Evaluation and Findings Report

for the

Application for Certification Pursuant to Section 401 of the Federal Clean Water Act

Submitted by
Symbiotics, LLC
for the

Applegate Dam Hydroelectric Project (FERC No. 11910)

Pursuant to
Oregon Administrative Rules Chapter 340, Division 48

Prepared by:
Oregon Department of Environmental Quality
811 SW 6th Avenue
Portland, Oregon 97204

August 23, 2007

This page intentionally left blank

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

On August 28, 2006, Symbiotics, LLC, filed a water quality certification application with the Oregon Department of Environmental Quality (ODEQ) for the construction and operation of hydroelectric facilities at the existing Applegate Dam. The Applegate Dam is located at river mile 46.8 on the Applegate River about 23 miles southwest of Medford, Oregon in Jackson County (Figure 1). Symbiotics, LLC (Symbiotics; Applicant) seeks water quality certification to support a license application it has filed with the Federal Energy Regulatory Commission (FERC) for the proposed Applegate Dam Hydroelectric Project (Project), FERC Project Number 11910. This report provides ODEQ's evaluation and findings relative to the Applicant's water quality certification application.

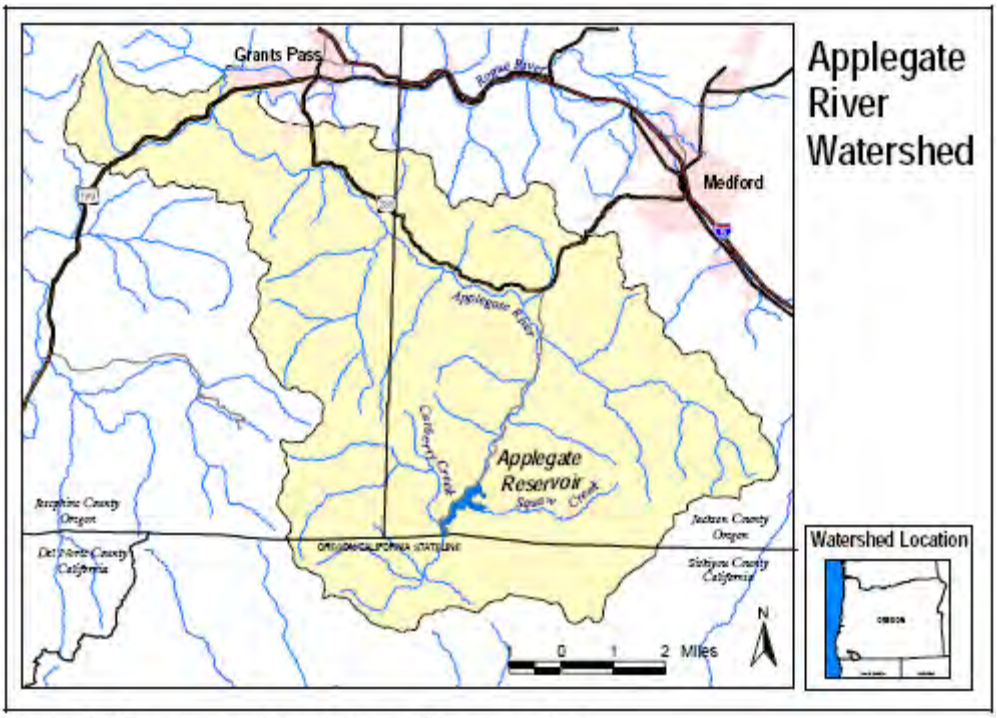

Figure 1. An area map of the Applegate River watershed.

2.0 REQUIREMENTS FOR CERTIFICATION

2.1 Applicable Federal and State Law

Section 401 of the Federal Clean Water Act (Clean Water Act or CWA), 33 USC §1341, establishes requirements for state certification of proposed projects or activities that may result in any discharge of pollutants to navigable waters. Before a federal agency may issue a permit or license for any project that may result in any discharge of pollutants to navigable waters, the state must certify that the proposed project will comply with applicable provisions of Sections 301, 302, 303, 306, and 307 of the Clean Water Act and any state regulations, including state water quality standards, adopted to implement these sections. The state is further authorized to condition any granted certificate to assure compliance with state water quality standards and other appropriate water quality-related requirements of state law.

ODEQ is the agency of the State of Oregon designated to carry out the certification functions prescribed by § 401 of the Clean Water Act for state waters. ODEQ must act on an application for certification in a manner consistent with the following federal and state requirements:

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:
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 ODEQ 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 for coordination among state agencies in the reauthorization of federally licensed hydroelectric projects, including state certification of water quality.

EQC rules identify the information that must be included in an application for § 401 certification (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 ODEQ pursuant to § 401 of the Federal Clean Water Act and state law:
• The determination of whether to issue or deny certification.
• The determination of conditions which are appropriate to include in any granted certificate.
• Development of findings as required by ORS 468B.040 and ORS 197.180(1).

2.2 General Application of State Water Quality Standards

Oregon water quality standards are contained in Oregon Administrative Rule (OAR) Chapter 340, Division 41 entitled "Department of Environmental Quality Water Pollution Division 41 Water Quality Standards: Beneficial Uses, Policies, and Criteria for Oregon." The water quality standards in Division 41 are composed of three elements: beneficial uses, numeric and narrative criteria, and the antidegradation policy, and are further implemented through Total Maximum Daily Loads (TMDLs) as applicable. The role of each of these is explained below.

2.2.1 Beneficial Uses

The Federal Clean Water Act and Oregon water quality standards are structured to require that water quality be protected and maintained so that existing and potential beneficial uses of public waters are not impaired or precluded by degraded water quality. The regulatory approach used is

to: (1) identify beneficial uses that are recognized as significant with regard to water quality protection; (2) develop and adopt criteria for significant water quality parameters that are necessary to protect the identified beneficial uses; (3) establish and enforce discharge limitations for each source that is permitted to discharge treated wastes into public waters to assure that water quality standards are not violated and beneficial uses are not impaired; and (4) establish and implement "best management practices" for a variety of "land management" activities to minimize their contribution to lower water quality standards and impairment of beneficial uses.

Beneficial uses to be protected have been identified generally for each river basin in Oregon and specifically for significant stream reaches within some basins. The State's designated beneficial uses to be protected in the Rogue Basin, where the proposed Applegate Dam Hydroelectric Project would be located, are listed in OAR 340-041-0271, Table 271A, and Figures 271A and 271B. These uses include public, private, domestic, and industrial water supply; irrigation; livestock watering; fish & aquatic life; wildlife & hunting; fishing; boating; water contact recreation; aesthetic quality; and hydropower.

2.2.2 Narrative and Numeric Criteria

Generally, the assumption is made that if water quality meets the numeric and narrative criteria for the most sensitive beneficial use, then the criteria is fully protective of all the beneficial uses. Water quality standard criteria have been adopted for water quality parameters that are most significant or useful in regulating pollution. These criteria take the form of both numeric limits and narrative statements and have been established based on best available information at the time they were adopted. Development of water quality standards is a continuing process. As new information becomes available, standards for additional parameters may be added and existing numeric and narrative criteria may be revised to better reflect the intent of protection of the identified beneficial uses.

2.2.3 Antidegradation Policy

Oregon's antidegradation policy (OAR 340-041-0004) applies to all surface waters. In the case of bodies of water that meet water quality standards, it provides for the maintenance of existing water quality. Specifically, the policy states that the existing quality of high quality waters (i.e., waters meeting water quality standards) shall be maintained and protected unless the Environmental Quality Commission makes certain rigorous findings of need. For water quality-limited waters, water quality may not be lowered; that is, these waters have a no degradation status.

2.2.4 Total Maximum Daily Loads (TMDLs)

DEQ also develops, and the U.S. Environmental Protection Agency approves, total maximum daily loads (TMDLs) for waters listed as water quality-limited pursuant to CWA §303(d). A TMDL identifies the amount of a specific pollutant that a water body can receive and still meet water quality standards and support the beneficial uses designated in that waterbody. A TMDL also identifies wasteload allocations for point sources of pollutants and load allocations for non-point sources. For a hydroelectric project located on a water quality-limited waterbody, a § 401 certification may serve as the means for implementing load allocations assigned to the project. Rules for developing, issuing and implementing TMDLs are in OAR 340-042-0025—0080.

3.0 PROJECT INFORMATION AND SUMMARY OF PROJECT

3.1 Applicant Information

3.1.1 Name and Address of Project Owner (Applicant)

Symbiotics, LLC
PO Box 535
Rigby, ID 83442
Phone: (208) 745-0834
Fax: (208) 745-0835

3.1.2 Name and Address of Owner's Official Representative

Mr. Brent L. Smith, President
Northwest Power Services, Inc.
PO Box 535
Rigby, ID 83442
Phone: (208) 745-0834
Fax: (208) 745-0835

3.1.3 Documents Filed in Support of § 401 Application

Symbiotics, LLC has filed the following documents in support of its § 401 certification application for the proposed Applegate Dam Hydroelectric Project:

- Additional information response to ODEQ request for additional information, June 20, 2007
    - Formal statement from Corps of Engineers relative to run-of-release operations
    - Information regarding cooling water discharge
    - Confirmation regarding data quality assurance
- Additional information response to ODEQ determination of incomplete 401 application, April 4, 2007; received by ODEQ April 11, 2007.
    - Letter Response
    - Water Quality Management and Monitoring Plan
    - Adjacent Property Ownership Maps
    - Hydroelectric Schematic Drawing
    - Pump System Drawing
    - Quality Assurance Plan
    - 2003/2004 Raw Water Quality Data
- Application for Certification pursuant to Section 401 of the Federal CWA, August, 2006; received by ODEQ August 29, 2006.
- Final License Application Addendum #1 for the Applegate Dam Hydroelectric Project FERC Project No 11910, May 2005; received by ODEQ May 23, 2005.
- Final License Application for the Applegate Dam Hydroelectric Project FERC Project No 11910, August, 2004; received by ODEQ on September 8, 2004.
- Environmental studies and environmental documents submitted individually or as appendices to the Final License Application, Final License Application Addendum, or Application for Certification are not listed separately here. Environmental studies and documents used in this § 401 Evaluation are referenced individually, and identified in Section 10, References.

- May 25, 2007 Letter from the Corps to ODEQ identifying that the Corps would continue to dictate the magnitude, frequency, and ramping rates of flows, and general operations of Applegate Dam.
- Revised Hazardous Substances and Spill Prevention and Cleanup Plan dated June 2007. Received by ODEQ on June28, 2007.

3.1.4 Notification of Complete Application

On June 29, 2007, ODEQ notified Symbiotics, LLC that it deemed the Application for § 401 Certification received on August 28, 2006 for the proposed Applegate Dam Hydroelectric Project to be administratively complete for processing.

3.2 Project Description

3.2.1 Waters of the State Potentially Impacted by Project

The proposed Applegate Dam Hydroelectric Project would be located at the existing Applegate Dam at river mile (RM) 46.8. The existing dam impacts water quality within Applegate Reservoir upstream of the dam as well as in the Applegate River downstream of the dam. Depending upon season and the water quality parameter being examined, the existing dam potentially impacts downstream water quality to the Rogue River confluence and possibly beyond. Similarly, construction and operation of the hydroelectric project, depending upon how the activities are conducted, could impact these same waters relative to existing conditions.

3.2.2 Adjacent Land Use and Ownership

The land adjacent to the reservoir is owned by the US Forest Service (USFS), and lands adjacent to the dam are owned by the US Army Corps of Engineers (Corps) and the USFS. The Corps owns and operates Applegate Dam.

3.2.3 Existing Project Facilities and Operations

More detailed description of the existing project and operations are included in the Application for Certification, and a summary description is provided here. Detailed data for the existing project is contained in Table 1.

The existing Applegate project was constructed and completed in 1982 by the Corps. Located at RM 46.8 on the Applegate River, 23 miles southwest of Medford, Oregon, the project includes a gravel embankment dam about 1,325 feet long at the crest and 242 feet high above the streambed elevation at 1,752 feet NGVD (National Geodetic Vertical Datum). Appurtenant features of the dam include a two-gate spillway, regulating outlet works and fish collection facilities.

The regulating outlet works consists of a multiple level intake tower, temperature control outlet system, 921-foot-long concrete outlet conduit and primary and secondary stilling basins. The 237-foot-high intake tower includes a regulating outlet intake and two water temperature control intakes. Five intake ports serve two wet wells for the two water temperature control intakes (three ports serve one wet well and two serve the other). One intake port of the temperature control system supplies water to the fish collection facilities through a 30-inch concrete conduit. Water selected for temperature regulation is passed through a regulating outlet conduit which extends 921 feet through the base of the embankment to the stilling basin. The outlet conduit has a design discharge of 5,700 cubic feet per second (cfs).

Table 1. Hydrologic and physical data for Applegate Reservoir and Dam (Corps website).

General	
Drainage area	223 square miles
Pool Elevations, M.S.L.	
Full pool	1,987.0
Spillway crest	1,943.7
Minimum flood control pool	1,889.0
Reservoir Capacity	
Full pool	89,300 ac-ft
Spillway Crest	82,200 ac-ft
Minimum flood control pool	17,000 ac-ft
Dam	
Type	Gravel fill embankment structure
Crest length	1,300 ft
Crest elevation	1,994 ft
Maximum height	242 ft
Spillway	
Type	Concrete gravity
Crest length	111.83 ft
Crest elevation	1,943.7 ft
Design discharge	93,600 cfs
Outlet Works	
Type	Multiple-use intake tower, conduit, stilling basin
Type gates	Hydraulic pressure slide
Operating slide gates, no. & size	2 - 2'9" x 6'
Emergency slide gates, no. & size	2 - 2'9" x 6'
Outlet Conduit	9'x 14'6" concrete oblong
Length	930 feet
Invert elev. of outlet tunnel	1,776
Capacity of outlets at elevation 1,889	4,200 cfs
Capacity of outlets at elevation 1,987	5,700 cfs

The fish collection facility is located next to the east wall of the stilling basin and consists of a fish barrier weir, fish ladder, collection pool, holding pool, and sorting and transfer facilities. The fish barrier weir acts as a water velocity barrier and blocks upstream fish migration into the primary stilling basin.

