the Powder River and many tributaries, including Rock Creek.

DEQ has mapped Rock Creek as Bull Trout spawning and rearing habitat and the Bull Trout temperature and spawning dissolved oxygen water quality criteria apply. Rock Creek was historic bull trout habitat, but there are no recent surveys that confirm their presence or absence. The eDNA study completed by the applicant did not detect evidence of Bull Trout (Warm Springs Hydro, 2017). However, ODF&W has stated that the eDNA method is not sufficient to detect fish in all parts of the watershed. The U.S. Fish and Wildlife Service has stated that the Project area is outside of Bull Trout Critical Habitat.

4. Project Description

4.1 Historic Hydropower Facility and Operations

The historic Rock Creek Powerhouse was constructed in 1904, and operated until 1995 (**Figure 2**). Some of the original project facilities are still present including portions of a wooden flume, the old powerhouse **Figure 4**, and access roads to the diversion, pipeline corridor, powerhouse and transmission line. None of these original facilities except the access roads will be used for the proposed project.



Figure 4. Historic Rock Creek Powerhouse.

4.2 Proposed Hydropower Project

4.2.1 Proposed Facilities

A new diversion and intake structure are proposed at the location of the historic diversion structure on Rock Creek at approximately RM 9.3. The diversion will consist of a low concrete weir across Rock Creek, an automated head gate, a fish screen, and a concrete pipeline intake structure. The diversion and intake structure would be located entirely on U.S. Forest Service (Forest Service) land.

The pipeline would consist an 8,300-ft section of low-pressure pipe and a 3,100-ft section of pressurized pipe. The low-pressure section would consist of 18-20 inch diameter plastic or steel pipe buried within the cleared and graded right-of-way that was used on the previous project as a foundation for an open, above-ground wooden flume. The first 3,700 ft of low-pressure pipeline would be located on Forest Service land and the remainder would be located on private land. The low-pressure pipe would convey water with little loss of elevation to a ridgetop above the powerhouse site. On the ridgetop the pipeline would transition to a 20-24 inch diameter high pressure plastic or steel pipe. The high-pressure pipe would be buried on the slope below the ridge top and then to the location of the powerhouse site adjacent to Rock Creek (**Warm Springs Hydro, 2019b**). The change in hydraulic head along the 2.3 mile by-pass reach is approximately 900 feet.

A new powerhouse would be constructed adjacent to Rock Creek at approximately RM 7 just above the Wilcox Ditch diversion. The powerhouse would be a pre-fabricated metal building approximately 20-ft x 15-ft x 15-ft tall and would contain a single Pelton turbine with a hydraulic capacity of 13 cfs connected to a 0.85 MW generator. The powerhouse would also contain switch gear and other equipment needed for monitoring and control of the turbine/generator. Water exiting the turbine would be discharged directly back to Rock Creek at the Powerhouse location.

A small transformer would be located next to the powerhouse, mounted on a concrete containment pad. The transformer would step up voltage from 4,800 V to 12,600 V and feed power onto a 350-ft long powerline segment between the powerhouse and Rock Creek Road. The project would interconnect with an Oregon Trail Electric Cooperative distribution line on Rock Creek Road.

All construction sites would be accessed using existing roads. Access roads for powerhouse, pipeline, and transmission line construction would be existing roads located on private land. The access road for diversion construction would be Forest Service Road 5520. Three staging areas would be used for temporary storage of equipment and construction supplies. The staging areas for powerhouse and pipeline construction would be located on private land owned by Warm Springs Hydro LLC. A staging area for diversion construction would be located on Forest Service land.

4.2.2 Proposed Operations

The project would have no effect on Rock Creek flow either above the hydropower diversion or below the powerhouse discharge because all diverted flow will be returned to Rock Creek. In the bypass reach, between the diversion and powerhouse, flows would be reduced whenever water is withdrawn for power generation. Flow through the bypass reach would depend on: i) incoming flow from upstream, ii) irrigation demand within the project reach, iii) a minimum flow requirements implemented to protect aquatic habitat and water temperature iv) the 13 cfs hydraulic capacity of the powerplant. Water that remains after irrigation demand, required minimum bypass flow, and flows needed for water temperature criteria compliance would be available for power generation. This water, up to a maximum of 13 cfs, would be diverted on a year-round basis. **Figure 5** shows average semi-monthly flow in the bypass reach under existing conditions and under proposed hydropower operations based on 20 years of flow records.

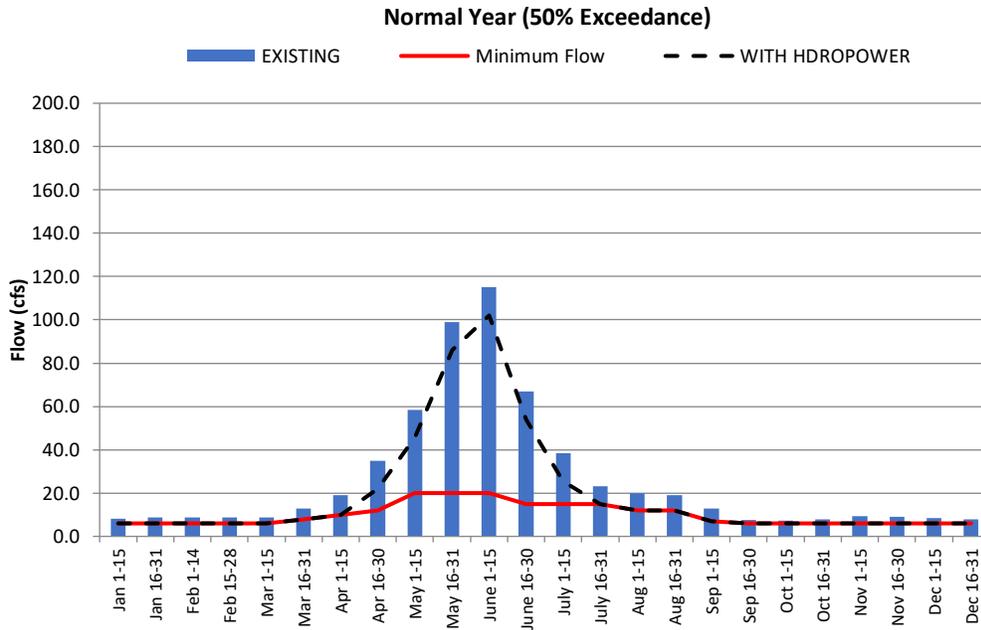


Figure 5. Mean semi-monthly flow in the bypass reach under existing conditions and under proposed hydropower operations. Minimum flow assumes mitigation option in Table 3. (Warm Springs Hydro, 2019a)

4.2.3 Instream Flow Releases

In accordance with the license application and the proposed certification conditions, Warm Springs Hydro must continue to operate its hydroelectric facility in a “run of river” mode throughout the life of the FERC license. Warm Springs Hydro shall discharge a continuous minimum flow from the Project diversion dam into Rock Creek in the quantities shown in **Table 2** or **Table 3** of this document. The minimum flow released to the Rock Creek shall be equal to or greater than those shown in **Table 2** if there is no Fish Habitat Mitigation Plan approved by the Oregon Department of Fish and Wildlife (ODFW). If there is an approved mitigation plan, the minimum flow values in **Table 3** apply. If natural inflow to the Project is equal to or less than the required minimum flow then no flow shall be diverted to the Project. Minimum flows are subject to change based on the results of temperature monitoring and modeling of the impact of the Project to water temperatures in the bypass reach as described below:

- Warm Springs Hydro shall perform daily temperature modeling runs when operating the Project during the period of June 1 to September 30, as described in Operation Compliance Monitoring Plan required in Condition 1j of §401 Water Quality Certification. All temperature model input parameters, calculated bypass reach heating estimate, and Powerhouse operating flow will be reported daily on the Agency approved reporting system described in the certification conditions.

Table 2. Minimum flows for Rock Creek without mitigation, based on Application for Instream Water Right (IS 72194) ODFW 1/8/92 (cubic feet/second)	
Time Interval	Instream Flow
January 1-February 15	9 cfs
February 16-28	15 cfs
March 1-June 15	20 cfs
June 16-30	15 cfs
July 1-31	12 cfs
August 1-December 31	9 cfs

Table 3. Minimum flows for Rock Creek with mitigation. (cubic feet/second)	
January 1-March 15	6 cfs
March 16-31	8 cfs
April 1-15	10 cfs
April 16-30	12 cfs
May 1-June 15	20 cfs
June 16-July 31	15 cfs
August 1-31	12 cfs
September 1-15	7 cfs
September 16-December 31	6 cfs

4.2.4 Water Quality Monitoring

In accordance with Condition 2 of the § 401 Water Quality Certification, Warm Springs Hydro, in consultation with the Oregon Department of Environmental Quality (DEQ), must develop a Project Water Quality Monitoring and Management Plan (WQMMP) within 90 days of issuance of the FERC license. Upon approval, the WQMMP becomes part of the §401 Certification Conditions for the Project for the purposes of any federal license or permit.

The requirements of the WQMMP are described in Condition 2 of the §401 Water Quality Certification for the project and include monitoring of temperature, dissolved oxygen, total dissolved gas, and macro-invertebrates.

5. Water Quality Standards and Regulations

5.1 Biologically-Based Numeric Criteria

DEQ establishes numeric criteria for certain water quality parameters to provide support for biological functions of aquatic organisms. DEQ has adopted numeric criteria for temperature and dissolved oxygen (DO) which reflect life stage development of salmonid fish species.

The biologically-based numeric criteria for temperature and DO for the impacted reach of Rock Creek presented in **Table 4**. The resident trout spawning use (August 15 through June 15) is based on the overlapping spawning periods of redband and bull trout described in the February 2004 letter from DEQ to US EPA Region 10 (**DEQ, 2004**). The Cold Water Aquatic Life designation for the remainder of the year is based on the DEQ memo (**DEQ, 2010**) which describes the application of updated U.S. EPA ecoregion maps used to determine appropriate DO criteria.

Table 4. Biologically-based Numeric Criteria for Temperature and DO for in Rock Creek

	August 15-June 15	June 16-Aug 14	Rule
Use	Resident Trout Spawning – redband and bull trout	Redband trout habitat/Cold Water Aquatic Life	OAR 340-041, Figure 260A
Temperature	12°C/53.6°F	12°C/53.6°F	OAR 340-041-0028
pH	6.5-9.0	6.5-9.0	OAR 340-041-0260
Dissolved Oxygen	a) Not less than 11.0 mg/l. If IGDO \geq 8.0 mg/l, the DO spawning criterion is 9.0 mg/l; b) Where pressure, altitude or temperature preclude attainment of the 11.0 or 9.0 mg/l criteria, DO saturation must be at least 95 percent; c) Spatial median IGDO must be at least 8.0 mg/l.	Criterion is 8.0 mg/l. Where precluded by pressure, altitude or temperature, DO saturation must be at least 90 percent. At DEQ discretion, DO must not fall below 8.0 mg/l as a 30-day mean, 6.5 mg/l as a 7-day mean, and 6.0 mg/l as an absolute minimum.	OAR 340-041-0016

5.2 Antidegradation

The purpose of Oregon's Antidegradation policy (OAR 340-041-0004) is to protect, maintain, and enhance the quality of existing surfaces. For waters which meet applicable water quality standards, the policy states that the existing water quality shall be maintained and protected unless the Oregon EQC

makes certain rigorous findings of need. For water bodies which do not meet certain criteria, the policy prohibits further degradation.

The Antidegradation policy complements the use of water quality criteria. While criteria provide the absolute minimum values or conditions that must be met in order to protect designated uses, the Antidegradation policy offers protection to existing water quality, including instances where water quality meets or exceeds the criteria.

5.3 Water Quality Impairment in the Project Vicinity

5.3.1 Water Quality Limited Waters

Waterbodies which fail to meet certain water quality criteria are designated as water quality limited pursuant to CWA §303(d). The EPA requires States to develop total maximum daily loads TMDLs for waters identified as water quality-limited. A TMDL identifies the maximum pollutant load which a water body may receive from combined point and non-point sources and still meet water quality standards necessary to support all designated beneficial uses. TMDLs quantify waste load allocations (WLAs) for point sources and load allocations (LAs) for non-point sources. For hydroelectric projects located on a water quality-limited waterbody, a §401 certification may serve as the means for implementing LAs assigned to the project. Rules for developing, issuing and implementing TMDLs are in OAR Chapter 340, Division 042.

The DEQ 2012 Integrated Report presents a database of water quality limited waters in Oregon. **Table 5** identifies the sections of rivers in or near the Project boundary currently identified as water quality limited in the 2012 Integrated Report (IR).

Table 5. Water Quality Limited Stream Reaches in the Rock Creek Project Vicinity

Water Body	River Mile	Parameter	Season	Criteria	Beneficial Use	Status	Assessment
Powder River	0 to 146.3	Arsenic	Year Around	Table 40 Human Health Criteria for Toxics	Human Health; Aquatic life	TMDL needed	Added 2010 IR
Powder River	0 to 130	Dissolved Oxygen	January 1 to May 15	Spawning: Not less than 11.0 mg/l or 95% of saturation	Redband trout spawning	TMDL needed	Added 2010 IR
Powder River	0 to 130	E. Coli	Fall/Winter/Spring	30-day log mean 126 org./100 ml; 406 single sample max.	Water contact recreation	TMDL needed	Added 2010 IR
Powder River	115.6 to 130	Fecal Coliform	Summer	Log mean of 200 org./100ml; no more than 10% > 400/100 ml	Water contact recreation	TMDL needed	Added 1998 IR

Since no TMDLs have been developed for the Powder River, DEQ will use the §401 evaluation process to identify the Project’s contribution to the listed parameters and include management conditions in the §401 Water Quality Certification to address those contributions. These §401 conditions may be modified as necessary when a TMDL is approved or modified.

5.3.2 Oregon Health Authority Listings

Based on mercury levels in fish tissue, the Oregon Health Authority (OHA) issued a health advisory on the Snake River including Brownlee Reservoir and the Powder River Arm of Brownlee Reservoir. The advisory includes all resident fish in these waters and recommends limiting consumption to 3 meals per month for sensitive individuals such as young children and women of child-bearing age, and 8 meals per month for the rest of the population. There are no health OHA advisories for Rock Creek or the Powder River in the project vicinity.

5.4 Water Quality Standards not of Concern

Water quality standards identified in **Table 6** are likely not negatively affected by the proposed operation of the Rock Creek hydroelectric facility. For this reason, and as further explained below, DEQ is reasonably assured that the water quality standards identified in **Table 6** below will be met during operation of the proposed Project.

Table 6: Water Quality Standards Not Affected by Proposed Project Operations

Criterion	Standard	DEQ Evaluation
Fungi OAR 340-041-007(10)	<i>The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or that are injurious to health, recreation, or industry may not be allowed.</i>	The Project is not expected to discharge substances which promote fungal growth. The Project will not alter the current flow regime in a manner which contributes to fungal growth.
Taste & Odors OAR 340-041-007(11)	<i>The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the palatability of drinking water or the palatability of fish or shellfish may not be allowed.</i>	DEQ knows of no reports of objectionable taste or odor or toxic conditions that are deleterious to fish or affect the palatability of water, fish, or shellfish. The proposed Project will not affect these characteristics.
Bottom or Sludge Deposits OAR 340-041-007(12)	<i>The formation of bottom or sludge deposits deleterious to habitat and aquatic life are not allowed.</i>	The proposed Project is not expected to generate sludge or bottom sediments.
Aesthetic conditions OAR 340-041-007(14)	<i>Aesthetic conditions offensive to human sight, taste, smell or touch may not be allowed.</i>	The proposed Project will not create aquatic conditions that are offensive to the human senses of sight, taste, smell, or touch.
Radioisotopes OAR 340-041-007(15)	<i>Radioisotope concentrations may not exceed maximum permissible concentrations in drinking water, edible fishes or shellfishes, wildlife, irrigated crops, livestock and dairy products, or pose an external radiation hazard.</i>	The Project will not utilize, store, or produce radioactive material.
Toxic Substances OAR 340-041-0033	<i>Discharge of toxic material that affects aquatic life or human uses is not allowed.</i>	The Project may not discharge toxic material in amounts which violate toxic substances criteria.

pH OAR 340-041-0021	<i>pH values in the Powder Basin may not fall outside of the range 6.5-9.0. When greater than 25% of ambient measurements taken between June and September are greater than pH 8.7, the Department will determine whether the values higher than 8.7 are anthropogenic or natural in origin (as resources allow).</i>	The Project will not alter the current flow regime in a manner which contributes to changes in pH.
Turbidity OAR 340-041-0036	<i>No more than a ten percent cumulative increase in natural stream turbidities may be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity.</i>	The Project will not alter the current flow regime in a manner which contributes to changes in turbidity.
Bacteria OAR 340-041-009	<i>Limits in-water concentration of bacterial cells, discharge of raw sewage, animal waste runoff, sewer overflows, and other sources of bacterial pollution.</i>	The Project will not discharge sewage or animal wastes into Project waters or engage in other activities which may contribute to bacterial pollution.
Nuisance Algae Growth OAR 340-041-0019	<i>Algal growth which impairs the recognized beneficial uses of the water body is not allowed.</i>	The Project will not alter the current flow regime in a manner that will create conditions favorable to algal growth.
Total Dissolved Solids OAR 340-041-0032 & OAR 340-041-0345	<i>Standard generally prohibits TDS concentrations which exceed basin-specific criterion of 100 mg/l.</i>	The Project does not contribute organic or inorganic substances in molecular, ionized, or micro-granular form which may affect TDS in Project waters.

5.5 Water Quality Standards of Potential Concern

Water quality standards which may potentially be impacted by the proposed Rock Creek hydroelectric operations are evaluated in **Section 6.0**. This section provides an evaluation of potential Project effects over the range of operating conditions proposed by the Applicant. Based on this evaluation, DEQ determines whether proposed activities will likely comply with each water quality standard. DEQ may provide conditions on the operation of the facility, as necessary, to provide assurance that proposed operations do not violate Oregon water quality standards.

This evaluation is limited to the effects the operation of the Project under a new License may have on water quality. Project construction or other activities which necessitate in-water work may require separate water quality certifications issued by DEQ or pre-authorized pursuant to a dredge and fill permit issued by the Corps pursuant to Section 404 of the CWA.

Based on information provided by Warm Springs Hydro coupled with a general understanding of the impact of hydroelectric operations on water quality, DEQ has identified water quality standards which may be affected by Project operations as proposed. **Table 7** identifies the water quality standards potentially impacted by the operation of the Project under a new FERC License. A detailed evaluation of the effects which Project operation may have these parameters is presented in **Section 6.0** of this report.

Table 7: Water Quality Standards of Potential Concern

Criterion	Standard	DEQ Evaluation
Temperature OAR 340-041-028	<i>Criteria is intended to minimize the risk to cold-water aquatic ecosystems from anthropogenic warming, to encourage the restoration and protection of critical aquatic habitat, and to control extremes in temperature fluctuations due to anthropogenic activities.</i>	The Project may cause excess warming of the by-pass reach of Rock Creek due to reductions in flow during hydropower operation.
Dissolved Oxygen OAR 340-041-0016	<i>Sufficient concentrations of dissolved oxygen are necessary to support aquatic life.</i>	Passing the discharge water through the Project penstock and turbines may reduce aeration.
Total Dissolved Gas OAR 340-041-0031	<i>Protects aquatic life from gas bubble trauma caused by water that is super saturated with atmospheric gases.</i>	Turbine discharge operation may cause gas entrainment in discharge waters.
Discoloration, oily sheen, oily coatings OAR 340-041-0007(13)	<i>Objectionable discoloration, scum, oily sheen, floating solids or coating aquatic life with oil films is not allowed.</i>	Oil is used in Project turbines and transformers. Fuels may be stored onsite for other Project operations.
Biocriteria OAR 340-041-0011	<i>Waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.</i>	Passing the Project discharge water through the Project penstock and turbines may reduce aeration and could affect biological communities.
Statewide Narrative Criteria: Highest and Best Practical Treatment, Prohibition of Deleterious Conditions 340-041-0007(1) and (10)	<i>Statewide Narrative Criteria: Highest and Best Practical Treatment, Prohibition of Deleterious Conditions 340-041-0007(1) and (10)</i>	Hydroelectric dams may influence the aquatic environment by creating conditions that adversely affect aquatic life. These deleterious effects may be due to changes in flow below the hydroelectric project.
Antidegradation OAR 340-041-0004	<i>Protects existing water quality by preventing unnecessary additional water quality degradation.</i>	Must be addressed when a project is proposed that may lower existing water quality conditions, even though standard violations are not anticipated.

6. Water Quality Compliance Evaluation

6.1 Temperature

6.1.1 Water Quality Standard

The applicable standard is given in 340-041-0028:

Temperature

(1) *Background.* Water temperatures affect the biological cycles of aquatic species and are a critical factor in maintaining and restoring healthy salmonid populations throughout the State. Water temperatures are influenced by solar radiation, stream shade, ambient air temperatures, channel morphology, groundwater inflows, and stream velocity, volume, and flow. Surface water temperatures may also be warmed by anthropogenic activities such as discharging heated water, changing stream width or depth, reducing stream shading, and water withdrawals.

(2) *Policy.* It is the policy of the Commission to protect aquatic ecosystems from adverse warming and cooling caused by anthropogenic activities. The Commission intends to minimize the risk to coldwater aquatic ecosystems from anthropogenic warming, to encourage the restoration and protection of critical aquatic habitat, and to control extremes in temperature fluctuations due to anthropogenic activities. The Commission recognizes that some of the State's waters will, in their natural condition, not provide optimal thermal conditions at all places and at all times that salmonid use occurs. Therefore, it is especially important to minimize additional warming due to anthropogenic sources. In addition, the Commission acknowledges that control technologies, best management practices and other measures to reduce anthropogenic warming are evolving and that the implementation to meet these criteria will be an iterative process. Finally, the Commission notes that it will reconsider beneficial use designations in the event that man-made obstructions or barriers to anadromous fish passage are removed and may justify a change to the beneficial use for that water body.

(3) *Purpose.* The purpose of the temperature criteria in this rule is to protect designated temperature sensitive beneficial uses, including specific salmonid life cycle stages in waters of the State.

(4) *Biologically Based Numeric Criteria.* Unless superseded by the natural conditions criteria described in section (8) of this rule, or by subsequently adopted site-specific criteria approved by EPA, the temperature criteria for State waters supporting salmonid fishes are as follows:

(criteria in bold are applicable to Rock Creek)

(a) The seven-day-average maximum temperature of a stream identified as having salmon and steelhead spawning use on subbasin maps and tables set out in OAR 340-041-0101 to OAR 340-041-0340: Tables 101B, and 121B, and Figures 130B, 151B, 160B, 170B, 220B, 230B, 271B, 286B, 300B, 310B, 320B, and 340B, may not exceed 13.0 degrees Celsius (55.4 degrees Fahrenheit) at the times indicated on these maps and tables;

(b) The seven-day-average maximum temperature of a stream identified as having core cold water habitat use on subbasin maps set out in OAR 340-041-101 to OAR 340-041-340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 16.0 degrees Celsius (60.8 degrees Fahrenheit);

(c) The seven-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use on subbasin maps set out at OAR 340-041-0101 to OAR 340-041-0340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit);

(d) The seven-day-average maximum temperature of a stream identified as having a migration corridor use on subbasin maps and tables OAR 340-041-0101 to OAR 340-041-0340: Tables 101B, and 121B, and Figures 151A, 170A, and 340A, may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit). In addition, these waterbodies must have coldwater refugia that are sufficiently distributed so as to allow salmon and steelhead migration without significant adverse effects from higher water temperatures elsewhere in the water body.

e) The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or redband trout use on subbasin maps and tables set out in OAR 340-041-0101 to 340-041-0340: Tables 121B, 140B, 190B, and 250B, and Figures 180A, 201A, 260A and 310A may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit);

(f) The seven-day-average maximum temperature of a stream identified as having bull trout spawning and juvenile rearing use on subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130B, 151B, 160B, 170B, 180A, 201A, 260A, 310B, and 340B, may not exceed 12.0 degrees Celsius (53.6 degrees Fahrenheit). From August 15 through May 15, in bull trout spawning waters below Clear Creek and Mehlhorn reservoirs on Upper Clear Creek (Pine Subbasin), below Laurance Lake on the Middle Fork Hood River, and below Carmen reservoir on the Upper McKenzie River, there may be no more than a 0.3 degrees Celsius (0.5 Fahrenheit) increase between the water temperature immediately upstream of the reservoir and the water temperature immediately downstream of the spillway when the ambient seven-day-average maximum stream temperature is 9.0 degrees Celsius (48 degrees Fahrenheit) or greater, and no more than a 1.0 degree Celsius (1.8 degrees Fahrenheit) increase when the seven-day-average stream temperature is less than 9 degrees Celsius.