The Corps operates and maintains the project to provide flood control, irrigation, fish and wildlife enhancement, recreation and water quality control benefits. The Corps manages flow releases from Applegate Reservoir throughout the year, to accomplish goals of the Oregon Department of Fish and Wildlife (ODFW) for downstream fisheries. These are to: 1) maintain sufficient discharge to preserve and enhance spawning and rearing habitat for salmonid fishes such as fall chinook, coho, steelhead and cutthroat trout; and, 2) release cooler water, as available, to improve spawning conditions and survival rates of juvenile steelhead and coho/chinook salmon. Temperature regulation is achieved via a thermistor array attached to a multiple-intake tower, which withdraws water from the appropriate depth to meet downstream temperature targets recommended by ODFW. Intakes are located at 1,838, 1,895, 1,930, 1,950 and 1,962 feet elevations (minimum pool is 1,889 ft and full pool is 1,987 ft). The Corps efforts to accommodate temperature and flow recommendations submitted by ODFW through the Oregon Water Resources Department (OWRD) are secondary to their flood control and safety operations of the dam and its appurtenant facilities.

3.2.4 Proposed Modification and New Facilities

The following detailed description of proposed modifications and new facilities is taken verbatim from the Application for Certification.

The proposed Applegate Dam Hydroelectric Project will have an installed capacity of 10 MW from two units of 5 MW each. The use of two units will allow for the efficient usage of regulated release flows ranging from 100 to about 825 cfs, with gross operating heads ranging between 110 and 211 feet. No modifications will be made to existing structures upstream of the flood control and temperature control gates. All proposed structures to be added are downstream of these locations. Detailed drawings of the proposed project are provided in Appendix A of the Application for Certification.

Conduit

The proposal calls for installation of a steel liner in the existing reinforced concrete 9 feet x 14.5 feet long flood control conduit. The liner will tie into the existing ½-inch thick steel liner located in the regulating outlet gate/conduit transition structure. The liner will be pressure grouted to the existing concrete outlet structure. A detailed structural analysis of the conduit will be made under both a full flow and dry condition to determine whether structural modifications are necessary to ensure the overall structural integrity of the regulating outlet.

The main powerhouse bifurcation will be located on the left side of the regulating outlet about 50 feet upstream of the outlet portal. A new outlet gate and trash rack will be located at the bifurcation entrance. Flows from the conduit will be diverted approximately 105 feet through a steel penstock 12 feet in diameter to the 50 x 60 feet powerhouse located on the left bank of the primary stilling basin and immediately downstream of the toe of the dam, opposite the fish collection facility. The steel penstock to the generation facility will bifurcate into separate penstocks, each 9 feet and 6 feet in diameter. An isolation valve will be upstream of each turbine. The 12 feet penstock will also branch to a line with an independent valve which will discharge into the primary stilling basin. The total discharge capacity will be about 1200 cfs from the turbines and bypass necessitating less frequent operation of the downstream outlet gate to pass project releases.

Downstream Outlet Gates

Hydraulic pressure will be maintained in the regulating outlet by the installation of two 5 feet by 15 feet hydraulically operated vertical gates. These will be located about 24 feet upstream of the outlet portal with an invert elevation equal to the existing transition section elevation. These gates will divert the flow to the turbines through the penstock located about 14 feet upstream of the gate.

Powerhouse

The powerhouse will be located approximately 10 feet to the left of the primary stilling basin and 70 feet downstream of the toe of the dam. It will consist of a concrete substructure and concrete block building housing two indoor type generators. The two units will be located in diagonal corners of the powerhouse. Control equipment will be located on the second floor. A gantry crane will be provided for assembling and dismantling units. A step-up transformer, switching structures and steel transmission take-off tower will be erected behind the powerhouse.

Two 96-inch diameter butterfly valves will be located within the powerhouse structure immediately upstream of Unit A and Unit B, respectively. In addition, a 60 inch Howell-Bunger valve will be located on the end of the bypass line.

Draft Tubes

Both the 3.2 and 9.6 MW units will discharge into the primary stilling basin through separate draft tubes so that all fish facility flow requirements are met. The secondary stilling basin is an integral part of the fish transport facility and flows entering will be of the same magnitude and direction as would occur if no hydroelectric facility were constructed.

The design centerline elevations of the units will allow for submergence of the discharge tubes below elevation 1768.5 NGVD, which is the elevation of the top of the fish barrier weir. These outlets will be located to have minimal adverse impact on development of the standing wave during high flood operation of the stilling basin and power generation. This may result in the requirement to curtail generation during the higher regulating outlet discharges. The results of the evaluation will be used to avoid a significant adverse impact during power generation.

Use of Impoundment

This proposal requires no modifications of the existing project uses and simply utilizes the released flows necessary for the originally authorized project purposes to produce hydroelectric power. Therefore the area and capacity of the impoundment will not be affected by operation of the proposed facility.

Proposed Turbines and Generators

Initial computations of various installed capacities with daily annual flow data resulted in a recommended installed capacity of 10 MW. Vertical Francis units with wicket gates are selected to allow for a wide range of operating flows and heads.

In order to avoid over stressing the existing regulating outlet conduit by dynamic pressure resulting from rapid gate closure following a loss of load to the generating equipment, it is proposed to use slow closing gates with equipment designed to withstand runaway speed.

4.0 BENEFICIAL USES AND WATER QUALITY STATUS OF THE APPLEGATE RIVER

In order to issue a § 401 Water Quality Certificate, ODEQ must make a finding that there is reasonable assurance that the proposed activity will not impair water quality and will comply with water quality standards. This Evaluation Report includes a review of the Project impact on each applicable water quality standard. Water quality standards are comprised of three elements, the beneficial uses that shall be protected, the water quality criteria intended to protect those uses and the antidegradation policy that protects existing water quality from degradation. In order to support the beneficial uses, different water quality criteria may apply to different waterbodies and reaches within those waterbodies. This section of the Evaluation Report identifies which beneficial uses have been designated in the Applegate River. It also identifies the known water quality impairments documented in the River. The detailed discussion regarding the Project impact on standards that are potentially affected is included in Section 5.

4.1 Beneficial Uses in the Applegate River

The aquatic beneficial uses that are designated by Oregon water quality standards in the Applegate River include public, private and domestic water supply, irrigation, livestock watering, wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality, and hydropower

[OAR 340-041-0271]. Fish and aquatic life is also a designated use that is further defined in Figures 271A and 271B of OAR 340-041. The aquatic uses and seasons are outlined in Table 2, below. These uses determine which numeric temperature and dissolved oxygen criteria are applicable to various reaches of the Applegate River. Table 2 also identifies the particular numeric criteria that apply to reaches of the Applegate that are affected by the Project.

Table 2: Temperature and Dissolved Oxygen Criteria for the Applegate River

Fish Use	River Miles	Temperature Criterion	Applicable Time Period	Dissolved Oxygen Criterion	Applicable Time Period
Salmon & Steelhead Spawning	RM 31.5 – RM 46.8	13.0°C (55.4°F)	September 15 - June 15	11.0 mg/l[1] or 95% saturation[2]	September 15 - June 15
Salmon & Steelhead Spawning	RM 0.0 – RM 31.5	13.0°C (55.4°F)	October 15 – May 15	11.0 mg/l[1] or 95% saturation[2]	October 15 – May 15
Core Cold Water Habitat	RM 31.5 – RM 46.8	16.0°C (60.8°F)	Year-round	8.0 mg/l or 90% saturation[3]	Year-round
Salmon & Trout Rearing & Migration	RM 0.0 – RM 31.5	18.0°C (64.4°F)	Year-round	8.0 mg/l or 90% saturation[3]	Year-round

[1] 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.
[2] 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.
[3] 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 (OAR 340-041 Table 21).

The Fish and Aquatic Use maps in Figures 271A and 271B of OAR 340-041 provide definition about which temperature criteria apply in the Applegate River. For the purposes of Oregon water quality standards, temperature is always measured as the seven day rolling average of the daily maximum temperature. OAR 340-041-0002(56). For ease in the referring to the criteria in this Evaluation and Findings Report, the criteria are identified simply as numeric values. These Fish and Aquatic Use designations also influence which dissolved oxygen criteria apply. Below is a short discussion of which temperature and dissolved oxygen criteria apply to the reaches of the Applegate River within and adjacent to the proposed Applegate Dam Hydroelectric Project.

4.2 Threatened and Endangered Aquatic Species in the Applegate River

Coho salmon (*O. kisutch*) in the Rogue and Applegate River basins belong to the Southern Oregon-Northern California Coast ESU (Evolutionary Significant Unit). This ESU is listed in the Federal Register (2002) as threatened by the National Oceanic and Atmospheric Administration (NOAA) under the Endangered Species Act (ESA).

The Clatsop philocascan caddisfly (*Philocasca oron*) and the Siskiyou caddisfly (*Tinodes siskiyou*) are two federally listed Species of Concern potentially occurring in the Applegate River Basin (BLM 1998). They are not currently listed by the State of Oregon.

4.3 Water Quality Impairment in the Applegate River

ODEQ is required to maintain a list of waters that have poor water quality and thus fail to support their beneficial uses. This list is required under the federal Clean Water Act's section 303(d) and in Oregon Administrative Rule (OAR 340-041-0046), and is commonly referred to as either the list of water quality limited waters, or the 303(d) list. Waterbodies included on this list may be subject to specified treatment under some ODEQ actions, such as developing permit conditions, antidegradation review, et cetera. In addition, ODEQ must develop Total Maximum Daily Loads (TMDLs) for these water bodies. TMDLs establish pollutant load allocations that will protect that waterbody from violating water quality standards, thus re-establishing support for the beneficial uses. Procedures for the issuance and implementation of TMDLs are described in OAR 340-042.

Applegate River reaches included on the state's 2004/2006 303(d) list are shown in Table 3. In order to issue a § 401 Water Quality Certificate, ODEQ will evaluate the § 401 Application to determine whether the proposed Project would be expected to contribute to water quality violations. When a hydroelectric project is operated on a waterbody that has impaired water quality, operations must comply with any allocations provided for the project of any approved TMDL. If no TMDL has been approved, then ODEQ will use the § 401 evaluation process to identify the project's contribution to the listed parameters and include management conditions in the § 401 Certificate to address those contributions. These § 401 conditions may be modified if necessary when a TMDL is approved.

Table 3: Water Quality Limited Status of the Applegate River

Parameter	River Miles	Season for Listing	Beneficial Use	Date of TMDL Approval
Dissolved Oxygen	0 to 31.5	October 15 - May 15	Salmon and steelhead spawning	No TMDL
Temperature	0 to 46.8	Summer	Anadromous fish passage Salmonid fish rearing	TMDL Approved: 2/11/2004

5.0 EVALUATION OF COMPLIANCE WITH STATE WATER QUALITY STANDARDS

5.1 Water Quality Standards Evaluated in this § 401 Review

As with any proposed activity that requires a § 401 Water Quality Certificate, some water quality standards are more likely to be effected than others. This section identifies which water quality standards are not likely to be violated (Standards not of Concern) and which standards might be violated (Standards of Potential Concern) by the proposed Project. Section 5.2 then provides a detailed analysis of the proposed project's construction and operation relative to the Standards of Potential Concern.

5.1.1 Water Quality Standards not of Concern

Table 4 lists the water quality standards that ODEQ does not expect to be affected by the proposed Project. Additionally, Symbiotics does not identify these water quality standards as standards of concern. ODEQ is reasonably assured that the proposed Project will not violate these standards given the proposed description of operations and construction methods and given that there are no pollutant discharges expected from the Project that might impact these standards. Further, aside from nuisance phytoplankton, these standards are not known to typically be violated at other hydroelectric plants or impoundments in Oregon. With respect to nuisance phytoplankton, the proposed Project will neither discharge nutrients to the reservoir nor impact reservoir level management, conditions which might otherwise impact phytoplankton growth within the reservoir.

Table 4. Water quality standards that are not expected to be affected by the proposed Applegate Dam Hydroelectric Project.

Criterion	Brief Description	Project Impact not Expected
Aesthetic conditions	Aesthetic conditions offensive to human sight, taste, smell or touch shall not be allowed. [OAR 340-041-007(14)]	The types of proposed Project activities are not expected to cause or contribute to aquatic conditions that would be offensive to the human senses of sight, taste, smell, or touch.
Bacterial Pollution	Limits in-water concentration of bacterial cells, because bacteria can cause or be an indicator of vectors that cause disease. [OAR 340-041-009]	There is no reason to suspect that the proposed Project will affect bacteria concentrations, since there are no proposed discharges of raw or treated sewage or animal waste into Project waters.
Creation of Taste & Odors	Tastes, odors and other conditions that are deleterious or toxic, or that affect palatability of drinking water or fish are not allowed OAR 340-041-007(11)	There are no physical or biological processes associated with the proposed Project that would be expected to cause tastes or odors.
Development of fungi	The development of fungi or other deleterious growth not allowed [OAR 340-041-007(10)]	The proposed Project is not expected to discharge nutrients or substances that contribute to fungal growth.
Nuisance Phytoplankton Growth	For reservoirs and streams, phytoplankton levels should not impair recognized beneficial uses [OAR 340-041-0019)]	The proposed Project is not expected to impact reservoir water levels and related nutrient processing relative to current dam operations.
Radioisotopes	Not allowed above maximum permissible concentrations in drinking water, or in fish, shellfish, or wildlife tissue [OAR 340-041-007(15)]	The proposed Project is not expected to add radioactive substances to water.
Total Dissolved Solids	Limit of 500 mg/L in the Rogue Basin [OAR 340-041-0275(2)	The proposed Project is not expected to add anything to water that would increase total

		dissolved solids.
Toxic material	Buildup of toxic material that affects aquatic life or human uses is not allowed [OAR 340-041-0033].	The proposed Project in not expected to add any toxic materials to water. Operation of the project is not expected to moderate sedimentation rates behind the dam.

5.1.2 Water Quality Standards of Potential Concern

The water quality standards that are of potential concern for this project are listed in Table 5. The § 401 Application has been evaluated to determine whether the proposed construction and operation of the proposed Project will contribute to water quality violations for these water quality standards of potential concern. The discussion and findings of this evaluation are included in the sections below. This discussion identifies factors and implementation measures necessary to provide ODEQ with reasonable assurance that the construction and operation of the proposed Project will not contribute to violation of these water quality standards of potential concern.