(12) Implementation of the Temperature Criteria.

(e) Other Nonpoint Sources. The department may, on a case-by-case basis, require nonpoint sources (other than forestry and agriculture), including private hydropower facilities regulated by a 401 water quality certification, that may contribute to warming of State waters beyond 0.3 degrees Celsius (0.5 degrees Fahrenheit), and are therefore designated as water-quality limited, to develop and implement a temperature management plan to achieve compliance with applicable temperature criteria or an applicable load allocation in a TMDL pursuant to OAR 340-042-0080.

(A) Each plan must ensure that the nonpoint source controls its heat load contribution to water temperatures such that the water body experiences no more than a 0.3 degrees Celsius (0.5 degree Fahrenheit) increase above the applicable criteria from all sources taken together at the maximum point of impact.

(B) Each plan must include a description of best management practices, measures, effluent trading, and control technologies (including eliminating the heat impact on the stream) that the nonpoint source intends to use to reduce its temperature effect, a monitoring plan, and a compliance schedule for undertaking each measure.

(C) The Department may periodically require a nonpoint source to revise its temperature management plan to ensure that all practical steps have been taken to mitigate or eliminate the temperature effect of the source on the water body.

6.1.2 Application of Water Quality Standard

The temperature standard protects waters of the state against anthropogenic thermal loading which may impair water quality or undermine support for designated beneficial uses. Water temperatures that are acutely or chronically above biologically based levels can harm aquatic organisms that depend upon cold water to live or reproduce. This is particularly true of Oregon's native "cold-water" fish such as salmon, bull trout, rainbow trout, cutthroat trout, steelhead trout and certain amphibians including frogs and salamanders. Elevated water temperature may produce negative physiological effects including decreased spawning success, impaired feeding and growth, reduced resistance to disease and parasites, increased sensitivity to toxic substances, diminished migration tendencies, reduced ability to compete with more temperature-resistant species, and increased vulnerability to predation. If water temperatures are high enough for sustained periods, mortality occurs.

Elevated temperatures may also adversely affect other important water quality parameters including DO, and increased algae and fungi productivity. DEQ adopts biologically based numeric temperature criteria to support specific life stage and development activities of species which may currently occupy or have historically occupied certain ranges. Native salmonids including redband trout, and potentially bull trout are present in Rock Creek. Biologically based numeric temperature criteria applicable to the Project are determined by the Fish Use and Spawning Map presented as Figures 260A of OAR 340, Division 041. Figure 260A designates the entire Project area as bull trout spawning and rearing habitat which has a seven-day-average maximum temperature criterion of 12.0°C. The temperature criterion is based on a calculation of the seven-day average maximum (7DAM) temperature. The 7DAM metric is the average of the daily maximum temperatures from seven consecutive days made on a rolling basis.

Definitions applicable to the temperature standard include:

340-041-0002 Definitions

Definitions applicable to all basins unless context requires otherwise:

(2) "Ambient Stream Temperature" means the stream temperature measured at a specific time and place. The selected location for measuring stream temperature must be representative of the stream in the vicinity of the point being measured.

(3) "Anthropogenic," when used to describe "sources" or "warming," means that which results from human activity;

(4) "Applicable Criteria" means the biologically based temperature criteria in OAR 340-041-0028(4), the superseding cold water protection criteria in OAR 340-041-0028(11), or the superseding natural condition criteria as described in OAR 340-041-0028(8). The applicable criteria may also be site-specific criteria approved by U.S. EPA. A subbasin may have a combination of applicable temperature criteria derived from some or all of these numeric and narrative criteria.

(9) "Cold-Water Aquatic Life" means aquatic organisms that are physiologically restricted to cold water, including but not limited to native salmon, steelhead, mountain whitefish, char (including bull trout), and trout.

(10) "Cold Water Refugia" means those portions of a water body where or times during the diel temperature cycle when the water temperature is at least 2 degrees Celsius colder than the daily maximum temperature of the adjacent well-mixed flow of the water body.

(13) "Core Cold-Water Habitat Use" means waters that are expected to maintain temperatures within the range generally considered optimal for salmon and steelhead rearing, or that are

suitable for bull trout migration, foraging, and sub-adult rearing that occurs during the summer. These uses are designated on the following subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130A, 151A, 160A, 170A, 180A, 201A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A.

(20) "Epilimnion" means the seasonally stratified layer of a lake or reservoir above the metalimnion; the surface layer.

(24) "Hypolimnion" means the seasonally stratified layer of a lake or reservoir below the metalimnion; the bottom layer.

(30) "Load Allocation (LA)" means the portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading that may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting loading.

Whenever possible, natural and nonpoint source loads should be distinguished.

(36) "Metalimnion" means the seasonal, thermally stratified layer of a lake or reservoir that is characterized by a rapid change in temperature with depth and that effectively isolates the waters of the epilimnion from those of the hypolimnion during the period of stratification; the middle layer.

(40) "Natural Conditions" means conditions or circumstances affecting the physical, chemical, or biological integrity of a water of the state that are not influenced by past or present anthropogenic activities. Disturbances from wildfire, floods, earthquakes, volcanic or geothermal activity, wind, insect infestation, and diseased vegetation are considered natural conditions.

(41) "Natural Thermal Potential" means the determination of the thermal profile of a water body using best available methods of analysis and the best available information on the site-potential riparian vegetation, stream geomorphology, stream flows, and other measures to reflect natural conditions.

(56) "Seven-Day Average Maximum Temperature" means a calculation of the average of the daily maximum temperatures from seven consecutive days made on a rolling basis. (65) "Total Maximum Daily Load (TMDL)" means the sum of the individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and background. If receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure. If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then waste load allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs.

6.1.3 Present Conditions

Water temperature data was collected in Rock Creek in 1999, 2000, 2007, 2008, 2016 and 2017. For each field effort temperature monitors were located at the top (diversion site) and bottom (powerhouse site) of the proposed bypass reach and temperature data was continuously recorded. The 7DAM temperature was calculated for each data set and compared with the bull trout spawning and juvenile rearing temperature criterion of 12°C (53.6°F). The monitoring data show that the temperature criterion was been historically exceeded for periods in July-September at the diversion site (RM 9.3) and in June – September at the powerhouse site (RM 7) (**Figures 6 and 7**).

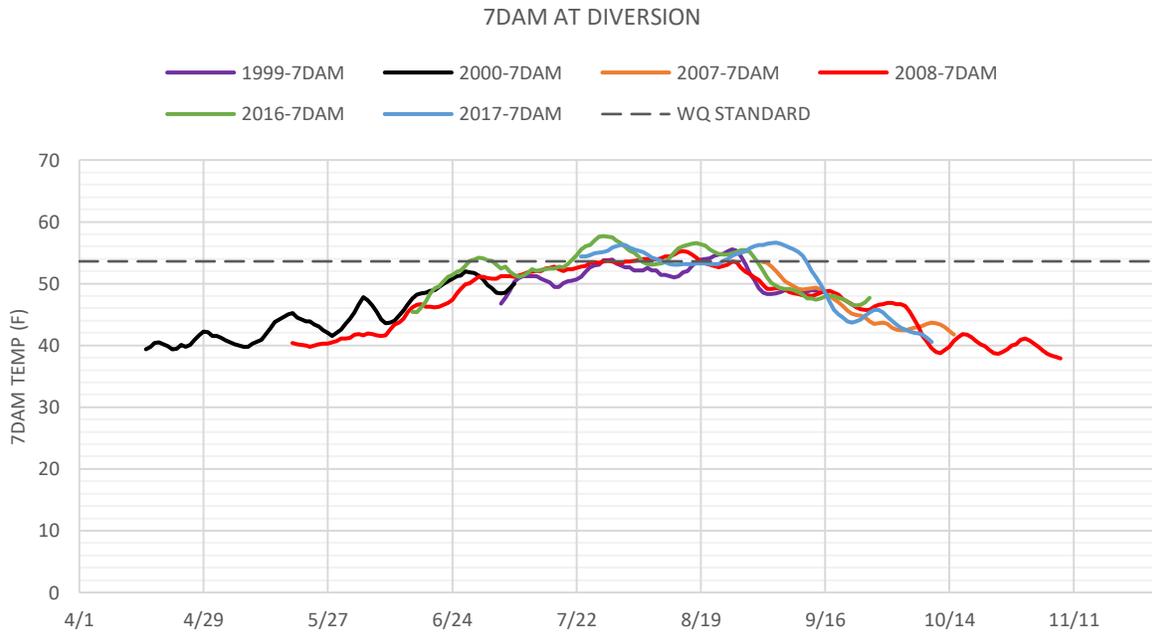


Figure 6. Seven day average maximum water temperature in Rock Creek at the diversion dam site. (Warm Springs Hydro, 2019b)

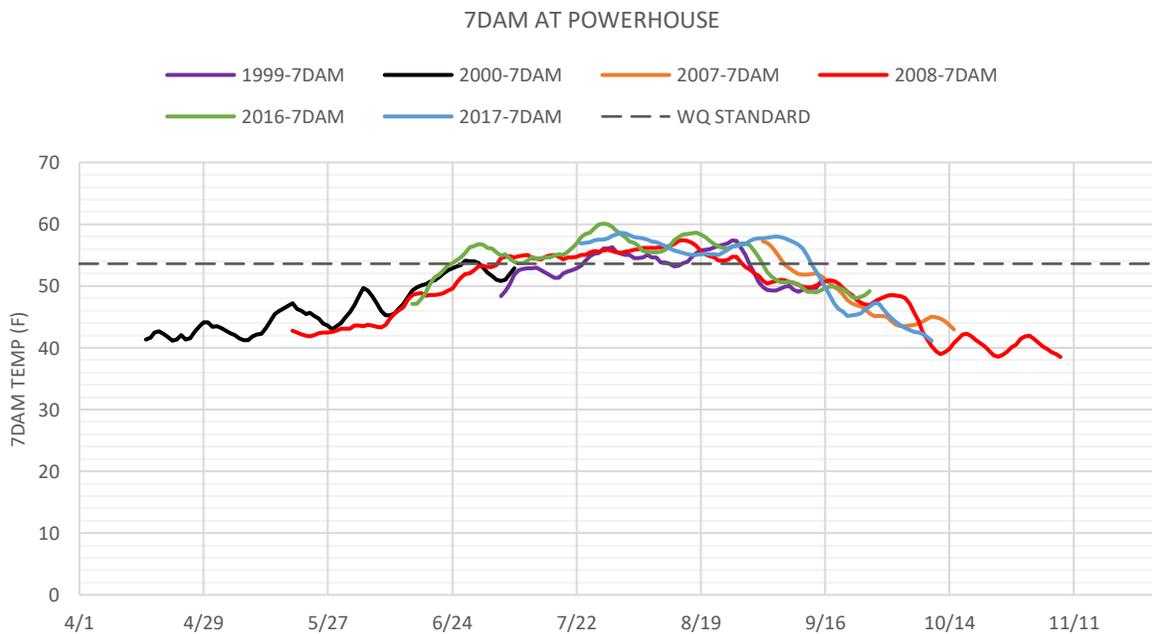


Figure 7. Seven day average maximum water temperature in Rock Creek at the Powerhouse site. (Warm Springs Hydro, 2019b)

Warming within the project reach was calculated by taking the difference in the 7DAM temperature between the diversion and powerhouse. Warming was calculated for each data set as shown in Figure 8. Warming ranges between -0.2 to +3.8°F with maximum warming occurring in July and August.

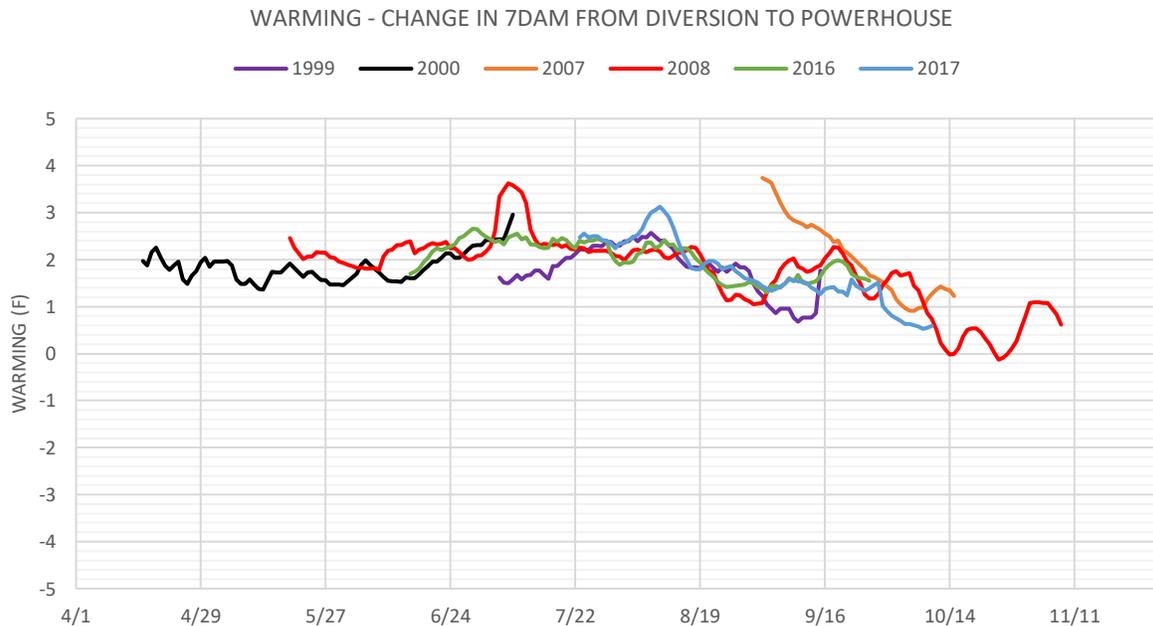


Figure 8. Calculated warming of water in by-pass reach. (Warm Springs Hydro, 2019b)

6.1.4 Applicant’s Position

It is the applicant’s position that the seven-day-average maximum water temperature in the project reach currently exceeds the 12° C (53.6 °F) bull trout spawning and juvenile rearing criterion intermittently during the period from late June to early September. Temperature standards will be met by operating the facility in a way that will not cause excess heating of the bypass reach of Rock Creek greater than 0.3 degrees C (0.5 degrees F) from all sources at the point of maximum impact.

The Applicant is currently conducting water temperature modeling of the project reach using the US Army Corps HEC-RAS software. The purpose of this modeling is to isolate the influence of flow on water temperature and to determine the conditions under which project operations could cause warming to exceed 0.3° C (0.5° F). Modeling runs were conducted using 2016 and 2017 temperature and flow data from the by-pass reach. The results of the modeling demonstrated the viability of the method to predict when diversions to the powerhouse must be reduced to avoid excess heating (SPF, 2020).

The 1D HEC-RAS routing model is set up utilizing all available measured channel characteristics (reach length, slope, roughness, cross section data). All flow inputs and outputs (such as the diversions just upstream of the powerhouse) will be incorporated into the model. Data sources will include:

- Flow Rates –OWRD’s gage (13281200) approximately 1/2 mile downstream of the powerhouse at approximately RM 6.5 will be used for flow records. If during any period of model run, there was water being diverted upstream, those estimates of diversion will be added to the downstream flow rates (with appropriate consideration for travel time) to provide estimates of flow rates for the upstream end of the reach. Then within the model run, the diversions will be withdrawn

within the model run. Simulated flow rates at the compliance point located in Rock Creek at the powerhouse discharge will need to match gaged OWRD flow rates at gage 13281200.

- Air Temperature –hourly air temperature data collected at both the upper and lower ends of the bypass reach.
- Relative Humidity - hourly relative humidity data collected at both the upper and lower ends of the bypass reach.
- Water Temperature - hourly water temperature data collected at both the upper and lower ends of the bypass reach.
- Atmospheric Pressure - hourly atmospheric pressure data collected at both the upper and lower ends of the bypass reach.
- Cloudiness – Cloudiness will be estimated based on localized relative humidity data (mentioned above) and cloudiness data from National Weather Service station at Baker City, OR. All assumptions and adjustments to represent localized conditions in the bypass reach will be thoroughly documented and justified.
- Solar Radiation – Initial values will be taken from an AgriMet station located near Haines, OR. USACE guidance will be followed to develop a time series for Solar Radiation based on the site latitude, longitude and time of year. This will represent a starting point (as the total potential solar radiation) which may need to be adjusted to represent the actual solar radiation based on topographic and vegetative shading. All adjustments will be documented and justified.
- Wind Speed and Direction – Initial values will be taken from an AgriMet station located near Haines, OR and/or a National Weather Service station in Eilertson meadows about 1 mile upstream of the project on Rock Creek. All assumptions and adjustments to represent localized conditions in the bypass reach will be documented and justified.

Warm Springs Hydro will continue to collect data and refine the HEC-RAS software prior to operation of the Project. Modeling runs will also be conducted during project operation in order to predict needed reductions in operating flows to meet temperature criteria in the bypass reach of Rock Creek. Over time, the modeling information will be used to attempt to develop operating rules that will assure compliance with water temperature criteria without the need for daily modeling. These operating rules would become part of the project's Operation Compliance Monitoring Plan and is a condition of the water quality certification.

6.1.5 DEQ Evaluation

The modeling approach and use of HEC-RAS has been reviewed by DEQ water quality modeling analysts and appears sound (DEQ, 2020). The model will be improved with additional data collected prior to operation of the project. The refined model will be used to develop operating rules for the Project to avoid excess heating of the by-pass reach and comply with the water temperature criteria.

6.1.6 DEQ Findings

DEQ is reasonably assured that operation of the proposed Project under a new FERC License, as conditioned, will comply with the temperature standard.

The Operation Compliance Monitoring Plan

Within 6 months of the issuance of any FERC license for the Project, Warm Spring Hydro must submit to DEQ for its review and approval an Operation Compliance Monitoring Plan, including but not limited to temperature compliance procedures. These procedures must include daily modeling runs to be completed

from June 1 to September 30 of each operating year as required by Condition 1f of the §401 Water Quality Certification. These modeling results will be used to determine when the flows in the bypass reach must be increased above the agreed upon minimum flows to avoid excess heating and develop operating rules for the Project. The Operation Compliance Monitoring Plan must be approved by DEQ prior to operation of the Project.

Water Quality Monitoring and Management Plan

Within 90 days of FERC License issuance, Warm Springs Hydro LLC shall submit a WQMMP to DEQ that addresses the temperature monitoring and reporting requirements. Upon DEQ approval, the WQMMP becomes part of the §401 Certification Conditions for the Project for the purposes of inclusion in any federal license or permit. The WQMMP must include procedures for collecting the required temperature modeling input data described in **Section 6.1.4** and any other data needed to perform the required temperature modeling and development of the Operation Compliance Monitoring Plan.

6.2 Dissolved Oxygen

6.2.1 Water Quality Standard

The standard is set forth in OAR 340-041-0016:

Dissolved Oxygen

Dissolved oxygen (DO): No wastes may be discharged and no activities must be conducted that either alone or in combination with other wastes or activities will cause violation of the following standards: The changes adopted by the Commission on January 11, 1996, become effective July 1, 1996. Until that time, the requirements of this rule that were in effect on January 10, 1996, apply:

- (1) For water bodies identified as active spawning areas in the places and times indicated on the following Tables and Figures set out in OAR 340-041-0101 to OAR 340-041-0340: Tables 101B, 121B, 180B, 201B and 260B, and Figures 130B, 151B, 160B, 170B, 220B, 230B, 271B, 286B, 300B, 310B, 320B, and 340B, (as well as any active spawning area used by resident trout species), the following criteria apply during the applicable spawning through fry emergence periods set forth in the tables and figures:
 - (a) The dissolved oxygen may not be less than 11.0 mg/l. However, if the minimum intergravel dissolved oxygen, measured as a spatial median, is 8.0 mg/l or greater, then the DO criterion is 9.0 mg/l;*
 - (b) Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 11.0 mg/l or 9.0 mg/l criteria, dissolved oxygen levels must not be less than 95 percent of saturation;*
 - (c) The spatial median intergravel dissolved oxygen concentration must not fall below 8.0 mg/l.**
- (2) For water bodies identified by the Department as providing cold-water aquatic life, the dissolved oxygen may not be less than 8.0 mg/l as an absolute minimum. Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 8.0 mg/l, dissolved oxygen may not be less than 90 percent of saturation. At the discretion of the Department, when the Department determines that adequate information exists, the dissolved oxygen may not fall below 8.0 mg/l as a 30- day mean minimum, 6.5 mg/l as a seven-day minimum mean, and may not fall below 6.0 mg/l as an absolute minimum (Table 21);*

The fish use map given in OAR 340, Division 041 Figure 260A indicates water bodies in the vicinity of the site are Redband/Lahontan trout and bull trout habitat. The biologically-based numeric DO criteria based on these uses are summarized in **Table 8** below:

Table 8. Biologically-based Numeric Criteria for DO for in Rock Creek

	August 15-June 15	June 16-August 14	Rule
Use	Resident Trout Spawning – redband and bull trout	Redband trout habitat/Cold Water Aquatic Life	OAR 340-041, Figure 260A
Dissolved Oxygen	a) Not less than 11.0 mg/l. If IGDO \geq 8.0 mg/l, the DO spawning criterion is 9.0 mg/l; b) Where pressure, altitude or temperature preclude attainment of the 11.0 or 9.0 mg/l criteria, DO saturation must be at least 95 percent; c) Spatial median IGDO must be at least 8.0 mg/l.	Criterion is 8.0 mg/l. Where precluded by pressure, altitude or temperature, DO saturation must be at least 90 percent. At DEQ discretion, DO must not fall below 8.0 mg/l as a 30-day mean, 6.5 mg/l as a 7-day mean, and 6.0 mg/l as an absolute minimum.	OAR 340-041-0016

6.2.2 Application of the Water Quality Standard

Dissolved oxygen is one of the principal parameters used to determine water quality in support of aquatic life. Maintaining adequate concentrations of DO is vital to the support of fish, invertebrates, and other aquatic life. Some aquatic species such as the salmonids are sensitive to reduced DO concentrations. Sensitivity also varies between various life stages (e.g., incubation, emergence, growth) and between different life processes (e.g., rearing and reproduction).

During spawning, salmonids will construct redds from suitable gravels to shelter eggs during incubation. Proper intergravel DO is critical for egg and embryo development. However, factors such as gravel porosity, substrate embeddedness, and sediment oxygen demand may reduce intergravel dissolved oxygen (IGDO) relative to DO in the water column. For this reason, DEQ establishes a biologically-based numeric criterion for IGDO to ensure adequate oxygen available to salmonids during early life stage development.

6.2.3 Present Conditions

Dissolved oxygen was measured at the powerhouse site at the downstream end of the by-pass reach of Rock Creek during several periods from June 2016 to September 2016. **Figure 9** shows the 2016 dissolved oxygen monitoring results. The high gradient turbulent flow in Rock Creek maintained dissolved oxygen near saturation, including during low flow conditions in August and September. Oxygen concentrations ranged from 8.5 – 11.3 mg/L with a maximum diurnal variation of approximately \pm 0.5 mg/L. Saturation ranged from 98% to just over 100%.

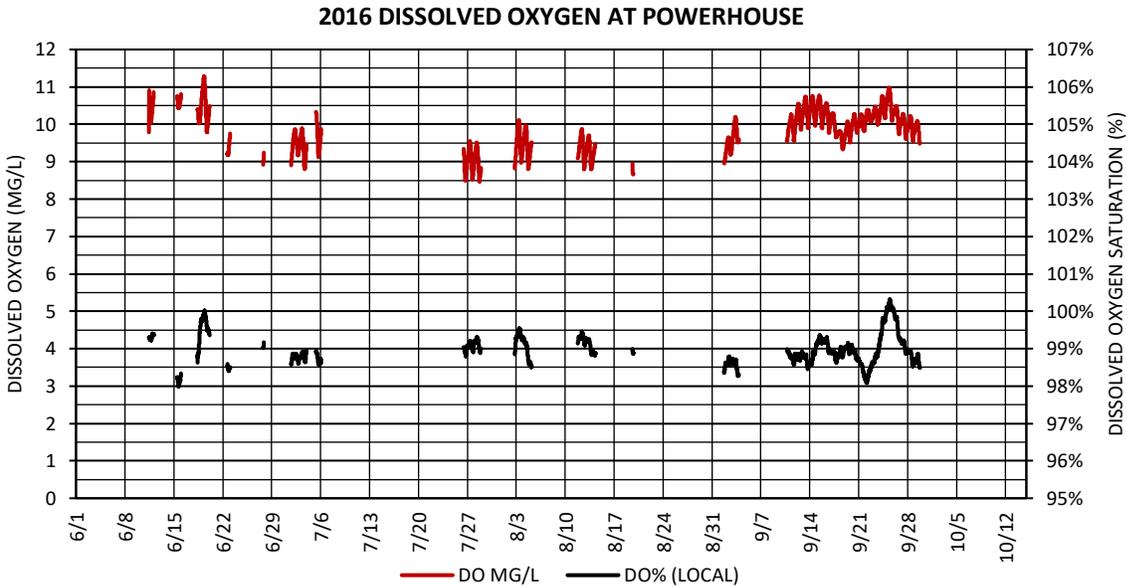


Figure 9. Dissolved oxygen measured in Rock Creek at the Powerhouse site in 2016. (Warm Springs Hydro, 2019b)

6.2.4 Applicant’s Position

Data from the various continuous monitoring periods in 2016 show that dissolved oxygen levels in the project reach are maintained above 95% saturation including during low flow periods at the end of summer and early fall. This is likely due to the high stream gradient and associated turbulent flow throughout the reach. During hydroelectric proposed operations water would always be released past the diversion according to the minimum flows and operating rules described in Section 3 of the FLA. By-pass reach flows in late summer during Project operation will be similar to those monitored in 2016 because late summer natural base flows often match the required minimum by-pass reach flows (**Figure 5**). The 2016 monitoring results show that the high stream gradient and turbulent flow would be very likely to maintain dissolved oxygen levels above 95% saturation.