Table 5. Water Quality Standards that may be potentially affected by the proposed Applegate Dam Hydroelectric Project.

Standard	Brief Description	Potential Impact
Temperature	Water temperature must be protective of aquatic communities [OAR 340-041-0028].	Instream temperature could be impacted during construction at the time the flow conduit is temporarily shutdown. During this time, the multiple level intake tower will be unavailable for temperature control.
Dissolved Oxygen	Sufficient concentrations of dissolved oxygen are necessary to support aquatic life [OAR 340-041-0016].	During construction, sedimentation could reduce downstream intergravel dissolved oxygen levels. Dissolved oxygen levels could be impacted during construction at the time the flow conduit is temporarily shutdown. Passing reservoir discharge water through the Project turbines may reduce aeration (oxygenation) relative to the current mode of discharge through the existing discharge outlet.
Sediment	Bottom deposits deleterious to habitat and aquatic life are not allowed [OAR 340-041-007(12)].	Construction activities such as excavation, grading, and clearing may result in sedimentation to the river.
Turbidity	Generally not to exceed 10% over background; limited-duration activities permitted in a § 404 or § 401 certificate are	Construction activities such as excavation, grading, and clearing may result in sedimentation and increased

	allowed, even when increases exceed this level [OAR 340-041-0036].	turbidity in the river. In stream work can result in disturbance of the streambed which can also elevate turbidity.
pH (Hydrogen Ion Activity)	Limits are between 6.5-8.5 [OAR 340-041-0275].	Construction activities in which cement or grout are used have some potential to increase pH due to accidental introduction into the river.
Total Dissolved Gas	Protects aquatic life from gas bubble disease, caused by water that is supersaturated with atmospheric gases [OAR 340-041-0031].	Water falling from height and plunging deeply into a pool can result in high TDG. High TDG is commonly observed below impoundment spillways when spilling.
Biocriteria	Protects aquatic communities from cumulative impacts of all potential impairment [OAR 340-041-0011].	Impacts to aquatic communities from increased turbidity and sedimentation during construction and also due to potential flow changes during operations at times of turbine start-up and shut-down.
Oily sheen, oily coatings	Objectionable discoloration, scum, oily sheen, floating solids or coating aquatic life with oil films is not allowed [OAR 340-041-0007(13)].	Oil is used in project turbines and transformers, so there is some risk of oil release at hydroelectric projects. During construction there is risk for spills of fuels, lubricants, and concrete form oils
Antidegradation	Protects existing water quality by preventing unnecessary additional water quality degradation [OAR 340-041-0004].	Must be addressed when a project is proposed that may lower existing water quality conditions, even though standard violations are not anticipated.

5.2 Evaluation for Standards of Potential Concern

This section provides the detailed evaluation of the Project relationship to each water quality standard that might be impacted by the proposed Project. The § 401 review includes the text of each water quality standard; a description of the current water quality conditions; potential operation and construction impacts and proposed measures; and ODEQ's evaluation and findings relative to the given standard. ODEQ may use several tools to evaluate the Project's impacts, including data submitted by the applicant, data collected by ODEQ, data from other projects, site-specific study results, modeling results and information from studies in the scientific literature.

5.2.1 Temperature

Water Quality Standard

Water temperature has a profound effect on organisms that live or reproduce in the water. This is particularly true of Oregon's native "cold-water" fish such as salmon, bull trout and steelhead and for some amphibians (frogs and salamanders). When water temperature becomes too high, salmon and trout (salmonids) suffer a variety of ill effects. With increasing temperature, salmonids experience sub-lethal effects of impaired feeding, decreased growth rates, reduced resistance to disease and parasites, increased sensitivity to toxics, intolerance during migration, reduced ability to compete with more temperature-resistant species and increased vulnerability to predation. If temperatures are high enough for sustained periods, mortality occurs. Elevated temperatures may also adversely affect other important water quality parameters (such as dissolved oxygen). Based on the available information, the temperature standard criteria were established with the primary intent of protecting the resident salmonid populations. Language in the standard recognizes that natural water temperatures may exceed the desirable upper limit criteria established in the standard for protection. When water temperatures are above the standard, discharges of waste or activities caused by human uses may not exceed 0.3º C collectively.

Pertinent excerpts of the applicable State standard for temperature are included here. The salmonid uses and related temperature criteria present in the affected reaches of the Applegate River are listed in Table 2 of this evaluation report (see section 4.1, Beneficial Uses).

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:
(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 water bodies 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.

(8) Natural Conditions Criteria. Where the department determines that the natural thermal potential of all or a portion of a water body exceeds the biologically-based criteria in section (4) of this rule, the natural thermal potential temperatures supersede the biologically-based criteria, and are deemed to be the applicable temperature criteria for that water body.

(12) Implementation of the Temperature Criteria.

(a) Minimum Duties. There is no duty for anthropogenic sources to reduce heating of the waters of the State below their natural condition. Similarly, each anthropogenic point and nonpoint source is responsible only for controlling the thermal effects of its own discharge or activity in accordance with its overall heat contribution. In no case may a source cause more warming than that allowed by the human use allowance provided in subsection (b) of this rule.

(b) Human Use Allowance. Insignificant additions of heat are authorized in waters that exceed the applicable temperature criteria as follows:

(B) Following a temperature TMDL or other cumulative effects analysis, waste load and load allocations will restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.3 degrees Celsius (0.5 Fahrenheit) above the applicable criteria after complete mixing in the water body, and at the point of maximum impact.

(h) 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.

(D) Once approved, a nonpoint source complying with its temperature management plan is deemed in compliance with this rule.

(i) Compliance Methods. Anthropogenic sources may engage in thermal water quality trading in whole or in part to offset its temperature discharge, so long as the trade results in at least a net thermal loading decrease in anthropogenic warming of the water body, and does not adversely affect a threatened or endangered species. Sources may also achieve compliance, in whole or in part, by flow augmentation, hyporheic exchange flows, outfall relocation, or other measures that reduce the temperature increase caused by the discharge.

(j) Release of Stored Water. Stored cold water may be released from reservoirs to cool downstream waters in order to achieve compliance with the applicable numeric criteria. However, there can be no significant adverse impact to downstream designated beneficial uses as a result of the releases of this cold water, and the release may not contribute to violations of other water quality criteria. Where the Department determines that the release of cold water is resulting in a

significant adverse impact, the Department may require the elimination or mitigation of the adverse impact.

Current Water Quality Condition

An 18.0°C (64.4°F) temperature criterion applies in Applegate Reservoir to protect trout. Results from past temperature surveys conducted in the reservoir by the Corps (1986 and 1997) and by Ecosystems Research Incorporated (ERI) in 2003 and 2004 are displayed in Figure 2. The survey results show that temperature stratification began by April, became more pronounced during the mid-summer months, and became nearly monothermic by November. During summer stratification, the epilimnion was about four to eight meters in depth and ranged from about 20ºC to 25ºC, with the warmest and deepest epilimnion occurring in August during the years surveyed. The survey results revealed a metalimnion extending down from the epilimnion to a depth of about 15 meters with temperatures declining to about 10ºC in summer. It appears that the hypolimnion temperatures were cold year-round and seasonally ranged between 5ºC and 10ºC. Based upon the years examined, the 18.0°C temperature criterion for trout appears to be met throughout the depth of the reservoir except the upper five to ten meters during the summer months.

The Applegate River is identified as water quality limited for temperature downstream of Applegate Dam (RM 46.8) to the mouth (RM 0.0) during the summer, and a temperature TMDL was approved February 11, 2004. As identified earlier in Table 2, a 13.0°C (55.4°F) temperature criterion applies to protect salmon and steelhead spawning in the river immediately downstream of Applegate Dam to RM 31.5 from September 15 through June 15. During the remainder of the year, a 16.0°C (60.8°F) temperature criterion applies in this river reach to protect core cold water habitat. From RM 31.5 to the mouth, the 13.0°C spawning criterion applies over a shorter period, October 15 through May 15, and an 18.0°C criterion applies during the balance of the year to protect salmon and trout rearing and migration.

Figure 3 provides a comparison of inflow and outflow temperatures collected from the river directly upstream and downstream from Applegate Reservoir during 1997. This figure reveals that temperature management via the Corps' outlet structure has allowed for generally cooler releases into the lower Applegate River compared to temperatures in the Applegate River flowing into the reservoir, particularly in the summer and into the fall. This figure also shows that the Corps-managed discharge from Applegate Dam during 1997 met both the current lower river spawning and core cold water criteria.

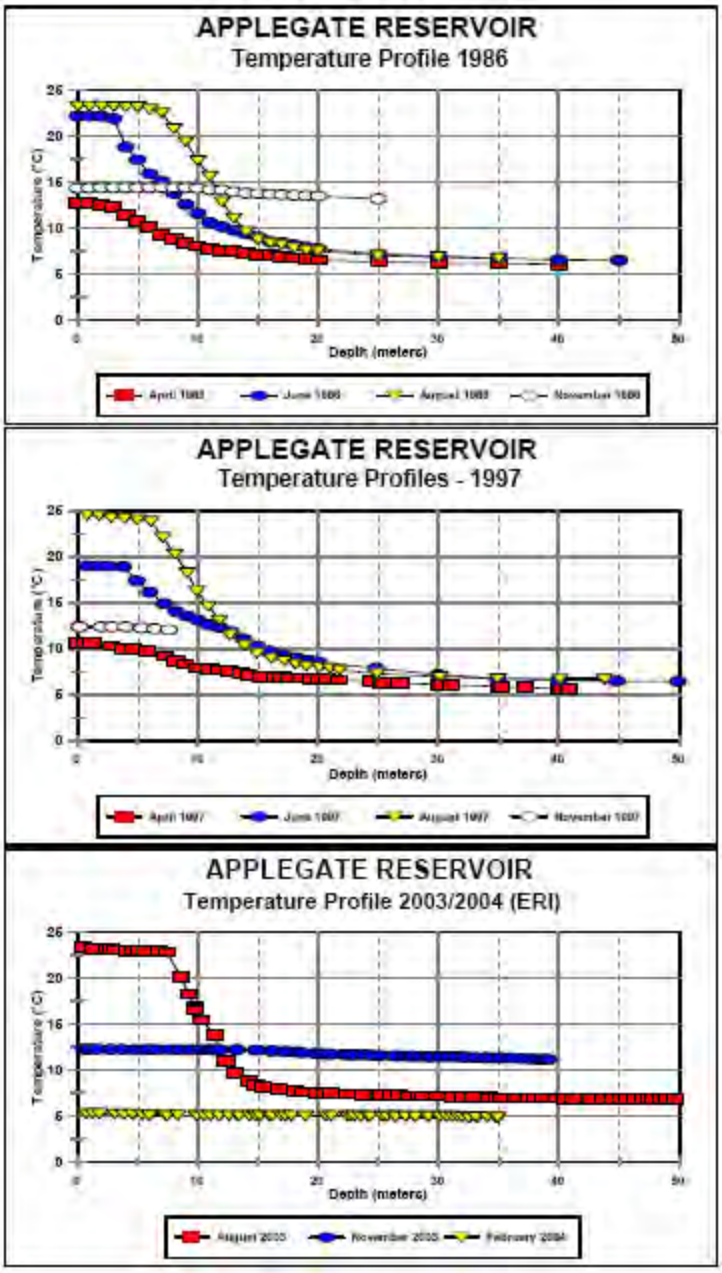

Figure 2. Applegate Reservoir temperature profiles near dam for 1986, 1997, and 2003/2004.

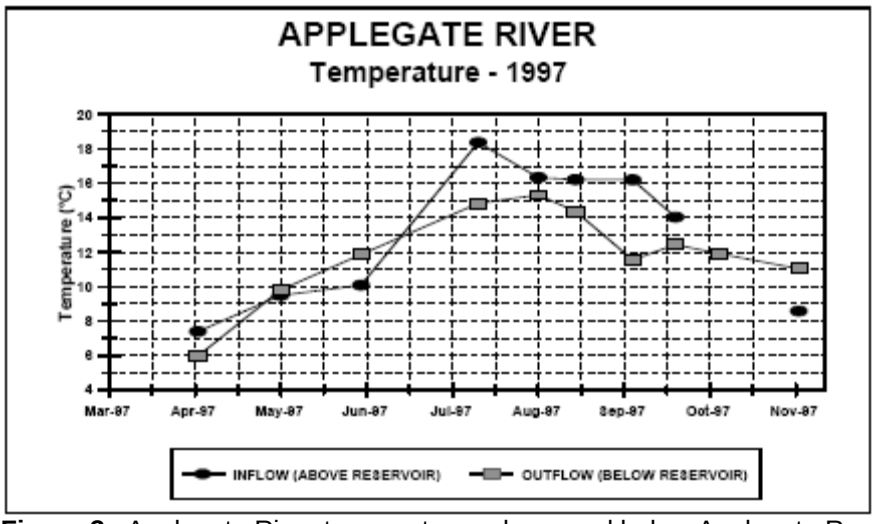

Figure 3. Applegate River temperatures above and below Applegate Reservoir in 1997.

Operations - Potential Impacts and Proposed Measures

Water temperature can be heavily impacted by impoundment dams. Large reservoirs may detain water for lengthy periods, allowing significant heating to occur in the surface waters and storing water for sufficient time periods resulting in released water that is either cooler or warmer than would occur without a dam in place during a given season. In addition, reservoir water withdrawal often occurs at a depth that is either warmer or colder than water that enters the project reservoir. River impoundments can also contribute to warming downstream of a dam by altering the upstream velocities. Warm and cool parcels of water travel downstream in a wave like pattern unique to each river. Warmer water parcels experience more exposure to sun light, by virtue of the time of day that they travel through exposed reaches. Cool water parcels may be cooler simply because they travel through the more exposed reaches at night, when solar radiation is minimal and long-wave radiant cooling may be greater due to the longer exposure in that reach. By decreasing water velocities, dams may cause warmer water parcels to pass over project dams at a different time of day than may have occurred without the Project. This characteristic may also influence downstream temperature patterns.