6.2.5 DEQ Evaluation

Warm Springs Hydro monitored dissolved oxygen in the project reach of Rock Creek during several periods from June 2016 to September 2016. Oxygen concentrations ranged from 8.5 – 11.3 mg/L with a maximum diurnal variation of approximately ± 0.5 mg/L. Saturation ranged from 98% to just over 100%. The DO criteria were met in this period during all flow ranges in the monitoring period.

6.2.6 DEQ Findings

DEQ is reasonably assured that operation of the proposed Project under a new FERC License will comply with the DO standard, provided the following measures are implemented:

Water Quality Monitoring and Management Plan

Within 90 days of FERC License issuance, Warm Springs Hydro LLC shall submit a WQMMP to DEQ which addresses the DO monitoring and reporting requirements presented below. Upon DEQ approval, the WQMMP becomes part of the § 401 Certification Conditions for the Project for the purposes of any federal license or permit.

- A description of methods for measurement of dissolved oxygen (DO) in Rock Creek at the outlet of the Powerhouse continuously during Project operations for a period of 90 days starting July 15th of the first year of operation of the Project. Warm Springs Hydro must download and evaluate DO data on a weekly basis. Warm Springs Hydro must report all DO data to DEQ within 90 days of the conclusion of the monitoring period.

DO Monitoring

Warm Springs Hydro LLC shall measure DO at the Powerhouse discharge location continuously during Project operations during the first year of operation as described in the certification conditions.

Monitoring of these parameters can be discontinued after the first season of monitoring if there are no violations of water quality criteria.

DO Reporting

Warm Springs Hydro LLC shall submit a report to DEQ within 90 days of completing the first season of monitoring activities or by December 30, whichever comes first. If monitoring indicates the DO water quality standard is not met, DEQ may require Warm Springs Hydro LLC to submit a report analyzing the situation and may require additional monitoring or adaptive management of the Project, or both, to ensure water quality standards are met below the Project. Subsequent year's reports (if necessary) will be submitted to DEQ by March 31 of each year, covering the previous year's operations, unless otherwise specified by DEQ. If there are no violations of the DO water quality criteria during the first season of monitoring, Warm Springs Hydro LLC may request that monitoring of these parameters be terminated.

6.3 Total Dissolved Gas

6.3.1 Water Quality Standard

The applicable water quality standard is set forth in 340-041-0031:

Total Dissolved Gas

- (1) *Waters will be free from dissolved gases, such as carbon dioxide hydrogen sulfide, or other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation, or other reasonable uses made of such water.*
- (2) *Except when stream flow exceeds the ten-year, seven-day average flood, the concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection may not exceed 110 percent of saturation. However, in hatchery-receiving waters and other waters of less than two feet in depth, the concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection may not exceed 105 percent of saturation.*

6.3.2 Application of the Water Quality Standard

Releases from hydropower facilities may cause the entrainment of atmospheric gases at levels which exceed saturation. This condition may occur in turbines or when the momentum from a high volume discharge stream enters a receiving water body and entrains air below the water surface in the process, or both. Under certain conditions, entrained air may dissolve into the water column at levels which exceed normal atmospheric equilibrium concentrations. Conditions which favor air entrainment include deep, non-turbulent receiving waters which provide the necessary hydrostatic pressure and quiescent conditions to form and maintain dissolved gases at supersaturated levels.

At levels above 110 percent saturation, the concentration of dissolved atmospheric gases in water may cause a variety of debilitating or lethal conditions in fish. The Total Dissolved Gas (TDG) standard is

designed to prohibit discharges or activities that result in atmospheric gases reaching known harmful concentrations once dissolved in water. The use of air in turbine intakes to avoid cavitation or to increase DO levels can create supersaturation of TDG, a condition that can be avoided if identified.

6.3.3 Present Condition

There is currently no hydropower facility at the site, and there are no known historic measurements of TDG.

6.3.4 Applicant's Position

The applicant has stated that the proposed project is not designed with a deep plunge pool at the discharge point and will not cause TDG issues.

6.3.5 DEQ Evaluation

TDG monitoring is needed to assure compliance with water quality standards.

6.3.6 DEQ Findings

In order to assure compliance with the TDG criteria at the new tailrace discharge, 72 hours of TDG monitoring will be required under lower flow conditions in August-September and higher flow conditions in June-July within the first year of operation. The Project WQMMP must include adaptive management strategies that will be employed if TDG criteria are not met.

Water Quality Monitoring and Management Plan

Within 90 days of FERC License issuance, Warm Springs Hydro shall submit a Water Quality Monitoring and Management Plan (WQMMP) to DEQ which addresses the TGD monitoring and reporting requirements presented below. The WQMMP must include adaptive management strategies that will be employed if TDG criteria are not met. Upon DEQ approval, the WQMMP becomes part of the §401 Certification Conditions for the Project for the purposes of any federal license or permit.

TGD Monitoring

Warm Springs Hydro shall measure TGD at a location within 25 feet of the Power Plant discharge to Rock Creek. Concurrent with TDG, DO and temperature measurements described previously, Warm Springs Hydro shall also record flow discharge flow from the Project. TDG measurements will be made continuously at a minimum interval of one hour during the 72 hour monitoring periods.

TGD Reporting

Warm Springs Hydro shall submit a report to DEQ within 90 days of completing the first season of monitoring activities. If monitoring indicates the TDG water quality standard is not met, DEQ will require Warm Springs Hydro to submit a report analyzing the situation and will require additional monitoring or adaptive management of the Project, or both, to ensure water quality standards are met below the Project. If it can be successfully demonstrated that the TDG standard is being met, Warm Springs Hydro can request to terminate TDG monitoring.

6.4 Discoloration, oily sheen, oily coatings

6.4.1 Water Quality Standard

The standard is given in OAR 340-041-0007(12):

Objectionable discoloration, scum, oily sheens, or floating solids, or coating of aquatic life with oil films may not be allowed.

6.4.2 Application of the Water Quality Standard

This narrative standard extends protections to surface waters against conditions which humans may reasonably find objectionable or which be harmful or deleterious to aquatic life.

6.4.3 Present Condition

DEQ knows of no reports of objectionable discoloration, scum, oily sheens, or floating solids in waters associated with the proposed Project. Warm Springs Hydro maintains that current spill prevention and response plans will be sufficient to help avoid spills of oil or hazardous materials and provide a rapid response to any spills that do occur.

6.4.4 Applicant's Position

Hydroelectric projects require certain oil and chemical liquids for operation and maintenance. Section 6.4 of the §401 Water Quality Certification application includes procedures for managing materials stored at the facility such as vehicle fuel, motor oil, hydraulic oil, lubricants, paint and transformer mineral oil. Warm Springs Hydro believes the spill prevention and response procedures contained in section 6.5 of the §401 Water Quality Certification application are adequate to safeguard aquatic resources from adverse consequences related to spills of hazardous materials.

6.4.5 DEQ Evaluation

The use of greases and lubricants and transformer oil is necessary to maintain proper equipment function and operation. The greatest risk to aquatic resources is from the accidental release of liquid petroleum products used or stored adjacent to open waterways. The remote location of the Project relative to first responders underscores the need to maintain employee training and awareness programs and adequate stores of spill response equipment necessary to contain and control releases of hazardous materials.

The measures described in Section 6.4 of the §401 Water Quality Certification Application do not include the reporting requirements of the Spill Prevention and Countermeasures Plan in Condition 5.0 of the §401 Water Quality Certification.

6.4.6 DEQ Findings

DEQ is reasonably assured Project operation under a new FERC License will not violate the State narrative criteria for objectionable discoloration, scum, and oily sheens provided the following measures are implemented:

Spill Prevention Control and Countermeasures Plan:

- a) Warm Springs Hydro must modify its Spill Prevention Control and Countermeasures Plan to include following condition and submit it to DEQ for review and approval within 90 days of the issuance of the FERC license. Once approved by DEQ, Warm Springs Hydro must operate consistent with that plan at all times.

- b) In the event of a spill or release or threatened spill or release to waters of the state, Warm Springs Hydro must immediately implement the plan and notify Oregon Emergency Response System (OERS) at 1-800-452-0311.
- c) If Warm Springs Hydro becomes aware that a hazardous materials spill or other Project operations have caused a water quality problem, Warm Springs Hydro must immediately:
 - i. Cease operations;
 - ii. Take appropriate corrective measures to prevent environmental damage;
 - iii. Collect water samples;
 - iv. Immediately notify the following agencies (DEQ, ODFW, OWRD, USFWS, USFS).
- d) Warm Springs Hydro shall manage work and staging areas in a manner which prevents the introduction of sediment, wastes, or hazardous materials into waters of the State in accordance with the project Erosion and Sediment Control Plan.

6.5 Biocriteria and Statewide Narrative Criteria

6.5.1 Biocriteria Water Quality Standard

The standard is given in OAR 340-041-0011:

Waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

Definitions applicable to the biocriteria standard include (OAR 340-041-0002):

(5) "Appropriate Reference Site or Region" means a site on the same waterbody, or within the same basin or ecoregion that has similar habitat conditions, and represents the water quality and biological community attainable within the areas of concern.

(6) "Aquatic Species" means plants or animals that live at least part of their life cycle in waters of the state.

(17) "Designated Beneficial Use" means the purpose or benefit to be derived from a water body, as designated by the Water Resources Department or the Water Resources Commission.

(19) "Ecological Integrity" means the summation of chemical, physical and biological integrity capable of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region.

(50) "Resident Biological Community" means aquatic life expected to exist in a particular habitat when water quality standards for a specific ecoregion, basin, or water body are met. This must be established by accepted biomonitoring techniques.

(75) "Without Detrimental Changes in the Resident Biological Community" means no loss of ecological integrity when compared to natural conditions at an appropriate reference site or region.

6.5.2 Application of Standard

This narrative criterion recognizes that compliance with individual criteria may not fully capture synergistic effects resulting from multiple stressors and cumulative impacts on aquatic species and resident biological communities. The biocriteria standard complements parameter-specific standards by extending broad protections to all designated beneficial uses with the implicit assumption that if the most sensitive beneficial use is protected, then all uses will be protected. Application of the biological criteria

standard is intended to assess the overall impact to the aquatic community from water quality changes attributable to an anthropogenic activity. In practice, the biological criteria standard uses biomonitoring techniques to assess biological health, integrity, and complexity of resident biological communities within the Project area relative to comparable reference locations.

6.5.3 Statewide Narrative Criteria

OAR 340-041-0007

(1) Notwithstanding the water quality standards contained in this Division, the highest and best practicable treatment and/or control of wastes, activities, and flows must in every case be provided so as to maintain dissolved oxygen and overall water quality at the highest possible levels and water temperatures, coliformbacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor, and other deleterious factors at the lowest possible levels.

(10) The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the potability of drinking water or the palatability of fish or shellfish may not be allowed.

6.5.4 Application of Standard

Narrative criteria in OAR 340-041-007(1) and (10) provide protection for aquatic life from adverse effects resulting from the presence of deleterious conditions. These standards require the highest and best practicable control of flows to maintain overall water quality at the highest possible levels and other deleterious conditions at the lowest possible level. Further, these standards prohibit deleterious conditions to fish or other aquatic life. Deleterious conditions may include chemical, biological, or physical changes to water quality that result from modifications to flow regimes and impoundments. Narrative criteria may be translated into specific limitations to ensure a proposed activity is consistent with the specific beneficial uses and attributes of a particular body of water.

6.5.5 Macroinvertebrates

6.5.5.1 Available Data

Neither DEQ nor Warm Springs Hydro LLC has collected any macroinvertebrate or other biomonitoring data to determine compliance with the biocriteria in the Project area.

6.5.5.2 Applicant's Position

Warm Springs Hydro maintains the Project complies with the biocriteria standard.

6.5.5.3 DEQ Evaluation

The biocriteria standard extends broad protections to all beneficial uses. This standard complements other criteria-specific water quality standards while examining cumulative impacts from multiple stressors associated with Project developments and operations.

DEQ has worked with Warm Springs Hydro as part of the agency stakeholder group to develop current project operations to protect aquatic habitat while providing for project operation. DEQ has determined that the minimum flows, water temperature compliance conditions, and water quality monitoring of the Power Plant discharge for DO and TDG, will likely assure project compliance with the biocriteria standard, however, macroinvertebrate data are needed.

6.5.5.4 DEQ Findings

DEQ is reasonably assured that operation of the Project under the conditions proposed in the application for a FERC License will comply with the Biological Criteria water quality standard provided the following measures are implemented:

- Within 90 days of FERC License issuance, Warm Springs Hydro shall develop a macroinvertebrate monitoring plan as part of the Project WQMMP, for the bypass reach of Rock Creek which will include standard bioassessment metrics including densities, abundance, richness and tolerance as well as identify monitoring locations. Upon DEQ approval, Warm Springs Hydro shall submit to FERC the WQMMP as part of the required §401 Certification Conditions for the Project for the purposes of any federal license or permit.
- Warm Springs Hydro shall submit an initial macroinvertebrate monitoring report to DEQ by January 31 of the year following monitoring. An additional round of sampling will be conducted 5 years following the first sampling event and a report of the findings will be submitted to DEQ by January 31 of the following year.
- If the results of the second macroinvertebrate sampling event indicate that the resident biological community in the bypass reach of Rock Creek has become impaired or in poor condition, based on comparison to the baseline monitoring results, Warm Springs Hydro shall develop, implement and evaluate measures to address compliance with the biocriteria standard as part of an adaptive management plan. The adaptive management plan will ensure that the project does not cause or contribute to a violation of the biocriteria standard. Following DEQ approval, Warm Springs Hydro shall implement the plan. Upon DEQ approval, Warm Springs Hydro shall submit to FERC the Adaptive Management Plan as part of the required §401 Certification Conditions for the Project for the purposes of any federal license or permit.

6.5.6 Resident Biological Communities

The Bull trout surveys conducted in the Project area and reported in the Updated Study Report (WSH, LLC, 2017) indicate that potential Bull trout habitat exists, but eDNA sampling did not result in detection of Bull Trout DNA. Redband and Brook trout were observed.

Amphibian surveys resulted in the documentation of potential habitat for Inland Tailed Frog, but no DNA were detected in the eDNA sampling for this species. No habitat for Columbia Spotted Frog was observed.

Flow alteration and Project operations affect redband trout and other salmonid species by decreasing available habitat, stranding fish and/or dewatering redds during ramping occurrences and disrupting migration by creating passage barriers.

6.5.7 Flow

6.5.7.1 Available Data

Figure 5 shows average semi-monthly flow in the bypass reach under existing conditions and under proposed hydropower operations based on 20 years of flow records.

The Project will alter the natural flow regime in the Rock Creek bypass reach by withdrawing 13 cfs of flow for a 2.3 mile reach of Rock Creek (WSH 2019).

6.5.7.2 Applicant's Position

Warm Springs Hydro maintains the Project complies with statewide narrative water quality criteria. Warm Springs Hydro has also shown interest in implementing an aquatic habitat mitigation project in exchange for alternative minimum flow in the by-passed reach.

6.5.7.3 DEQ Evaluation

Flow alteration and Project operations affect Redband trout and Brook trout by, among other effects, decreasing available habitat. The applicant has worked with ODFW and USFWS to determine the potential loss of habitat that would occur during Project operation. ODFW and USFWS have accepted Warm Springs Hydro's proposed minimum flows shown in Table 3 of this document if there is also an acceptable Habitat Mitigation Plan. If there is no approved Habitat Mitigation Plan, the minimum flows listed in Table 2 of this document will apply. Table 2 minimum flows are based on the ODFW instream water right for the affected reach of Rock Creek.

6.5.7.4 DEQ Findings

DEQ is reasonably assured that operation of the proposed Project under a new FERC License will comply with the applicable narrative criteria, provided the following conditions are implemented:

- Minimum bypass instream flows in accordance with Table 3 (with habitat mitigation) or Table 2 (without habitat mitigation).
- Prior to operation of the project, Warm Springs Hydro shall install and maintain an operational compliance monitoring flow gage at the diversion location. The flow gage shall provide for continuous real time recording of flow and water temperature in the bypass reach measured in 15 minute intervals and reported as an hourly average (top of the hour average) during the duration of the hydropower license. An additional temperature measuring station will be installed in Rock Creek downstream of the Powerhouse discharge. Flow and water temperature data from both stations will be provided to Agencies through an internet reporting system or other system approved by the Agencies. Warm Springs Hydro will develop rating curves to enable accurate flow measurements at flows up to a level that is greater than or equal to bank-full stage at the gage location. The flow gage will be established in conformance with United States Geological Survey criteria and maintained as such thorough the life of the project license.
- Habitat Mitigation Plan: Warm Springs Hydro may implement the minimum flows from Table 2 (ODFW and USFW agreed upon flows) of the §401 Certification Conditions if Warm Springs Hydro provides mitigation for the loss of instream fish habitat in lieu of providing minimum flows equivalent to ODFW's in-stream water right that are listed in in Table 1 of the §401 Certification Conditions. In this case, Warm Springs Hydro shall revise the Fish Habitat Mitigation Plan in Appendix B of the FLA (Mitigation Plan) consistent with ODFW Fish and Wildlife Habitat Mitigation Policy goals and objectives for Habitat Category 4 (see OAR 635, Division 415: <https://www.dfw.state.or.us/OARs/415.pdf>). Warm Springs Hydro shall revise the Mitigation Plan to identify the project's impact on fish habitat resulting from the lesser bypass flow and the mitigation project(s) consistent with ODFW Fish and Wildlife Habitat Mitigation Policy mitigation plan requirements pursuant to OAR 635-415-0020 (8).

6.5.8 Ramping

Hydroelectric project operation can cause ramping, or project induced flow fluctuations. Sudden flow fluctuations within stream reaches due to hydroelectric project operations can adversely impact fish at all life history stages and other aquatic resources. According to USFWS, "Significant rapid flow reduction in the Rock Creek bypass reach could affect fish populations by stranding eggs, fry, or juvenile fish.

Hydroelectric project operation can result in ramping due to project startup, shut down, unit trips, and during construction, operation, and maintenance of project facilities” (USFWS, 2019).

6.5.8.1 Applicant Position

The Applicant has not proposed to operate the facility for power peaking, therefore hourly flow fluctuation for power generation would not occur.

6.5.8.2 DEQ Evaluation

Although hourly flow fluctuation won’t occur, ODFW notes “Ramping could occur during unplanned outages that close the penstock and cause the entire Project inflow to spill over the diversion dam. When the Project is brought back online, the flow to the Rock Creek bypass reach would be reduced as the head gate opens and water is diverted into the penstock. Therefore, the Project should adhere to ramping rates to protect fish resources” (ODFW, 2019).

6.5.8.3 DEQ Findings

DEQ concurs that ramping may occur at the Project and the Applicant shall adhere to ramping rates to protect fish resources. The requirements for ramping are specified in the ODFW and USFWS Section 30c Terms and Conditions which were both submitted to FERC on November 12, 2019 and described below.

DEQ is reasonably assured that operation of the proposed Project under a new FERC License will comply with the applicable narrative criteria, provided the following conditions are implemented:

- Warm Springs Hydro shall restrict down-ramping in Rock Creek during Project start-up after a Powerhouse shutdown following a target rate of no more than 1 inch per hour during the period of May 1 to October 31 and 2 inches per hour during the period of November 1 to April 30. Prior to start of Project operations, Warm Springs Hydro shall complete a site-specific study to develop operating procedures to meet the down-ramping rate targets identified above for inclusion in the Operation Compliance Monitoring Plan (as specified in Condition 1j). Unscheduled Project outages shall be reported to Agencies within one business day.

6.5.9 Fish Passage and Screening

6.5.9.1 Applicant Position

The Applicant proposes to build a new diversion and intake structure on Rock Creek at the location of the historic diversion structure that consist of a low concrete weir across Rock Creek, a roller head gate, a fish screen, and a pipeline intake structure. The Applicant’s proposal will result in an artificial obstruction in Rock Creek that will impede movement of redband trout in Rock Creek. The Applicant proposes to provide upstream fish passage by modifying the stream channel adjacent to the fish screen structure to create an approximately 6-foot wide raceway below a notch in the weir wall. The Applicant proposes that the raceway gradient will be sufficiently low to allow fish to swim up the raceway and jump across the weir through the notched section. Downstream fish passage will be accommodated by continuous flow over the weir. The Applicant proposes to install a rotary drum screen at the intake of the diversion.

6.5.9.2 DEQ Evaluation

USFWS notes “Fish passage will be needed for both upstream and downstream movement of redband and bull trout (meeting ODFW/NMFS fish passage criteria)” (USFWS, 2019). USFWS also notes “Redband trout are a native resident fish that migrate within their spawning and rearing habitats which are located both up- and downstream of the Project area. Providing safe, timely and effective downstream fish passage at the Project would minimize the potential for delay, injury, and mortality of redband trout (all life stages), and other native species under a new license, and allow completion of life histories without

harming current timing and use of habitats up and downstream of the Project” (USFWS, 2019). Additionally, providing safe, timely and effective upstream fish passage at the Project would minimize the potential for delay, injury, and mortality of redband trout (all life stages), and other native species under a new license.

ODFW has developed criteria for fish passage. ODFW notes “The conceptual drawings included in the FLA (Exhibits F-4 and F-6) are insufficient for ODFW to determine whether the Applicant’s fish passage design will meet the above mentioned criteria” (ODFW, 2019). ODFW requires the Applicant to design, construct, evaluate, operate and maintain downstream and upstream fish passage facilities to provide for the safe, timely, and effective downstream passage of native fish species, primarily redband trout. USFWS requires the Applicant to “submit all downstream and upstream fish passage facility preliminary design plans and specifications, and final design plans and specifications to USFWS, ODFW, and USFS for review” (USFWS, 2019).

6.5.9.3 DEQ Findings

DEQ concurs that the project will impede movement of redband trout in Rock Creek. DEQ concurs with ODFW and USFWS requirements that the fish passage design be approved by them. The design, construction, operation and maintenance of downstream and upstream fish passage facilities at the diversion dam will provide for the safe, timely, and effective passage of native fish species, primarily redband trout.

Additionally, fish screens designed and operated to ODFW criteria will minimize injury and mortality to fish by preventing entry at water diversions while allowing water to be delivered to its intended use. DEQ concurs that designing the fish screens to ODFW criteria will reduce harm to native fish species, including redband trout.

DEQ is reasonably assured that operation of the proposed Project under a new FERC License will comply with the applicable narrative criteria, provided the following conditions are implemented:

- **Upstream and Downstream Fish Passage:** Warm Springs Hydro shall design, construct, evaluate, operate and maintain downstream and upstream fish passage facilities (including fish screens) at the diversion dam as proposed on page 8 and Exhibit F-4, F-5 and F-6 of the Final License Application for the Project to provide for the safe, timely, and effective upstream and downstream passage of native fish species, primarily redband trout. Upstream and downstream fish passage facilities (including fish screens) shall be designed in accordance with National Marine Fisheries Service (NMFS, 2011) guidance and conditions listed in Condition 2 of the ODF&W 30c Terms and Conditions (30c Terms and Conditions), and Sections 13 of the USFWS 30c Terms and Conditions for the Project submitted to FERC on November 12, 2019. Construction of both fish passage facilities shall be completed, and the facilities fully operational, before Warm Springs Hydro initiates the diversion of flow for Project operation. Warm Springs Hydro shall conduct and complete a hydraulic evaluation of both the downstream and upstream fish passage facilities and ensure the facility operates within allowable hydraulic criteria prior to continuous Project operation, and maintain the facility to ensure optimal performance over the license term.
- Implement fish screening requirements from ODFW and USFWS Section 30c Terms and Conditions submitted to FERC on November 12, 2019.