Different from most dams, the Corps constructed the Applegate Dam with a multiple level intake tower and temperature control outlet system. Utilizing five intake ports located at different depths within Applegate Reservoir, the Corps is able to selectively withdraw and blend water from different temperature horizons within the reservoir. This temperature control system not only allows the Corps a capacity to generally avoid the typical temperature impacts caused by impoundment dams, but it also provides the Corps with an ability to carefully manage outflow temperatures to benefit downstream temperatures to enhance salmonid fisheries.

Symbiotics proposes to operate the Project in a “run-of-reservoir” or “run-of-release” mode, whereby there will be no changes to existing operations in terms of how the Corps manages the reservoir to meet downstream temperature and flow targets. The Corps has provided the Department with a letter indicating that it will remain the owner of Applegate Dam and will continue to dictate the operations of the proposed Project once it is licensed by FERC. Specifically, the Corps intends to dictate the magnitude, frequency, ramping rates of flows, and general operations of its dam (including temperature management) during all phases of the Project development, construction, and operation throughout the period that the FERC Project is in place. In other words, the Corps will continue to manage reservoir levels, release schedule, and downstream temperature management. Resultantly, the proposed hydroelectric Project would not be expected to modify the downstream river temperature or the temperature in the reservoir.

To monitor compliance with ODEQ water quality criteria, including temperature, during Project operation, Symbiotics proposes that three stations be monitored continuously for various water quality parameters as indicated in Table 6. Monitoring site locations are indicated in Figure 4. It is projected that these water quality parameters, with the possible exception of turbidity (see Section 4.2.4), would be monitored for at least the first five years of operation.

Symbiotics also proposes to monitor temperature, dissolved oxygen, and streamflow prior to operations to assist with evaluation of potential operational effects on dissolved oxygen. This is discussed in more detail in Section 5.2.2. While Symbiotics did not specifically indicate whether this pre-operation monitoring for this purpose is proposed to take place necessarily during the construction phase as opposed to the pre-construction phase, ODEQ assumes and would require the latter or a combination of pre-construction and construction monitoring to gather sufficient data. In any event, ODEQ captures this aspect of Symbiotics' monitoring proposal as pre-construction in Table 6.

Construction - Potential Impacts and Proposed Measures

During most of the estimated 16-month construction period, water will continue to be delivered from the reservoir to the lower river via the existing Corps outlet under normal Corps operations. However, an exception to this will occur during installation of a steel liner in the existing penstock tunnel in the dam and during connection of the turbine draft tubes to the primary stilling basin wall. These activities are proposed to be completed over an approximately one month period of time between July 1 and August 31 in accordance with ODFW guidelines for timing of in-water work (ODFW 2000), during which time reservoir discharge will need to be bypassed around the existing penstock and stilling basin below the dam.

During the approximate one-month period that flow will need to be bypassed around the dam (Construction Bypass Period), the capacity to use the temperature-regulating multiple intake structure will be lost. As a result, ODEQ has concern for potential temperature modification of the water being discharged to the lower river and retained in the reservoir relative to what otherwise would be accomplished by the Corps utilizing the multiple intake structure. To address this water quality concern, Symbiotics proposes that a siphon-pump barge system be utilized to bypass flows during the Construction Bypass Period. The system would allow the appropriate amount of water to be siphoned from the appropriate depth to provide the necessary magnitude and temperature of releases required for downstream fisheries during the bypass period, thus mimicking the function of the temporarily unavailable temperature regulating facilities. Once the siphoning is initiated, Symbiotics judges that no pumping should be needed as long as the reservoir elevation does not drop past 30 feet below the dam crest. Inspection of mean reservoir elevations during July-August for the years 1980 to 2001 indicates that reservoir levels decline during this period, but are unlikely to drop below this level. However, if wet, average and dry years are broken out, inspection of reservoir elevations indicates that this no-pumping-needed critical level may be reached by the end of August during an average year and would be exceeded during a dry year. Close consultation with the Corps would be necessary in the months prior to the Construction Bypass Period to plan for whether pumping would likely be necessary. In either case, Symbiotics proposes to provide for pumping if necessary to assist in transferring water over the spillway to avoid any potential interruption in bypass flows. While the pumps would be supplied directly with power, Symbiotics indicates that diesel-powered pumps could also be utilized as backups in case power was interrupted to the primary pumps. Symbiotics estimates that two pumps of about 150 horsepower per pump would be needed to provide a total of as much as 300 cfs. July-August releases from Applegate Lake have typically been in the 250 cfs to 300 cfs range during recent years. The Company indicates that the pumps could be increased in capacity or number from that currently envisioned providing a greater maximum discharge, if necessary, and that backup pumps would be provided in the event of a pump failure. Water would be released over the spillway in enclosed pipes.

The proposed siphon-pump system would have the capacity to draw from any depth and could be instantly raised or lowered within the water column to tap desired release temperatures via an automated system. Symbiotics indicates that it would be in daily contact with the Corps and utilize their real-time temperature data base to determine the necessary depth of water intake. Symbiotics would position the intakes to attempt to meet that temperature release. Achievement of this target temperature would be evaluated hourly, and adjustments to the intake depth made if necessary, until the target was reached. As the reservoir dropped and/or the temperature profile changed, this intake depth would be re-evaluated daily, or as necessary, to maintain the downstream target temperature. It should be noted that it may not be feasible to meet the temperature target should reservoir temperatures preclude it. For example, cooler temperature releases may not be possible if the reservoir is too warm throughout the water column to achieve them, as has occurred in the past under normal operations and, as such, would not be considered an impact of the proposed Project.

Symbiotics proposes that bypass flows would be maintained during the Construction Bypass Period in the same manner as temperature, using the gaging station as the compliance point. Pump output would be adjusted as necessary to achieve the downstream flow target(s) during this period. Symbiotics would monitor discharge at the gauging station continuously during the Construction Bypass Period to determine whether any interruption in flow occurred. Any marked drop in flow would necessitate an immediate inspection of the pumps. Another option proposed by Symbiotics is to equip the pump outlets with an alarm which would sound at the construction site office should flows cease or diminish appreciably. At that time, siphoning (if occurring) could be supplemented by pumping or another pump could be triggered automatically to begin siphoning or pumping as necessary. Although these aspects of the system are not as yet known, Symbiotics would commit to providing ODEQ with a detailed pumping plan once final engineering was completed. This would be made available to ODEQ and the other resource agencies for a 60-day review period so that it could be evaluated prior to the start of any construction. Symbiotics states that the siphon-pump system would actually have a more refined capacity to achieve a desired water temperature by selectively drawing water from a desired single depth than would be the case for blending water from the existing intake tower with its five static level intake ports.

Applegate River temperature is monitored continuously at the U.S. Geological Survey (USGS) gaging station No. 14362000 located 0.6 miles below Applegate Dam. Symbiotics proposes that it would monitor this Internet database on a daily basis to track compliance with temperature targets issued by ODFW during construction.

In addition to tracking temperature measurements from the USGS gage, Symbiotics proposes to monitor water temperature during the construction phase at three additional locations identified in Table 6 and shown in Figure 4.

Table 6. Symbiotics' Proposed, Adaptive Water Quality Monitoring Plan

Pre-Construction Phase			
Parameter	**Station Location**[1]	**Frequency**	**Method**
Temperature	CS-1 and CS-3	Continuous	Hydrolab or other remote sensing
Dissolved Oxygen	CS-1 and CS-3	Continuous	Hydrolab or other remote sensing
Streamflow	USGS Gage	Continuous	From USGS[2]
Construction Phase			
Parameter	**Station Location**[1]	**Frequency**	**Method**
Temperature	CS-1, CS-2 and CS-3; USGS Gage	Continuous	Hydrolab or other remote sensing[2]
Dissolved Oxygen	CS-1, CS-2 and CS-3	Continuous	Hydrolab or other remote sensing
Total Dissolved Gas	CS-1, CS-2 and CS-3	Continuous (immediately prior to and during bypass)	Hydrolab or other remote sensing
Turbidity	CS-1 and CS-3	Continuous	Hydrolab or other remote sensing
pH	CS-1 and CS-3	Continuous	Hydrolab or other remote sensing
Streamflow	USGS Gage	Continuous	From USGS[2]
Operations Phase			
Parameter	**Station Location**[1]	**Frequency**	**Method**
Temperature	OS-1, OS-2 and OS-3	Continuous – 5-year minimum	Hydrolab or other remote sensing
Dissolved Oxygen	OS-1, OS-2 and OS-3	Continuous – 5-year minimum	Hydrolab or other remote sensing
Total Dissolved Gas	OS-1, OS-2 and OS-3	Continuous – 5-year minimum	Hydrolab or other remote sensing
Turbidity	OS-1, OS-2 and OS-3	Continuous – "first few years"	Hydrolab or other remote sensing
Streamflow	USGS Gage	Continuous	From USGS[2]

[1] Monitoring Station Locations:

CS-1: Reservoir upstream of construction at the water depth(s) from which reservoir releases will originate. This station will likely either be suspended from the Corps' intake tower or from a nearby, floating buoy in the reservoir. The reported value for CS-1 shall be a flow-weighted average of reservoir release depths monitored.

CS-2: Spillway Pool; July/August only when siphoning or pumping over spillway.

CS-3: Applegate River 30 meters downstream of primary stilling basin, likely mounted to the stream bank retaining wall on the powerhouse side of the river. If this site is infeasible, it would be situated further downstream, but within 0.1 miles of the Project construction area.

USGS Gage: Gaging Station No. 14362000, 0.6 miles downstream of Applegate Dam.

OS-1: Within the Project penstock during operation. Water would be diverted from the penstock into a separate monitoring chamber located in the powerhouse.

OS-2: Powerhouse outfall; Project discharge would by monitored by this station which would be located in the powerhouse tailrace. This station will reflect water quality of the turbine effluent immediately prior to river entry.

OS-3: Same as CS-3;

[2] For the USGS gage, Symbiotics would track temperature and streamflow that is monitored by the USGS and reported on the Internet.

Symbiotics proposes to provide ODEQ, ODFW, USFWS, NOAA-Fisheries, FERC and other

interested parties with annual summaries of water quality data, potential violations and the results of any mitigative measures to improve water quality conditions. Based on comments received from ODEQ and the other resource agencies, Symbiotics would adaptively modify their water quality monitoring and management program as necessary, and the effectiveness of such changes would be evaluated on an annual basis.

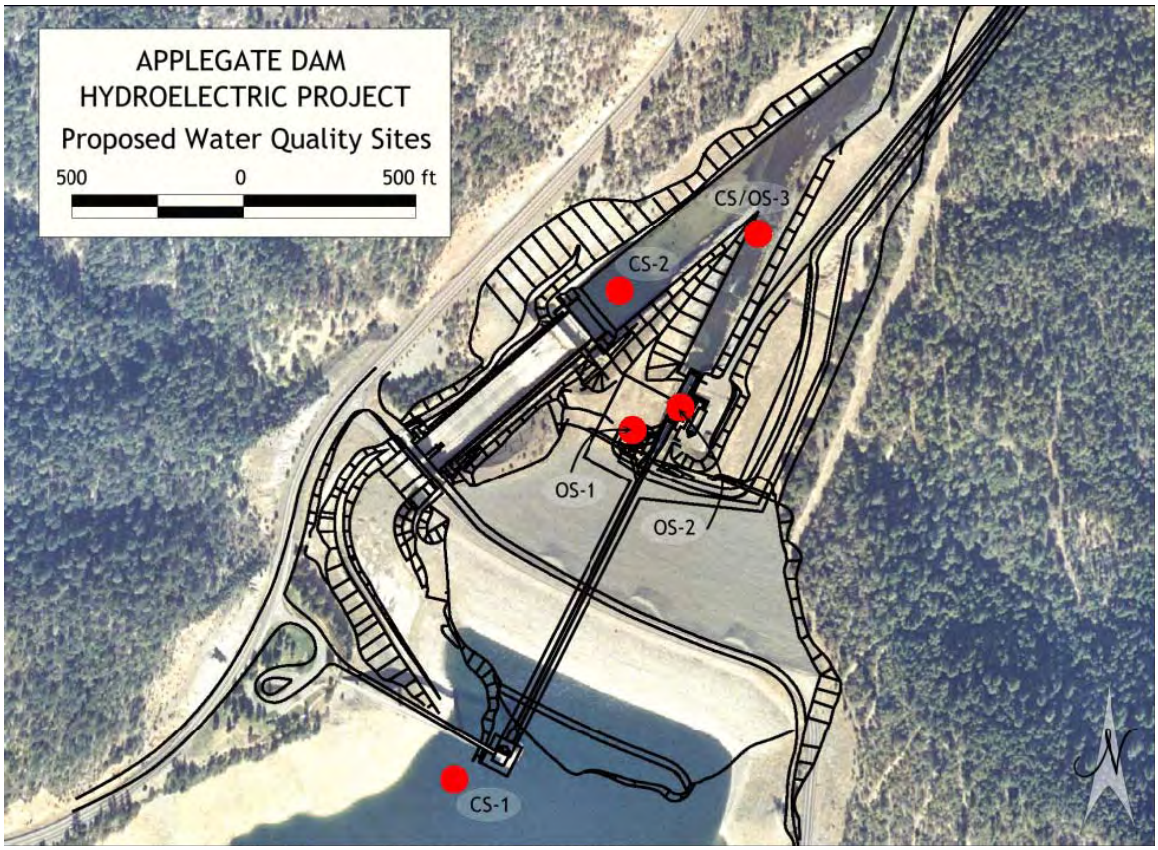

Figure 4. Proposed water quality monitoring sites during construction and operation

ODEQ Evaluation

Given that the Corps will continue to dictate reservoir levels and temperature management at Applegate Dam during both construction and operation, ODEQ does not expect that the proposed Project would have the capability to influence reservoir or downstream river temperatures, with the exception of the Construction Bypass Period when the Corps multiple level intake tower would be taken off-line. During that period of time, Symbiotics has proposed a siphon-pump barge system be utilized to continue to route water of appropriate temperature past the dam. ODEQ is reasonably assured that this methodology would guard against Project-caused temperature standard violations if certain safeguards are in place. These safeguards would include sufficiently-sized primary pumps, sufficiently-sized back-up pumps with an independent power source, failsafe pump alarms, pump automation, monitoring of the pump-siphon barge system to ensure proper operation, temperature and streamflow monitoring, and submittal for review and approval of a detailed pumping plan.