6.6 Antidegradation

Water quality standards have three main elements; the beneficial uses that are protected by the standard, numeric and narrative criteria which support these uses and an antidegradation policy that governs how and when existing water quality may be lowered. When DEQ considers issuing a permit or a water quality certificate the DEQ action must comply with the antidegradation provisions of the water quality standards.

EPA rules adopted pursuant to Section 303 of the federal Clean Water Act require state water quality standards to contain a statewide Antidegradation policy. This policy must provide that existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

6.6.1 Water Quality Standard

The applicable antidegradation policy is set forth in 340-041-0004, with only applicable sections summarized below:

Antidegradation

- (1) *Purpose.* The purpose of the Antidegradation Policy is to guide decisions that affect water quality such that unnecessary further degradation from new or increased point and nonpoint sources of pollution is prevented, and to protect, maintain, and enhance existing surface water quality to ensure the full protection of all existing beneficial uses. The standards and policies set forth in OAR 340-041-0007 through 340-041-0350 are intended to supplement the Antidegradation Policy.
- (2) *Growth Policy,* is not applicable
- (3) *Nondegradation Discharges.* The following new or increased discharges are subject to this Division. However, because they are not considered degradation of water quality, they are not required to undergo an Antidegradation review under this rule:
 - ((a-b), not applicable)
 - (c) *Temperature.* Insignificant temperature increases authorized under OAR 340-041-0028(11) and (12) are not considered a reduction in water quality.
 - (d) *Dissolved Oxygen.* Up to a 0.1 mg/l decrease in dissolved oxygen from the upstream end of a stream reach to the downstream end of the reach is not considered a reduction in water quality so long as it has no adverse effects on threatened and endangered species.
- (4) *Recurring Activities.* Since the baseline for applying the Antidegradation policy to an individual source is the water quality resulting from the source's currently authorized discharge, and since regularly-scheduled, recurring activities remain subject to water quality standards and the terms and conditions in any applicable federal and state permits, certifications and licenses, the following activities will not be considered new or increasing discharges and will therefore not trigger an antidegradation review under this rule so long as they do not increase in frequency, intensity, duration or geographical extent:
 - (a) Rotating grazing pastures
 - (b) Agricultural crop rotations, and
 - (c) Maintenance dredging.
- (5) *Exemptions to the Antidegradation Requirement.* Some activities may, on a short term basis, cause temporary water quality degradation. However, these same activities may also have substantial and desirable environmental benefits. The following activities and situations fall into this category. Such activities and situations remain subject to water quality standards, and must demonstrate that they have minimized adverse effects to threatened and endangered species in order to be exempt from the antidegradation review under this rule:
 - (a) *Riparian Restoration Activities.* Activities that are intended to restore the geomorphology or riparian vegetation of a water body, or control invasive species need not undergo an antidegradation review

as long as the Department (DEQ) determines that there is a net ecological benefit to the restoration activity. Reasonable measures that are consistent with the restoration objectives for the water body must be used to minimize the degradation.

- (b) *Emergency Situations.* The Director (of DEQ) or a designee may, for a period of time no greater than 6 months, allow lower water quality without an antidegradation review under this rule in order to respond to public health and welfare emergencies (for example, a significant threat of loss of life, personal injury or severe property damage);
- (6) *High Quality Waters Policy:* Where the existing water quality meets or exceeds those levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, and other designated beneficial uses, that level of water quality must be maintained and protected. However, the Environmental Quality Commission, after full satisfaction of the intergovernmental coordination and public participation provisions of the continuing planning process, and with full consideration of sections (2) and (9) of this rule, and OAR 340-041-0007(4), may allow a lowering of water quality in these high quality waters if it finds:
 - (a) No other reasonable alternatives exist except to lower water quality; and
 - (b) The action is necessary and benefits of the lowered water quality outweigh the environmental costs of the reduced water quality. This evaluation will be conducted in accordance with DEQ's "Antidegradation Policy Implementation Directive for NDDDES Permits and section 401 water quality certifications," pages 27, and 33-39 (March 201) incorporated herein by reference;
 - (c) All water quality standards will be met and beneficial uses protected; and
 - (d) Federal threatened and endangered aquatic species will not be adversely affected.
- (7) *Water Quality Limited Waters Policy:* Water quality limited waters may not be further degraded except in accordance with section (9)(a)(B), (C) and (D) of this rule.
- (8) *Outstanding Resources Waters Policy,* this section is not applicable
- (9) *Exceptions.* The Commission or Department may grant exceptions to this rule so long as the following procedures are met:
 - (a) In allowing new or increased discharged loads, the Commission or Department must make the following findings:
 - (A) The new or increased discharged load will not cause water quality standards to be violated;
 - (B) The action is necessary and benefits of the lowered water quality outweigh the environmental costs of the reduced water quality. This evaluation will be conducted in accordance with DEQ's "Antidegradation Policy Implementation Internal Management Directive for NPDES Permits and section 401 water quality certifications," pages 27, and 33-39 (March 2001) incorporated herein by reference; and
 - (C) The new or increased discharged load will not unacceptably threaten or impair any recognized beneficial uses or adversely affect threatened or endangered species. In making this determination, the Commission or Department may rely upon the presumption that if the numeric criteria established to protect specific uses are met the beneficial uses they were designed to protect are protected. In making this determination the Commission or Department may also evaluate other State and federal agency data that would provide information on potential impacts to beneficial uses for which the numeric criteria have not been set;
 - (D) The new or increased discharged load may not be granted if the receiving stream is classified as being water quality limited under OAR 340-041-0002(62)(a), unless:
 - (i) The pollutant parameters associated with the proposed discharge are unrelated either directly or indirectly to the parameter(s) causing the receiving stream to violate water quality standards and being designated water quality limited; or
 - (ii) Total maximum daily loads (TMDLs), waste load allocations (WLAs) load allocations (LAs), and the reserve capacity have been established for the water quality limited receiving stream; and compliance plans under which enforcement action can be taken

- have been established; and there will be sufficient reserve capacity to assimilate the increased load under the established TMDL at the time of discharge; or*
- (iii) *Effective July 1, 1996, in water bodies designated water-quality limited for dissolved oxygen, when establishing WLAs under a TMDL for water bodies meeting the conditions defined in this rule, the Department may at its discretion provide an allowance for WLAs calculated to result in no measurable reduction of dissolved oxygen (DO). For this purpose, "no measurable reduction" is defined as no more than 0.10 mg/L for a single source and no more than 0.20 mg/L for all anthropogenic activities that influence the water quality limited segment. The allowance applies for surface water DO criteria and for Intergravel dissolved oxygen (IGDO) if a determination is made that the conditions are natural. The allowance for WLAs applies only to surface water 30-day and seven-day means; or*
- (iv) *Under extraordinary circumstances to solve an existing, immediate and critical environmental problem, the Commission or Department may, after the completion of a TMDL but before the water body has achieved compliance with standards, consider a waste load increase for an existing source on a receiving stream designated water quality limited under sub-section (a) of the definition of "Water Quality Limited" in OAR 340-041-0002. This action must be based on the following conditions:*
- (I) That TMDLs, WLAs and LAs have been set; and*
 - (II) That a compliance plan under which enforcement actions can be taken has been established and is being implemented on schedule; and*
 - (III) That an evaluation of the requested increased load shows that this increment of load will not have an unacceptable temporary or permanent adverse effect on beneficial uses or adversely affect threatened or endangered species; and*
 - (IV) That any waste load increase granted under subparagraph (iv) of this paragraph is temporary and does not extend beyond the TMDL compliance deadline established for the water body. If this action will result in a permanent load increase, the action has to comply with sub-paragraphs (i) or (ii) of this paragraph.*
- (b) *The activity, expansion, or growth necessitating a new or increased discharge load is consistent with the acknowledged local land use plans as evidenced by a statement of land use compatibility from the appropriate local planning agency.*
- (c) *Oregon's water quality management policies and programs recognize that Oregon's water bodies have a finite capacity to assimilate waste. Unused assimilative capacity is an exceedingly valuable resource that enhances in-stream values and environmental quality in general. Allocation of any unused assimilative capacity should be based on explicit criteria. In addition to the conditions in subsection (a) of this section, the Commission or Department may consider the following:*
- (A) Environmental Effects Criteria:*
 - (i) Adverse Out-of-Stream Effects. There may be instances where the non-discharge or limited discharge alternatives may cause greater adverse environmental effects than the increased discharge alternative. An example may be the potential degradation of groundwater from land application of wastes;*
 - (ii) Instream Effects. Total stream loading may be reduced through elimination or reduction of other source discharges or through a reduction in seasonal discharge. A source that replaces other sources, accepts additional waste from less efficient treatment units or systems, or reduces discharge loadings during periods of low stream flow may be permitted an increased discharge load year-round or during seasons of high flow, so long as the loading has no adverse effect on threatened and endangered species;*

- (iii) *Beneficial Effects. Land application, upland wetlands application, or other non-discharge alternatives for appropriately treated wastewater may replenish groundwater levels and increase stream flow and assimilative capacity during otherwise low stream flow periods.*
- (B) *Economic Effects Criteria. When assimilative capacity exists in a stream, and when it is judged that increased loadings will not have significantly greater adverse environmental effects than other alternatives to increased discharge, the economic effect of increased loading will be considered. Economic effects will be of two general types:*
 - (i) *Value of Assimilative Capacity. The assimilative capacity of Oregon's streams is finite, but the potential uses of this capacity are virtually unlimited. Thus it is important that priority be given to those beneficial uses that promise the greatest return (beneficial use) relative to the unused assimilative capacity that might be utilized. In-stream uses that will benefit from reserve assimilative capacity, as well as potential future beneficial use, will be weighed against the economic benefit associated with increased loading;*
 - (ii) *Cost of Treatment Technology. The cost of improved treatment technology, non-discharge and limited discharge alternatives may be evaluated.*

6.6.2 Application of Standard

The antidegradation policy describes the intent and focus of the Environmental Quality Commission in applying water quality standards to new or modified sources and anthropogenic activities that may adversely affect water quality or beneficial uses. The policy outlines a review process to be completed before DEQ may assign additional assimilative capacity in Oregon waters to a new or modified source of pollution.

In applying the antidegradation policy to this §401 application, DEQ evaluates the operating conditions of the Project under a FERC License to determine whether there is reasonable assurance that no degradation of existing water quality will occur unless the identified degradation complies with the Antidegradation Policy.

6.6.3 Present Conditions

Existing water quality conditions are described in this Evaluation and Findings Report, application for federal license, and the §401 Water Quality Certification Application. Present water quality in Rock Creek is good with some moderate temperature impairment. It otherwise supports all beneficial uses.

6.6.4 Applicant's Position

Warm Springs Hydro believes operation of the Project will comply with Oregon water quality standards and other relevant provisions of state law and that temperature increases in the by-pass reach will be *de minimus*. Warm Springs Hydro believes that the project complies with Oregon's antidegradation policy.

6.6.5 DEQ Evaluation

The Project will operate as a run-of-reservoir facility using releases for hydropower generation. The project discharge will be managed so that it does not lower water quality, meets all applicable water quality criteria, and supports sensitive beneficial uses.

6.6.6 DEQ Findings

DEQ has determined the project meets the antidegradation policy. DEQ will require additional water quality monitoring and operational procedures to assure future compliance. This antidegradation evaluation is limited to potential water quality impacts resulting from operations under a FERC License

for the Rock Creek Hydroelectric Project. Subsequent antidegradation reviews may be required to process separate water quality actions such as §401 water quality certificates issued in conjunction with §404 of the CWA for in-water construction or maintenance projects.

DEQ implements the antidegradation policy via the antidegradation review. Tier 1 and Tier 2 reviews are included in this antidegradation review.

Existing Use Review:

Antidegradation reviews must ensure protection of existing uses defined in EPA's regulations as "those uses actually attained in the waterbody on or after November 28, 1975." The basic protection provided by Tier 1 applies to all waters, regardless of use designation. There have been no changes to Rock Creek since DEQ updated the designated uses in 2003. The existing uses in Rock Creek affected by the Project are equivalent to the designated uses. DEQ has determined that the Project operations, following implementation of the section 401 water quality certification with conditions, will protect designated uses, which are equivalent to existing uses. This analysis results in a finding that existing uses are protected.