Given that ODEQ is reasonably assured that the proposed Project will not have the capability to impact water temperature outside of the Construction Bypass Period, the need for Symbiotics to monitor temperature for determination of temperature standard compliance is quite limited. Note, water temperature gain resultant from friction caused by water passing through the turbines would be negligible, as would the temperature gain to the lower river caused by any necessary

discharge of water potentially used to cool the turbine/generator system. However, as ODEQ has concerns for potential dissolved oxygen impacts during operations and throughout construction (discussed in Section 5.2.2), and given that dissolved oxygen concentration and percent saturation is directly related to instream temperature, ODEQ concurs with Symbiotics' proposal to monitor temperature throughout construction and during at least the first five years of operation. Temperature data collected outside of the Construction Bypass Period will also be useful for confirming the hydroelectric Project's no-temperature impact status or for identifying and quantifying such impact if it does occur so that it can be immediately addressed.

DEQ Finding

ODEQ is reasonably assured that the construction and operation of the proposed Project will not contribute to violations of the temperature standard provided that Symbiotics meets the following conditions:

1. Throughout the life of the FERC license, during both the Project's construction and operation phases, Symbiotics shall operate its hydroelectric facilities in a "run-of-release" mode, whereby Symbiotics will neither cause deviation from requirements dictated by the U.S. Army Corps of Engineers (Corps) for magnitude, frequency, and ramping rates of streamflow, nor adversely impact the Corps' management of water quality being discharged from Applegate Dam.

2. Symbiotics shall employ an Environmental Coordinator to provide daily oversight of all phases of construction and to ensure fulfillment of all environmental obligations during construction.

3. Construction Bypass Period: The approximate one-month period that flow will need to be bypassed around the dam to allow installation of a steel liner in the existing penstock tunnel and connection of the turbine draft tubes to the primary stilling basin wall shall be performed between July 1 and August 31 in accordance with ODFW guideline for timing of in-water work. In order to bypass flows around the dam during this Construction Bypass Period, Symbiotics shall:

    a. Implement an automated siphon-pump system that will draw water from any forebay depth as is necessary to meet downstream temperature and flow targets to the extent that would otherwise be possible using the existing Corps temperature and flow regulating facilities.

    b. Submit, once final engineering is completed, a detailed pumping plan to ODEQ, ODFW, and other appropriate resource agencies for a 60-day review and comment period. The pumping plan shall include the below identified components unless otherwise approved in writing by ODEQ:

        i. Provide two or more pumps with combined pumping capacity to meet the given year's seasonal instream flow targets. These primary pumps shall be powered by a dependable power source.
        ii. If at any time siphoning is not feasible and the primary pumps must be utilized to pass flows past the dam, a capable redundant pump system must be on standby to fully back-up the primary pumps in the event the primary pumps fail or falter. These secondary pumps shall be automated to immediately initiate and maintain flow levels and shall be powered by a dependable power source independent from that of the primary pumps.
        iii. The siphon-pump system shall be equipped with a failsafe alarm system that will immediately alert the Environmental Coordinator and other appropriate personnel of any significant, unintended flow reduction. Such flow reduction shall be immediately corrected and reported to ODEQ and ODFW.

4. Temperature and Flow Monitoring and Reporting

To adequately assess water quality and ensure compliance with Oregon water quality standards, Symbiotics shall implement an Adaptive Water Quality Monitoring and Reporting Plan (AWQMRP), including the following monitoring and reporting requirements for temperature and streamflow. ODEQ may require modifications to the AWQMRP as it deems appropriate to assess or confirm water quality standard compliance. Symbiotics may request modifications to the AWQMRP, subject to ODEQ written approval. All monitoring shall be performed in accordance with an ODEQ-approved Quality Assurance Plan.

a. Monitoring Requirements:

Pre-Construction Phase (commencing no later than 60 days of license issuance)				
Parameter	**Station Location[1]**	**Frequency**	**Duration**	**Method**
Temperature, °C	CS-1 and CS-3	Hourly	For one full season or until construction phase monitoring commences	Hydrolab or other remote sensing
Streamflow, cfs	USGS Gage	Hourly	For one full season or until construction phase monitoring commences	From USGS[2]
Construction Phase				
Parameter	**Station Location[1]**	**Frequency**	**Duration**	**Method**
Temperature, °C	CS-1, CS-2 and CS-3; USGS Gage	Hourly	Throughout Construction (only during flow bypass for CS-2)	Hydrolab or other remote sensing and from USGS[2]
Streamflow, cfs	USGS Gage	Hourly; 15-minute during flow bypass	Throughout Construction	From USGS[2]
Operations Phase				
Parameter	**Station Location[1]**	**Frequency**	**Duration**	**Method**
Temperature, °C	OS-1, OS-2 and OS-3; USGS Gage	Hourly	Five Years[3]	Hydrolab or other remote sensing and from USGS[2]
Streamflow, cfs	USGS Gage	Daily Average	Five Years[3]	From USGS[2]

[1] Monitoring Station Locations:

CS-1: Reservoir upstream of construction at the water depth(s) from which reservoir releases will originate. This station will likely either be suspended from the Corps' intake tower or from a nearby, floating buoy in the reservoir. A flow-weighted average shall be calculated and reported to represent the combined intake flow when the reservoir release is blended.
CS-2: Spillway Pool; when siphoning or pumping over spillway.
CS-3: Applegate River 30 meters downstream of primary stilling basin, likely mounted to the stream bank retaining wall on the powerhouse side of the river. If this site is infeasible, it would be situated further downstream, but within 0.1 miles of the Project construction area.
USGS Gage: Gaging Station No. 14362000, 0.6 miles downstream of Applegate Dam.

OS-1: Reservoir upstream of construction at the water depth(s) from which reservoir releases will originate. This station will likely either be suspended from the Corps' intake tower or from a nearby, floating buoy in the reservoir. A flow-weighted average shall be calculated and reported to represent the combined intake flow when the reservoir release is blended.
OS-2: Powerhouse outfall; Project discharge would by monitored by this station which would be located in the powerhouse tailrace. This station will reflect water quality of the turbine effluent immediately prior to river entry.
OS-3: Same as CS-3;

[2] For the USGS gage, Symbiotics shall track temperature and streamflow that is monitored by the USGS and reported on the Internet.

[3] ODEQ anticipates that five years monitoring duration will be adequate for this parameter to confirm that the hydroelectric project operations are not impacting this or a related water quality parameter. ODEQ reserves its authority, however, to require continued or resumed monitoring and reporting of this parameter during the license if it either becomes apparent or suspected by ODEQ that this parameter or a related parameter related to this parameter is being impacted by the hydroelectric project.

b. Reporting Requirements:

i. Quarterly temperature and flow monitoring reports shall be submitted within 30 days following each calendar quarter during the pre-construction and construction phases and annually within 30 days following each calendar year during project operations. Each report shall include an analysis of the required monitoring data including tabular and graphical representation of daily average temperatures, daily maximum temperatures, and daily average streamflow for each for each station monitored. Each report shall identify and quantify any instances in which the hydroelectric Project adversely impacted the Corps efforts to meet temperature and flow targets measured at USGS Gaging Station No. 14362000. If any such instances occurred during the time being reported, Symbiotics shall identify in the report the cause and proposed measures to avoid recurrence.

ii. During the Construction Bypass Period, Symbiotics shall immediately, within 24 hours, phone the ODEQ Medford Office to report of any instances when the siphon-pump system has failed or faltered, adversely impacting capability to achieve temperature and streamflow targets at USGS Gaging Station No. 14362000. Such instances shall be followed up with a letter within 72 hours specifically describing the incident, its cause, and the mitigating or correcting measures implemented or scheduled to be implemented.

5.2.2 Dissolved Oxygen

Water Quality Standard

One of the principal parameters used to characterize water quality is dissolved oxygen (DO). Maintaining adequate concentrations of DO is vitally important for supporting fish, invertebrates, and other aquatic life. Some aquatic species such as the salmonids are very sensitive to reduced concentrations of DO. Sensitivity also varies between various life stages (egg, larvae, and adults), and between different life processes (feeding, growth, and reproduction). DO levels within gravels (intergravel DO, or IGDO) directly influence the survival of salmonid embryos. The critical DO levels for the developing embryos occur in the gravel surrounding the eggs at these redds. High water column DO levels are not necessarily indicative of adequate IGDO levels, and vary depending on several interrelated factors including water column concentrations, the percentage of fine sediment in the gravel pores, sediment oxygen demand, and oxygen demand of the eggs.

Excerpts from Oregon's dissolved oxygen standard are included here. The designated DO criteria applicable downstream of the proposed Project varies with river mile and season based upon on the general spatial and temporal presence of species and life stages. Table 2 (see section 4.1, Beneficial Uses) identifies where and when numeric dissolved oxygen criteria have been designated to apply downstream of the proposed Project.

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);

Current Water Quality Condition

An 8.0 mg/l (or 90% saturation) DO criterion applies in Applegate Reservoir to protect trout. In 1998 the Corps collected DO data within Applegate Reservoir. As indicated in Figure 5, DO within the reservoir demonstrates summertime stratification, similar to that, and likely directly related to, the temperature stratification discussed in Section 5.2.1. During each of the four seasons sampled in 1998, DO levels appeared to have been quite good year-round; generally at or above the applicable 8.0 mg/l standard criterion at all depths. There was an exception, however, during the month of September, 1998, when DO levels dropped to about 6.5 mg/l for a layer of water between 5 and 18 meters. ERI collected additional DO data to aid characterization of reservoir DO concentrations in August 2003, November 2003, and February 2004, shown in Figure 6. Similar to 1998, during the winter and spring of 2003/2004, when the reservoir is cold and basically isothermal, the DO concentrations are generally uniform with depth and well oxygenated. During the month of August, 2003, however, DO levels in the upper 8 meters were down to the 6.0 to 6.5 mg/l range. Thus, comparing 1998 and 2003/2004, it appears that DO levels in the reservoir are generally good year-round throughout the depth profile, with the exception of varying depths in the late summer and early fall when the reservoir is stratified, perhaps from August into October or November.

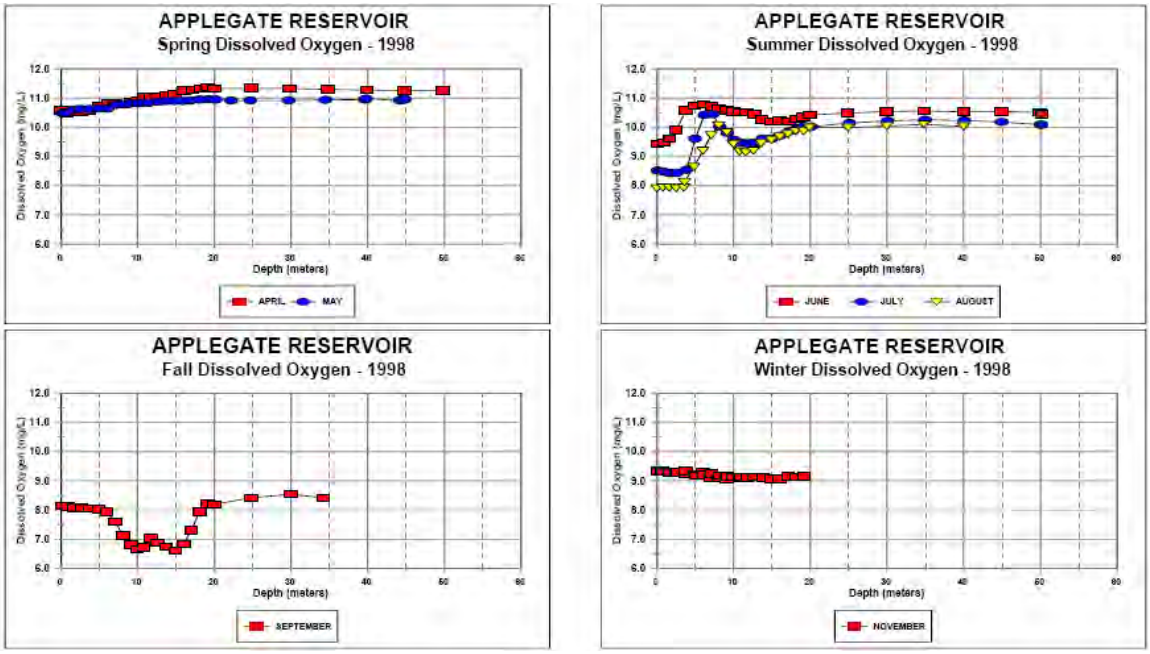

Figure 5. Applegate Reservoir average monthly dissolved oxygen profiles for spring and summer (top), and fall and winter (bottom) in 1998.

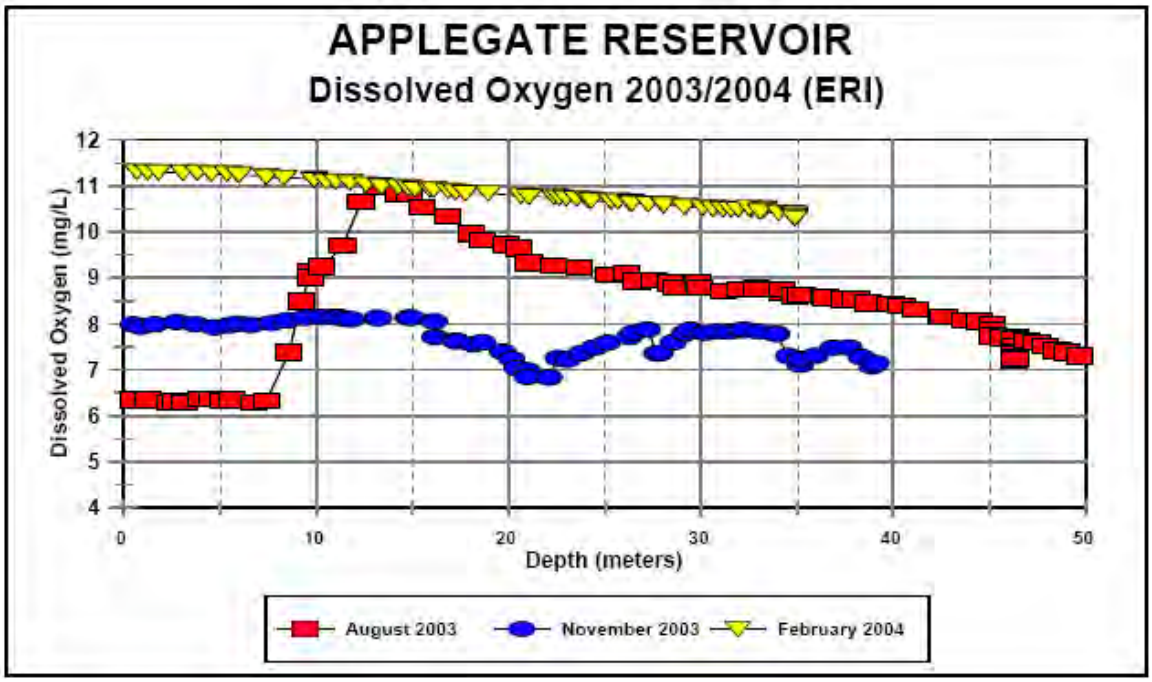

Figure 6. Dissolved oxygen reservoir profiles during 2003-2004.