Protection of High Quality and Impaired Waters:

Implementation of antidegradation rules ensures that an activity in Oregon waters will not result in a lowering of water quality. If DEQ finds that the activity will result in a lowering of water quality, DEQ must demonstrate in an in-depth antidegradation review that such a lowering meets antidegradation requirements set out in 340-041-0004(6), for high quality waters, or 340-041-0004(9), for water quality limited waters, whichever is applicable. DEQ has evaluated the proposed operating conditions of the Project under a FERC license. DEQ has determined that there is reasonable assurance that proposed Project operations under the license will not lower water quality, if the conditions required under the section 401 certification are met. DEQ is therefore reasonably assured that the proposed Project operations, with the section 401 conditions implemented will not result in lowering of water quality. As a result, DEQ does not need to conduct an in-depth antidegradation review.

Based on the antidegradation review DEQ finds that federal requirements at 40 CFR 131.12 have been met; that state requirements at OAR 340-041-0004 have been met and that the Proposed Action subject to the conditions in the section 401 water quality certification is consistent with antidegradation requirements. DEQ is reasonably assured that Project operation will comply with the antidegradation policy provided the following measures are implemented:

- Perform dissolved oxygen and total dissolved gas monitoring procedures in the bypass reach at the powerhouse discharge point in Rock Creek.
- Develop and implement an adaptive management plan if the monitoring indicates the project causes or contributes to a violation of the applicable dissolved oxygen or TDG criteria.
- Macroinvertebrate biomonitoring of the bypass reach of Rock Creek which will include standard bioassessment metrics including densities, abundance, richness and tolerance as well as identify monitoring locations.
- Develop and implement an adaptive management plan if the monitoring indicates impairment to the macroinvertebrate community in Rock Creek.
- Maintain minimum flows in the by-pass reach in accordance with §401 Water Quality Certification conditions and ODFW and USFWS terms and conditions.
- Conduct water temperature monitoring and modeling of the bypass reach on a daily basis during the critical period of June 1- September 30 as described in Condition 1c and the approved Operation and Compliance Monitoring Plan required in §401 Water Quality Certification Condition 1j. The monitoring and modeling will be coupled with operating procedures that will

limit heating to the bypass reach due to project operation to less than 0.3 ° C by reducing project operation and increasing by-pass reach minimum flows at critical times.

- Implement project ramping requirements in accordance with §401 Water Quality Certification Condition 1h and ODFW and USFWS terms and conditions.
- Construct and operate fish screening and passage facilities at the diversion dam in accordance with §401 Water Quality Certification Condition 3b and ODFW and USFWS terms and conditions.

7. Evaluation of Compliance with Sections 301, 302, 303, 306 and 307 of the Federal Clean Water Act

In order to certify a project pursuant to §401 of the federal Clean Water Act, DEQ must find that the project complies with applicable provisions of Sections 301, 302, 303, 306 and 307 of that Act and state regulations adopted to implement these sections. Sections 301, 302, 306 and 307 of the federal Clean Water Act deal with effluent limitations, water quality related effluent limitations, national standards of performance for new sources and toxic and pretreatment standards. All of these requirements relate to point source discharges and are the foundation for conditions to be incorporated in National Pollution Discharge Elimination System (NPDES) permits issued to the point sources. Point source discharges at hydroelectric projects may include cooling water discharges, stormwater, and sewage discharges.

Section 303 of the Act relates to Water Quality Standards and Implementation Plans. The federal Environmental Protection Agency (EPA) has adopted regulations to implement Section 303 of the Act. The EQC has adopted water quality standards consistent with the requirements of Section 303 and the applicable EPA rules. The EQC standards are codified in OAR Chapter 340, Division 41. EPA has approved the Oregon standards pursuant to the requirements of Section 303 of the Act. Therefore, the Project must comply with Oregon Water Quality Standards to qualify for certification. As discussed above in this report, the proposed Project will comply with Oregon Water Quality Standards and therefore Section 303 of the Clean Water Act, provided the conditions to the §401 Certification are satisfied.

Required NPDES Permits

DEQ requires stormwater permits for certain industries based on Standard Industrial Classification (SIC) codes. The Occupational Safety and Health Administration (OSHA) assigns SIC Code 4911 to Electric Services facilities engaged in “electric power generation, transmission, and distribution.” DEQ does not regulate stormwater discharge from facilities with SIC Code 4911 under NPDES General Permit 1200-Z. Based on the SIC Code assigned to the Project, DEQ does not require Warm Springs Hydro LLC to obtain an NPDES 1200-Z industrial stormwater permit.

Facilities engaged in upland construction activities which will disturb more than one acre of land and which may reasonably result in surface water discharge to waters of the state must obtain a construction stormwater permit from DEQ. Certain actions required of Warm Springs Hydro LLC pursuant to a new FERC License may require that Warm Springs Hydro LLC obtain a NPDES 1200-C construction stormwater permit prior to construction. DEQ will condition this §401 water quality certification to

require Warm Springs Hydro LLC to obtain all applicable permits prior to engaging in activities which may result in discharge to waters of the state, including a §404 Permit from the US Army Corps of Engineers and any associated §401 Water Quality Certification from DEQ for in-water work.

8. Evaluation of Compliance with Other Requirements of State Law

Once a Project is determined to qualify for a §401 certification, additional determinations may be made to identify additional conditions that are appropriate in a certification to assure compliance with other appropriate requirements of state law, pursuant to §401(d) of the Clean Water Act. Such requirements are “appropriate” if they have any relation to water quality, see *Arnold Irrigation Dist. v. DEQ*, 79 Or App 136 (1986), and may include requirements as to water quantity if necessary to protect a beneficial use. See *PUD No.1 of Jefferson Co. v. Washington Dept. of Ecology*, 511 U.S. 700 (1994).

8.1 Department of State Lands

ORS 196.810 requires that permits must be obtained from the Oregon Department of State Lands (DSL) prior to any fill and removal of material from the bed or banks of any stream. Such permits, if issued, may be expected to contain conditions to assure protection of water quality to protect fish and aquatic habitat.

The proposed new license will include construction activities which may require a removal-fill permit from DSL, a dredge and fill permit from the Corps pursuant to § 404 of the Clean Water Act, and a §401 water quality certification from DEQ. Warm Springs Hydro must first obtain all applicable permits, certificates, and authorizations prior to engaging in activities required under the terms of a FERC License.

8.2 Department of Fish and Wildlife

The state laws summarized below are administered by the Oregon Department of Fish and Wildlife and pertain to providing and maintaining passage around artificial obstructions, protecting aquatic habitat and protecting and restoring native fish stocks.

- **ORS 541.405** Oregon Plan for Salmon and Watersheds
Restore native fish populations and the aquatic systems that support them, to productive and sustainable levels that will provide environmental, cultural and economic benefits.
- **ORS 496.012** Wildlife Policy
This statute establishes ODFW’s primary directive to prevent serious depletion of any indigenous species and to maintain all species of fish and wildlife at optimum levels.
- **ORS 496.435** Policy to Restore Native Stocks
Restore native stocks of salmon and trout to historic levels of abundance.
- **ORS 509.580 - 509.645** ODFW’s Fish Passage Law
Provide upstream and downstream passage at all artificial obstructions in Oregon waters where migratory native fish are currently or have historically been present.

- **OAR 635-007-0502 through 0509** Native Fish Conservation Policy.
- **OAR 635-500-0100-0120** Trout Management
Maintain the genetic diversity and integrity of wild trout stocks; and protect, restore and enhance trout habitat.
- **OAR 635-415-0000-0030** Fish and Wildlife Habitat Mitigation Policy

8.3 Department of Land Conservation and Development

ORS Chapter 197 contains provisions of state law requiring the development and acknowledgement of comprehensive land use plans. This chapter also requires state agency actions to be consistent with acknowledged local land use plans and implementing ordinances. A land use Compatibility Statement signed by the Baker County Planning Department is included in the 401 Certification application. The form (dated February 18, 2020) indicates that the Project is considered conforming with land use rules because the use predates the Baker County Planning Ordinance.

8.4 Department of Environmental Quality

Onsite Septic Systems

On-site disposal of sewage is governed by ORS 454.705 et. seq. and OAR Chapter 340, Divisions 71 and 73. The purpose of these rules is to prevent health hazards and protect the quality of surface water and groundwater.

Warm Springs Hydro has not indicated that there are plans for waste facilities at the Project location.

Hazardous Materials

ORS 466.605 et. seq. and ORS 468.780-815 establish requirements for reporting and cleanup of spills of petroleum products and hazardous materials. ORS 468.742 requires submittal of plans and specifications for water pollution control facilities to DEQ for review and approval prior to construction. One of the purposes of these statutes and rules is to prevent contamination of surface or groundwater.

Section 6.4.6 of this report describes DEQ's requirements for a Spill Prevention Control and Countermeasures Plan for the Project.

NPDES Permits

Oregon rule (OAR 340-045-0015) requires facilities that discharge to water to secure NPDES permits for discharges of pollutants to surface water.

Prior to engaging in future construction activities which may disturb more than one acre and which will result in stormwater discharge to surface waters, Warm Springs Hydro must first obtain an NPDES 1200-C construction stormwater permit from DEQ.

8.5 Water Resources Department

ORS 543.017 requires that minimum standards for development of hydroelectric power be met including preservation of anadromous salmon and steelhead species, wild game fish, and recreational opportunities.

The Oregon Water Resources Department (OWRD) has stated that the Project has a valid Oregon Water Right Certificate No. 4120 that was developed by the original owners of the Rock Creek hydroelectric project. That right is currently leased instream under lease IL-108 that is set to terminate December 31, 2020. This right allows the diversion of 13 cfs from Rock Creek for power generation and has a priority date of April 11, 1902.

9. Public Comment

On July 31, 2020, DEQ issued a notice inviting public review and comment on the proposed certification decision. DEQ held a virtual public hearing to discuss the decision on August 18, 2020. No comments were received at the hearing. Two comments in favor of licensing the Project were received via email, one from a private citizen, and one from the Baker County Commissioners. Warm Springs Hydro also provided comments via email regarding data collection methods and timing. The edits to the final certification conditions are summarized below:

- Condition 1e: added reference to USGS flow measurement guidance.
- Condition 2a: clarified data collection requirements for flow and solar radiation
- Condition 3d: clarification of timing of hydraulic evaluation and post construction monitoring of downstream and upstream fish passage structures.
- Condition 6i: reduced fee payment schedule from five years to four.

The public comment period concluded on September 4, 2020.

10. Conclusions and Recommendation for Certification

DEQ has evaluated Warm Springs Hydro's application for §401 water quality certification and related supporting documents and considered public comments. DEQ has determined that the proposed Project will comply with the applicable provisions of Sections 301, 302, 303, 306 and 307 of the Clean Water Act, OAR Chapter 340, Division 41 and other appropriate requirements of state law provided Warm Springs Hydro implements the proposed §401 Water Quality Certification Conditions.

Based on the preceding analysis and findings, it is recommended that pursuant to §401 of the Federal Clean Water Act and ORS 468B.040, the Director, or assigned signatory, conditionally approve the application for certification of the Rock Creek Hydroelectric Project, FERC Project No. P-12726, consistent with the findings of this document.

11. References

DEQ, 2004, Oregon Responses to EPA Questions Regarding the State’s water Quality Temperature Standards, Portland, OR

DEQ, 2010, Application of DO criteria to “salmon and trout rearing and migration” beneficial use and “redband or lahontan cutthroat trout” beneficial use, Portland, OR.

DEQ, 2020, Temperature Modeling Report Review Memo, Jim Bloom, DEQ, Portland, OR

Northwest Power and Conservation Council, 2004, Powder Subbasin Report, in Columbia River Basin Fish and Wildlife Program, Portland, OR. <http://www.nwcouncil.org/fw/subbasinplanning/Default.htm>

ODFW, 2019, Comments and Terms and Conditions for Rock Creek Hydroelectric Project, P-12726.

SPF Water Engineering, 2020, Rock Creek Temperature Impact Analysis, Boise, ID.

USFWS, 2019, Comments and Terms and Conditions -Notice of Application Accepted for Filing, Ready for Environmental Analysis, and Soliciting Comments, Recommendations, Terms and Conditions, and Preliminary Fishway Prescriptions; Rock Creek Hydroelectric Project; FERC No. 12726-002, Baker County, Oregon.

Warm Springs Hydro, LLC, 2017, Rock Creek Updated Study Report, Ivins, UT.

Warm Springs Hydro, LLC, 2019a, Application for License for a Minor Water Project for Rock Creek Hydroelectric Project, Ivins, Utah.

Warm Springs Hydro, LLC, 2019b, Application for Certification Pursuant to Section 401 of the Federal Clean Water Act for the Rock Creek Hydroelectric Project, Ivins, UT.