The applicable DO criteria in the Applegate River downstream of the dam varies depending upon river mile and season, and is based upon designated fish use, as earlier identified in Table 2. The spawning criterion of 11.0 mg/l criterion or 95% DO saturation applies from September 15 through June 15 in the upper reach (RM 31.5 - RM 46.8) and from October 15 through May 15 in the lower reach (RM 0.0 – RM 31.5). During the remainder of the year, an 8.0 mg/l criterion or 90% DO saturation applies in both reaches. As identified in Table 3, the lower reach is identified under the 2004/2006 303(d) list as water quality limited for DO during the designated salmon and steelhead spawning season, October 15 through May 15.

Symbiotics' 401 application provides a comparison of water quality conditions upstream and downstream of Applegate Dam. Data used for the comparison was collected by the Corps, the U.S. Geological Survey (USGS Station No. 14362000) and ERI. Figure 7, provides a comparison of DO data collected from the upper river just upstream of the reservoir with that just downstream of the dam in 1997. The 1997 data revealed that DO concentrations exiting the dam to the lower river were higher than that entering the reservoir during each of the months monitored from April through November. The minimum discharge DO concentration was measured in August 1997, a remarkably high concentration of 10.2 mg/l. ERI's conducted additional reservoir inflow and outflow monitoring during 2003 and 2004, which also yielded higher measured DO concentrations in the reservoir discharge with the exception of January 2004. For January 2004, the DO of the outflow was about 4 mg/l less than inflow, however the outflow DO was still at near saturation values given the temperature of the discharge. Based upon the comparison years, it appears that DO levels discharging from Applegate Dam under current operations are compliant with the DO criteria that apply below the dam.

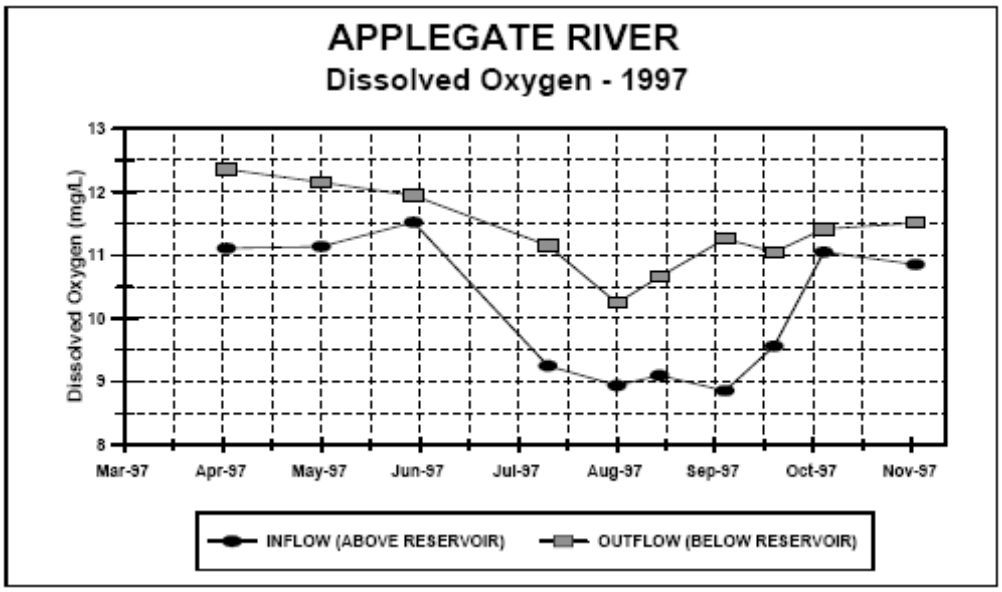

Figure 7. Dissolved oxygen concentrations in the Applegate River above and below Applegate Reservoir during 1997.

Operations - Potential Impacts and Proposed Measures

Symbiotics proposes to operate the Project in a manner such that the Corps will continue to dictate the magnitude, frequency, and ramping rates of flow passed through Applegate Dam. In other words, operation of the hydroelectric project will not result in modification of reservoir level management from that dictated and under the control and responsibility of the Corps. Additionally, under Symbiotics' proposal, the Corps will continue to dictate the timing and proportion of reservoir water that is withdrawn from different depths with the existing multiple level intake tower. Effectively, operation of the dam for hydropower production would be done in a manner that would not be expected to influence water quality within the reservoir or entering the penstock tunnel.

A potential does exist, however, for hydroelectric operations to influence the water quality as it is discharged to the lower river with respect to dissolved oxygen. Currently, under Corps operations, reservoir water is discharged from the penstock tunnel via the existing outlet structure with very high energy and turbulence that results in some increment of aeration. Depending upon the DO saturation level of the water, the water being discharged via the outlet structure may

increase in DO concentration and saturation due to this aeration. Such an increase in DO is considered beneficial if the water being discharged would not otherwise meet the seasonally applicable DO criterion for the lower river. Upon retrofit for hydroelectric production, the water's high energy would be dissipated as it passes through and turns the Project's turbines, resulting in a relatively lower energy discharge with potentially reduced aeration and DO levels. This turbine discharge would, however, receive some level of aeration as it cascades over the primary stilling basin to the river below. Overall, ODEQ suspects that turbine generation could cause some relative decrease in seasonal DO, and could potentially contribute to DO standard violation. To address ODEQ's concern, Symbiotics has proposed an adaptive management approach that includes study and, if needed, implementation measures.

Symbiotics proposes the following implementation measures to address potential operational impacts to DO:

- Monitor DO in relation to water temperature and streamflow prior to operations to characterize any change in DO levels under the current discharge through the existing outlet structure. The data would be used to set-up a predictive DO model.
- Monitor DO over a range of conditions during at least the first five years of operation and compare the data against that predicted by the DO model for without-turbine operation.
- Evaluate DO data and model-predicted values to identify any noncompliance with the DO standard downstream of the dam.
- Provide annual reports including all raw data; identification of the extent and timing of DO violations, if any, and their cause; and recommendations for implementation of operational or engineering countermeasures. The proposed countermeasures would be subject to additional monitoring and would require ODEQ approval prior to implementation.
- Implement any approved countermeasures.

In addition to allowing identification of any noncompliance with DO standard criteria, the comparison of with-and-without-turbines discharge DO levels would allow evaluation of compliance with the antidegradation policy (discussed in Section 5.2.8).

Construction - Potential Impacts and Proposed Measures

During the majority of construction, water will continue to be delivered from the reservoir to the lower river via the existing Corps outlet under normal Corps operations. However, an exception to this will occur during the approximate one-month Construction Bypass Period, previously described in Section 5.2.1. To address the concern for modification of water quality, including DO, during this critical period, Symbiotics has proposed implementation of a siphon-pump barge system, also described in Section 5.2.1. With respect to the siphon-pump spillway discharge system, Symbiotics indicates that the terminal height of the discharge pipes on the spillway apron could be adaptively adjusted higher or lower to improve DO and total dissolved gas levels of the water plunging into the stilling basin below. Symbiotics proposes that DO be measured in the pool immediately below the spillway during the Construction Bypass Period.

ODEQ Evaluation

ODEQ does not expect that construction of the Project would likely impact DO levels in the reservoir or in the lower river while water continues to be delivered via the Corp's multiple intake structure as dictated by the Corps (run-of-release). While in-river and adjacent-to-river construction activities could potentially pose some risk for downstream sedimentation which could potentially impact intergravel DO, ODEQ expects that such potential will be minimized via erosion and sediment control measures as is discussed in more detail in Section 5.2.3. However, during the estimated one month Construction Bypass Period, there would be risk to modification of the DO being discharged to the lower river via the proposed siphon-pump barge system.

Implementation of safeguards, such as those previously discussed for temperature (Section 5.2.1), would significantly reduce concern for potential contribution to DO standard violation during this critical construction period.

With respect to the operations phase, ODEQ is concerned for the potential reduction in DO that may result from the changeover from discharging from the dam's current outlet structure to future turbine discharge. At this time it is neither possible to know what the DO levels will be with turbine discharge nor to know what the extent of DO reduction, if any, will be. Additionally, depending upon the season, if there is a relative reduction in DO with turbine discharge, at this time it is not possible to know if such reduction will necessarily contribute to violations of DO. While ODEQ does not expect that any such DO reduction, if it exists, will be large, it nonetheless needs to be determined and considered in terms of DO standard compliance and antidegradation compliance (discussed in Section 5.2.8). It appears, based upon in-reservoir DO data for the few years examined, that DO criteria are likely met most of the year in the river downstream of the dam. It is plausible, however, that DO might not be met in some years in the late summer or early fall, particularly around the time of reservoir turnover, and depending upon aeration provided by the existing outlet structure. It is during this same time, especially at the onset of the fall spawning season (starting September 15) when more stringent DO criteria apply downstream of the dam, that there would be greater potential for turbine discharge to contribute to nonattainment of the DO standard.

Several comments provided to ODEQ during a public commenting period identified potential violations of DO to be a significant issue on the Applegate River given the river's DO water quality limited status and given the important fish populations that reside and spawn in the river (see Attachment 1 for more detail). In consideration of and response to this concern, ODEQ deems it warranted to require an adaptive management plan for dissolved oxygen and requirement related to water quality monitoring equipment malfunctions that provide for heightened protection against DO violations and assurances that DO violations (or other water quality violations) do not go unmonitored and unidentified. Measures directed toward maintaining ongoing monitoring capacity, quick evaluation and identification of DO violations and monitoring equipment failures, and operational shutdown in the event of clearly identified DO violations or suspected violations during times of monitoring failure, would each provide an increment of assurance against DO violations. ODEQ is reasonably assured that the proposed Project's operations will not contribute to DO standard violations if Symbiotics' implements such measures along with its application proposal to monitor DO prior to turbine start-up and during operations, and commits to adaptively implement countermeasures as may be determined necessary.

ODEQ Findings

ODEQ is reasonably assured that the construction and operation of the proposed Project will comply with the dissolved oxygen standard provided that Symbiotics meets the following conditions:

1. Throughout the life of the FERC license, during both the Project's construction and operation phases, Symbiotics shall operate its hydroelectric facilities in a "run-of-release" mode, whereby Symbiotics will neither cause deviation from requirements dictated by the U.S. Army Corps of Engineers (Corps) for magnitude, frequency, and ramping rates of streamflow, nor adversely impact the Corps' management of water quality being discharged from Applegate Dam.

2. Adaptive Dissolved Oxygen Management Plan: Within 12 months of FERC license issuance, Symbiotics shall submit for Oregon Department of Environmental Quality (ODEQ) approval a proposed Adaptive Dissolved Oxygen Management Plan. Upon ODEQ approval, Symbiotics shall implement the plan. The plan shall specify Symbiotics':

    a. Data collection and reporting methods and procedures;

b. Procedures for reviewing data to identify any Project-related contributions to dissolved oxygen violations of the dissolved oxygen and antidegradation standards;
c. Corrective measures that will be implemented to prevent additional dissolved oxygen violations;
d. Plan and schedule for implementation of corrective measures;
e. Procedures for notifying ODEQ of any violations, subsequent shutdowns, and recommencement of operations following implementation of corrective measures.

3. Project Shutdown due to Dissolved Oxygen Violations: If either ODEQ or Symbiotics determine that Project operations are contributing to downstream dissolved oxygen violations of the dissolved oxygen standard or the antidegradation standard, Symbiotics shall immediately discontinue Project operations. Recommencement of operations shall not take place until corrective measures have been successfully implemented.

4. Monitoring Equipment Malfunction Prevention and Response Plan: No later than three months prior to the commencement of Project construction activities, Symbiotics shall submit for ODEQ approval a Monitoring Equipment Malfunction Prevention and Response Plan to address water quality monitoring equipment malfunctions during both construction and operation phases of the Project. Upon ODEQ approval, Symbiotics shall implement the plan. The plan shall specify the following:

   a. Procedures and measures that will be implemented to prevent monitoring equipment malfunctions;
   b. Procedures for identifying the occurrence and nature of any monitoring equipment malfunctions that may occur;
   c. Plan, schedule, and corrective measures that will be implemented to address monitoring equipment malfunctions;
   d. Procedures for notifying ODEQ of the occurrence and nature of monitoring equipment malfunctions, corrective measures implemented, and recommencement of operation.
   e. Procedures and timelines for Project shutdown as may be necessitated by Condition 5, below.

5. Project Shutdown due to Monitoring Equipment Malfunctions: In the event that a water quality monitoring equipment malfunction occurs, Symbiotics shall shutdown operations if so directed by ODEQ or described in the approved Monitoring and Equipment Malfunction Plan due to ODEQ concern for likely Project-related contribution to water quality standards violation for a parameter that can no longer be monitored due to the equipment malfunction.

6. If either ODEQ or Symbiotics determine that Project operations are contributing to downstream violations of the dissolved oxygen standard, Symbiotics shall, within 60 days of request, develop and submit for ODEQ approval a plan and schedule to prevent further violations. Upon approval of the remedial plan by ODEQ, Symbiotics shall implement the plan in accordance with the approved schedule.

7. Symbiotics shall employ an Environmental Coordinator to provide daily oversight of all phases of construction and to ensure fulfillment of all environmental obligations during construction.

8. Construction Bypass Period: The approximate one-month period that flow will need to be bypassed around the dam to allow installation of a steel liner in the existing penstock tunnel and connection of the turbine draft tubes to the primary stilling basin wall shall be performed between July 1 and August 31 in accordance with ODFW guideline for timing

of in-water work. In order to bypass flows around the dam during this Construction Bypass Period, Symbiotics shall:

a. Implement an automated siphon-pump system that will draw water from any forebay depth as is necessary to meet downstream temperature and flow targets and applicable dissolved oxygen criteria, to the extent that would otherwise be possible using the existing Corps temperature and flow regulating facilities.
b. Submit, once final engineering is completed, a detailed pumping plan to ODEQ, ODFW, and other appropriate resource agencies for a 60-day review and comment period. The pumping plan shall include the below identified components unless otherwise approved in writing by ODEQ:
    i. Provide two or more pumps with combined pumping capacity to meet the given year's seasonal instream flow targets. These primary pumps shall be powered by a dependable power source.
    ii. If at any time siphoning is not feasible and the primary pumps must be utilized to pass flows past the dam, a capable redundant pump system must be on standby to fully back-up the primary pumps in the event the primary pumps fail or falter. These secondary pumps shall be automated to immediately initiate and maintain flow levels and shall be powered by a dependable power source independent from that of the primary pumps.
    iii. The siphon-pump system shall be equipped with a failsafe alarm system that will immediately alert the Environmental Coordinator and other appropriate personnel of any significant, unintended flow reduction. Such flow reduction shall be immediately corrected and reported to ODEQ and ODFW.
    iv. The elevation of the siphon-pump pipe terminus on spillway apron shall be immediately adjusted up or down as needed to adaptively correct any TDG or DO standard noncompliance attributable to spillway discharge.

9. Dissolved Oxygen Monitoring and Reporting

To adequately assess water quality and ensure compliance with Oregon water quality standards, Symbiotics shall implement an adaptive Water Quality Monitoring and Reporting Plan (AWQMRP), including the following monitoring and reporting requirements for dissolved oxygen. ODEQ may require modifications to the AWQMRP as it deems appropriate to assess or confirm water quality standard compliance. Symbiotics may request modifications to the AWQMRP, subject to ODEQ written approval. All monitoring shall be performed in accordance with an ODEQ-approved Quality Assurance Plan.

1. Monitoring Requirements:

Pre-Construction Phase (commencing within 60 days of license issuance)				
Parameter	**Station Location[1]**	**Frequency**	**Duration**	**Method**
Dissolved Oxygen, mg/l and % saturation	CS-1 and CS-3	Hourly	For one full season or until construction phase monitoring commences	Hydrolab or other remote sensing
Construction Phase				
Parameter	**Station Location[1]**	**Frequency**	**Duration**	**Method**
Dissolved Oxygen, mg/l	CS-1, CS-2 and CS-3	Hourly	Throughout Construction	Hydrolab or other remote sensing

and % saturation			(only during flow bypass for CS-2)	
Operations Phase				
Parameter	**Station Location[1]**	**Frequency**	**Duration**	**Method**
Dissolved Oxygen, mg/l and % Saturation	OS-1, OS-2 and OS-3	Hourly	Five Years[3]	Hydrolab or other remote sensing

[1] Monitoring Station Locations:

CS-1: Reservoir upstream of construction at the water depth(s) from which reservoir releases will originate. This station will likely either be suspended from the Corps' intake tower or from a nearby, floating buoy in the reservoir. The reported value for CS-1 shall be a flow-weighted average of reservoir release depths monitored.

CS-2: Spillway Pool; when siphoning or pumping over spillway.

CS-3: Applegate River 30 meters downstream of primary stilling basin, likely mounted to the stream bank retaining wall on the powerhouse side of the river. If this site is infeasible, it would be situated further downstream, but within 0.1 miles of the Project construction area.

USGS Gage: Gaging Station No. 14362000, 0.6 miles downstream of Applegate Dam.

OS-1: Reservoir upstream of construction at the water depth(s) from which reservoir releases will originate. This station will likely either be suspended from the Corps' intake tower or from a nearby, floating buoy in the reservoir. A flow-weighted average shall be calculated and reported to represent the combined intake flow when the reservoir release is blended.

OS-2: Powerhouse outfall; Project discharge would by monitored by this station which would be located in the powerhouse tailrace. This station will reflect water quality of the turbine effluent immediately prior to river entry.

OS-3: Same as CS-3;

b. Reporting Requirements:

i. Dissolved oxygen reports shall be submitted to ODEQ within 30 days following each calendar quarter during the construction phase and during the first full year of operation. Thereafter, annual dissolved oxygen reports shall be submitted within 60 days following each calendar year of Project operations. Each report shall include an analysis of the required dissolved oxygen monitoring data including tabular and graphical representation of daily minimum dissolved oxygen concentrations, and identification of the change in daily dissolved oxygen minimums between the two monitoring stations. The operational phase reports shall also include tabular and graphical representation of the daily average dissolved oxygen differentials, a comparison of measured dissolved oxygen concentration change between stations OS-1 and OS-3 with that measured or predicted for non-turbine discharge. Determination of non-turbine discharge concentration change should be based upon a technically defensible model, pre-construction and construction measured data, measured data generated during temporary turbine shutdown, or a combination of these methods. The tabular and graphical representations of observed dissolved oxygen differentials shall include plotting against temperature and discharge flow if these parameters significantly influence the magnitude of the differentials. Reported discharge should be specified as from either the outlet structure or turbines. The operational-phase reports shall include assessment of compliance with dissolved oxygen and antidegradation policy considering the identified differentials and considering seasonally applicable dissolved oxygen criteria.

ii. During the Construction Bypass Period, Symbiotics shall immediately (within 24 hours) notify the ODEQ Medford Office to report of any instances when the siphon-pump system has failed or faltered, contributing to reduced downstream

water quality. Such instances shall be followed up with a letter within 72 hours of the incident specifically describing the incident, its cause, and the mitigating or correcting measures implemented or scheduled to be implemented.

5.2.3 Sedimentation and Turbidity

Sediment Standards

Sediment can impact aquatic environments by altering the condition of aquatic habitat. Fine grained sediment can alter both the physical structure of aquatic habitat and the water quality experienced by aquatic organisms. For instance, fine sediment particles can fill the spaces between larger gravel and rocks. This can physically impair habitat utilized by smaller aquatic biota as well as fish. Covering the bottom surface of lakes and rivers with sediments can reduce the dissolved oxygen in both the water column and in the substrate which provides habitat for aquatic organisms. This can result in conditions that are less supportive of aquatic life.

In aquatic environments, sedimentation occurs when water carrying eroded and suspended particles slows down, and the water's capacity to keep the particles suspended is lost. This can occur when water is ponded, such as in a reservoir, or when river bed slope decreases, contributing to slower water velocities. Reservoirs are often designed with flow control structures that allow the water elevation and water storage above the structure to be managed. Changes in the way water storage is managed can influence sedimentation that occurs as a result of project reservoirs. Erosion and runoff of soil due to construction or de-vegetation can also contribute sediment to waterways. The standards that may be affected by sediment movement in the Rogue Basin, including the Applegate River, are listed below.

340-041-0007
Statewide Narrative Criteria
(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, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor, and other deleterious factors at the lowest possible levels.
(12) The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry may not be allowed;

Turbidity Standard

Turbidity is a measure of the amount of light intercepted by a given volume of water due to the presence of suspended and dissolved matter and microscopic biota. Increasing the turbidity of the water decreases the amount of light that penetrates the water column. High levels of turbidity are harmful to aquatic life. The standard is designed to minimize the addition of soil particles or any other suspended substances that would cause significant increases in the river's normal, seasonal turbidity pattern. Increases in suspended sediment generally correlate with increases in turbidity. Oregon's turbidity standard is stated below.

340-041-0036
Turbidity
Turbidity (Nephelometric Turbidity Units, NTU): No more than a ten percent cumulative increase in natural stream turbidities may be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity. However, limited duration activities necessary to address an emergency or to accommodate essential dredging, construction or other legitimate

activities and which cause the standard to be exceeded may be authorized provided all practicable turbidity control techniques have been applied and one of the following has been granted:
(a) Emergency activities: Approval coordinated by the Department with the Oregon Department of Fish and Wildlife under conditions they may prescribe to accommodate response to emergencies or to protect public health and welfare;
(b) Dredging, Construction or other Legitimate Activities: Permit or certification authorized under terms of section 401 or 404 (Permits and Licenses, Federal Water Pollution Control Act) or OAR 14l-085-0100 et seq. (Removal and Fill Permits, Division of State Lands), with limitations and conditions governing the activity set forth in the permit or certificate.

Current Water Quality Condition

Current turbidity and sediment condition in the Project vicinity is not identified in the 401 application. The Applegate River is not identified on the 2004/2006 as water quality limited for either parameter.

Operations - Potential Impacts and Proposed Measures

Symbiotics proposes no change in the existing flow regime below Applegate Dam. The Corps has provided ODEQ with a letter confirming that it will remain the owner of the dam and will continue to dictate the operation of the proposed Project once it is licensed by FERC. Specifically, the Corps will dictate the magnitude, frequency and ramping rates of flows below Applegate Dam. Symbiotics indicates that since there would be no change in the flow regime during Project operation, there should be no potential for additional movement of the streambed. The application identifies that the turbine draft tubes would discharge directly into the existing concrete-walled primary stilling basin, from which water is released in a laminar sheet over the downstream retaining wall and into the river below. There would be no change in the trajectory of downstream flow below the dam from existing conditions and therefore no added potential for stream bank erosion during operation.

During Project operation, Symbiotics will be implementing landscaping and re-vegetation measures following construction. Symbiotics identifies that the success of landscaping and re-vegetation measures at the construction site should be the only concern for potential sedimentation during the operational phase, and only for a limited period post-construction. During the operational phase, Symbiotics proposes to monitor turbidity (see Table 6) for compliance with the State standard until soil erosion controls are determined conclusively to be effective. Monitoring of the re-vegetation effort would occur annually for three years both in the spring and the fall. Soil erosion on re-vegetated areas would be reported to ODEQ if rills exceed 2 inches in depth or 6 inches in width. Contingency measures would be recommended and implemented in a timely fashion if re-vegetation goals are not met within three years. Contingency measures may include, but are not limited to re-seeding, additional mulch, soil amendments and supplemental irrigation.

Construction - Potential Impacts and Proposed Measures

Retrofit of Applegate Dam for the production of power will involve a number of activities that may produce temporary sedimentation and turbidity in the river near the Project area. These include: 1) powerhouse and tailrace excavation; 2) construction of a parking area adjacent to the powerhouse; 3) construction of the powerhouse road; 4) grading of the existing access road; 5) clearing for an equipment staging area; and, 6) stockpiling of topsoil and spoil material. These Project features are interposed over a photograph in Figure 8.

Figure 8. Photograph showing locations of project features and disturbance in relation to local vegetation (features are not to scale in this view). Purple represents disturbed areas which will be replanted (including the staging area); green represents the proposed vegetation mitigation area; and, orange represents the proposed powerhouse and access road.

A Soil Erosion Control Plan (Symbiotics 2006) has been submitted to ODEQ by Symbiotics identifying the current vegetation condition in the Project area and the surface disturbances that will occur; the measures to control erosion, dust, and sediment during construction; and monitoring and revegetation that will be implemented. The total area estimated to be disturbed by the construction activities is 55,665 square feet (about 1.3 acres); while the area calculated to be permanently occupied is 6,475 square feet (about 0.15 acres).

Symbiotics identifies that the following Best Management Practices (BMPs) advocated by ODEQ (2006) will be implemented to control erosion and sedimentation due to construction disturbances:

- Use of silt fences, straw bale barriers and berms to control runoff and erosion in affected areas as necessary;
- Removal, stockpiling and maintenance of topsoil;
- Removal and proper management of spoil material excavated from the penstock and powerhouse areas;
- Dust control on roads and in other construction areas;
- Locating of excavation equipment, personal vehicles and onsite construction trailers in the staging area;
- Use of designated walkways to the powerhouse area to limit trampling of vegetation;
- Re-contouring of the staging area to the original topography;
- Reapplication of topsoil to the staging area;
- Preservation of existing vegetation in construction area where possible; and

- Revegetation of the staging area and other locations for restoration or enhancement as necessary using acceptable, native plants.

Symbiotics proposes to employ an Environmental Coordinator to provide daily oversight of all phases of construction and to ensure fulfillment of environmental obligations. This person would assess the extent of any erosion and evaluate the effectiveness of erosion control measures. Specific erosion control measures would also be inspected after every storm event and repaired or replaced if their effectiveness has been impaired. Symbiotics proposes to monitor turbidity continuously throughout the construction phase (Table 6).

ODEQ Evaluation

Given Symbiotics proposed run-of-release operations, construction site revegetation proposal, and the method of turbine discharge to the river, ODEQ is reasonably assured that Project will not contribute to downstream sedimentation or turbidity during Project operations.

With respect to the construction phase, ODEQ is concerned for potential sedimentation and turbidity impacts to the Applegate River. ODEQ requires that a NPDES Stormwater General Permit No. 1200-C be obtained for construction activities that disturb one or more acres where there is potential discharge to surface waters. Symbiotics' proposes to disturb an estimated 1.3 acres of land adjacent to the Applegate River, where stormwater is likely. Thus, Symbiotics will need to obtain this permit from ODEQ. Among other requirements, these stormwater permits require implementation of erosion and sediment control plans that meet new BMPs. Additional detail regarding these permits can be found in a fact sheet at the following website:

http://www.deq.state.or.us/wq/pubs/factsheets/stormwater/apply1200c.pdf

Relative to the Project construction phase, ODEQ would be reasonably assured of compliance with the sediment and turbidity water quality standards if Symbiotic obtains and adheres to the required stormwater permit, including implementation of an approved erosion and sediment control plan. Symbiotics would need to adhere to its proposed Soil Erosion Control Plan, unless revised in association with issuance of the required stormwater permit.

ODEQ Findings

ODEQ is reasonably assured that the construction and operation of the proposed Project will comply with the sedimentation and turbidity standards provided that Symbiotics meets the following conditions:

1. Throughout the life of the FERC license, during both the Project's construction and operation phases, Symbiotics shall operate its hydroelectric facilities in a "run-of-release" mode, whereby Symbiotics will neither cause deviation from requirements dictated by the U.S. Army Corps of Engineers (Corps) for magnitude, frequency, and ramping rates of streamflow, nor adversely impact the Corps' management of water quality being discharged from Applegate Dam.

2. Prior to any ground disturbing activities, apply for, obtain, and then fully implement an NPDES stormwater construction permit administered by ODEQ.

3. Implement all aspects of the August 2006 Soil Erosion Control Plan or revisions thereof approved by ODEQ through the NPDES stormwater construction permitting process.

4. Symbiotics shall employ an Environmental Coordinator to provide daily oversight of all phases of construction and to ensure fulfillment of all environmental obligations during construction.

5. Sediment and Turbidity Monitoring and Reporting

In addition to other monitoring and reporting requirements identified in the NPDES permit and soil erosion control plan, and to adequately assess water quality and ensure compliance with Oregon water quality standards, Symbiotics shall implement an adaptive Water Quality Monitoring and Reporting Plan (AWQMRP), including the following monitoring and reporting requirements related to sediment and turbidity. ODEQ may require modifications to the AWQMRP as it deems appropriate to assess or confirm water quality standard compliance. Symbiotics may request modifications to the AWQMRP, subject to ODEQ written approval. All monitoring shall be performed in accordance with an ODEQ-approved Quality Assurance Plan.

a. Monitoring Requirements:

Construction Phase				
Parameter	**Station Location[1]**	**Frequency**	**Duration**	**Method**
Turbidity, NTU	CS-1 and CS-3	Hourly	Throughout Construction	Hydrolab or other remote sensing

[1] Monitoring Station Locations:
CS-1: Reservoir upstream of construction at the water depth(s) from which reservoir releases will originate. This station will likely either be suspended from the Corps' intake tower or from a nearby, floating buoy in the reservoir. The reported value for CS-1 shall be a flow-weighted average of reservoir release depths monitored.
CS-3: Applegate River 30 meters downstream of primary stilling basin, likely mounted to the stream bank retaining wall on the powerhouse side of the river. If this site is infeasible, it would be situated further downstream, but within 0.1 miles of the Project construction area.

b. Reporting Requirements:

Symbiotics shall submit quarterly erosion and sediment control reports to ODEQ within 30 days following each calendar quarter during the construction phase. These reports shall include a summary of all erosion and sediment control inspections, turbidity monitoring results, and identification of any corrective actions taken during the reporting period.

5.2.4 Hydrogen Ion Concentration (pH)

Water Quality Standard

The balance of acid and alkaline substances in water is indicated by the pH value. Values range from 1 (very acid) to 14 (very alkaline). Most streams in Oregon have pH values falling somewhere between 6.5 and 8.5. There may be seasonal fluctuations in the pH number due to substances entering the water from land or bio-chemical activity in the water, including influences from in-water plant growth. Since fish and other aquatic life in any particular stream have evolved under specific pH conditions, it is important to set a pH standard that reflects natural conditions and will prevent any intolerable acid/alkalinity levels. The Rogue Basin pH criterion has been set at a tolerance range of 6.5 to 8.5 to coincide with the locally natural range.

The potential impact that hydroelectric projects have on pH in aquatic systems usually occurs as a result of altering hydrology that impacts the aquatic community. Hydroelectric plants to not discharge pollutants that alter the acidity or alkalinity of water. If they impact the pH of the Project waters, it is generally by creating conditions that encourage lush growth of aquatic plants. Altering hydrology may slow down water velocities, increase water temperatures and ultimately

influence the concentration of available nutrients. All of these conditions have the potential to increase algal and aquatic plant growth. As they use light energy to convert carbon dioxide into sugars and thus chemical energy, plants alter the carbon dioxide and associated carbonate concentrations dissolved in water which lead to changes in pH of the water. Construction activities involving alkaline materials such as un-cured concrete and grouts have some potential to impact instream pH, too.

340-041-0021
pH
(1) Unless otherwise specified in OAR 340-041-0101 through 340-041-0350, pH values (Hydrogen ion concentrations) may not fall outside the following ranges:
(a) Marine waters: 7.0 – 8.5;
(b) Estuarine and fresh waters: 6.5 – 8.5.
(2) Waters impounded by dams existing on January 1, 1996, which have pHs that exceed the criteria are not in violation of the standard, if the Department determines that the exceedance would not occur without the impoundment and that all practicable measures have been taken to bring the pH in the impounded waters into compliance with the criteria.

340-041-0275
Water Quality Standards for the Rogue Basin
(1) pH (hydrogen ion concentration). pH values may not fall outside the following ranges:
(b) Estuarine and fresh waters (except Cascade lakes): 6.5-8.5.

Current Water Quality Condition

While the 401 application does not contain information on the current pH condition in the vicinity of Applegate Dam, limited historic data can be found in the 2004/2006 303(d) list. The list does not identify the Applegate River as water quality limited for pH, and only identifies a few instances were instream pH levels were outside standard criteria of 6.5 to 8.5. 1 of 43 (2%) samples monitored at RM 3.1 between 1994 and 2004 fell outside the pH criteria for measurements taken in the fall, winter and spring. During summer monitoring of the same site during the same years, 1 of 23 (4%) samples were outside the criteria range. Earlier data collected between 1986 and 1995 collected at RM 12.0 similarly measured 4% (1 of 25 samples) outside the standard range of 6.5 to 8.5.

Operations - Potential Impacts and Proposed Measures

During Project operation, there would be no anticipated effects on pH conditions because water withdrawal through the Project penstock would occur from the same reservoir depth, and therefore the same pH water, as under existing Corps operation.

Symbiotics proposes to operate the Project in a manner such that the Corps will continue to dictate the magnitude, frequency, and ramping rates of flow passed through Applegate Dam. In other words, operation of the hydroelectric project will not result in modification of reservoir level management from that dictated and under the control and responsibility of the Corps. Additionally, under Symbiotics' proposal, the Corps will continue to dictate the timing and proportion of reservoir water that is withdrawn from different depths with the existing multiple level intake tower. Effectively, operation of the dam for hydropower production would be done in a manner that would not be expected to influence pH within the reservoir or entering the penstock tunnel. Discharge via turbines as opposed to the current outlet structure is not expected to influence the pH of water that passes to the river.

Construction - Potential Impacts and Proposed Measures

During construction, cement and grout will be used. If uncured cement or grout is accidentally introduced to the river, there would be some potential for raising the water's pH. Washout and

cleanup of the concrete truck after emptying could potentially enter the river or pollute stormwater ultimately entering the river. Among activities where cement and grout will be used include the lining of the penstock and construction of the powerhouse, tailrace and parking area.

To minimize pollution and pH impacts from the construction activities, Symbiotics proposes to implement BMPs #3 and #6 recommended by ODEQ (2006). These BMPs specify construction practices and measures such as containment, isolation, and cleanup designed to prevent direct or stormwater discharge of these materials to the river. Symbiotics also indicates that as with other practices, construction subcontractors would be overseen daily by an onsite Environmental Coordinator to ensure that concrete wastes and grout are properly managed and the proposed BMPs are adhered to.

With regard to monitoring, Symbiotics proposes that pH levels be monitored continuously during construction at sites CS-1 and CS-3, to identify any increases in pH that may be attributable to construction activities. The company also proposes to submit reports of any pH noncompliance together with any identified construction activities not in compliance with the BMPs.

ODEQ Evaluation

ODEQ does not expect that the proposed Project will have any impact on pH during the operational phase. During the construction phase, ODEQ has some limited concern for potential increases of instream pH in the event that uncured concrete or grout comes in either direct contact with river water or in contact with stormwater entering the river. ODEQ is reasonably assured that the construction activities will not result is noncompliance with pH standard criteria given Symbiotics' proposal to implement the specific BMPs, provide an on-site Environmental Coordinator, and monitoring and reporting.

ODEQ Findings

ODEQ is reasonably assured that the proposed Project will comply with the pH standard provided that Symbiotics meets the following conditions:

1. Throughout the life of the FERC license, during both the Project's construction and operation phases, Symbiotics shall operate its hydroelectric facilities in a "run-of-release" mode, whereby Symbiotics will neither cause deviation from requirements dictated by the U.S. Army Corps of Engineers (Corps) for magnitude, frequency, and ramping rates of streamflow, nor adversely impact the Corps' management of water quality being discharged from Applegate Dam.

2. Symbiotics shall employ an Environmental Coordinator to provide daily oversight of all phases of construction and to ensure fulfillment of all environmental obligations during construction.

3. During the construction phase, Symbiotics shall implement BMPs #3 and #6 found in *Best Management Practices for Storm Water Discharges Associated with Construction Activities: Guidance for Eliminating or Reducing Pollutants in Storm Water Discharges*. Oregon Department of Environmental Quality. DEQ Northwest Region Document.

4. pH Monitoring and Reporting

   To adequately assess water quality and ensure compliance with Oregon water quality standards, Symbiotics shall implement an adaptive Water Quality Monitoring and Reporting Plan (AWQMRP), including the following monitoring and reporting requirements for pH. ODEQ may require modifications to the AWQMRP as it deems appropriate to assess or confirm water quality standard compliance. Symbiotics may

request modifications to the AWQMRP, subject to ODEQ written approval. All monitoring shall be performed in accordance with an ODEQ-approved Quality Assurance Plan.

a. Monitoring Requirements:

Construction Phase				
Parameter	**Station Location[1]**	**Frequency**	**Duration**	**Method**
pH, Standard Units	CS-1 and CS-3	Hourly	Throughout Construction	Hydrolab or other remote sensing

[1] Monitoring Station Locations:
CS-1: Reservoir upstream of construction at the water depth(s) from which reservoir releases will originate. This station will likely either be suspended from the Corps' intake tower or from a nearby, floating buoy in the reservoir. The reported value for CS-1 shall be a flow-weighted average of reservoir release depths monitored.
CS-3: Applegate River 30 meters downstream of primary stilling basin, likely mounted to the stream bank retaining wall on the powerhouse side of the river. If this site is infeasible, it would be situated further downstream, but within 0.1 miles of the Project construction area.

b. Reporting Requirements:

pH reports shall be submitted to ODEQ within 30 days following each calendar quarter during the construction phase. Each report shall include an analysis of the required monitoring data including tabular and graphical representation of daily maximum pH data collected at stations CS-1 and CS-3. The pH reports shall identify and quantify any instances in which the construction activities reduced adversely impacted pH, the causation, and the corrective measures proposed or implemented.

5.2.5 Total Dissolved Gas

Water Quality Standard

The supersaturation of atmospheric gases in water may cause either crippling or lethal gas bubbles to form in the tissues of fish. Water spillage at hydropower dams can cause supersaturation. When water is spilled over the face of a dam, it entrains air as it plunges to the stilling or plunge pool at the base of the dam. The momentum of the fall carries the water and entrained gases to great depths in the pool; and, under increased hydrostatic pressure, the entrained gases are driven into solution, potentially causing supersaturation of dissolved gases. The Total Dissolved Gas (TDG) standard is designed to prohibit discharges or activities that will 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 dissolved oxygen levels can create supersaturation of TDG, a condition that can be avoided if identified.

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.

Current Water Quality Condition

Current TDG condition in the Project vicinity is not identified in the 401 application. The 2004/2006 303(d) list neither identifies the Applegate River as water quality limited for TDG, nor does the list identify that any TDG monitoring has been conducted.

Operations - Potential Impacts and Proposed Measures

Symbiotics does not anticipate that there will be any addition of TDG with turbine discharge when compared to the discharge through the existing outlet structure since no additional aeration would occur and no turbine air admission system is being proposed to address concerns for potential DO reduction. Indeed, Symbiotics indicates that some reduction in TDG from existing conditions may occur due to reduced turbulence in the turbine discharge relative to the existing Corps outlet. Symbiotics proposes continuous TDG monitoring for at least the first five years of operation (Table 6).

Construction - Potential Impacts and Proposed Measures

During the majority of construction, water will continue to be delivered from the reservoir to the lower river via the existing Corps outlet under normal Corps operations, resulting in no potential for changed TDG concentrations. However, an exception to this mode of flow delivery will occur during the approximate one-month Construction Bypass Period, previously described in Section 5.2.1. To address the concern for modification of water quality, including TDG, during this critical bypass period, Symbiotics has proposed implementation of a siphon-pump barge system, also described in Section 5.2.1. With respect to the siphon-pump spillway discharge system, Symbiotics indicates that the terminal height of the discharge pipes on the spillway apron could be adaptively adjusted higher or lower to moderate TDG and DO levels if determined necessary from monitoring results. Symbiotics proposes that TDG be measured in the pool immediately below the spillway immediately prior to (establishing background conditions) and during this bypass period to determine whether the ODEQ criterion of 110 percent saturation is exceeded (Table 6).

ODEQ Evaluation

Proposed operations are for run-of-release, resulting in no change in the timing and quantity of flow passed through the dam. What will be changed is the manner in which water will be passed through the dam. It is not expected, given run-of-release operations, that passing of water over the spillway would be any more common with turbine operations than with the existing outlet structure. When Corps-dictated run-of-release flows exceed turbine capacity, Symbiotics will still have the outlet structure with which to pass additional flow. The combined turbine and outlet structure discharge capacity upon retrofit of the dam will be essentially the same as the current no-turbine capacity, dictated by the common penstock delivery system. Any concern for potentially high TDG concentrations resultant from discharges in excess of penstock flow capacity would thus be the same.

ODEQ agrees with Symbiotics that discharge via turbine discharge would not be expected to elevate TDG levels beyond that caused by turbulent discharge via the existing outlet structure. ODEQ is not aware of any existing issue of elevated TDG resultant from existing discharge through the outlet structure. If levels are elevated by the current mode of turbulent, high-energy discharge through the outlet structure, then turbine discharge may be expected to potentially reduce these elevated levels. ODEQ does not see a need for monitoring TDG during the first five years of operations since there is not a current expectation for Project-induced TDG increase. However, as identified in the Evaluation subsection of Section 5.2.8, Symbiotics may want to

volitionally opt to monitor TDG in association with concerns for antidegradation policy compliance for DO.

If monitoring of DO at the project reveals that DO reduction is significant and needs to be addressed, then ODEQ will require implementation of DO adaptive measures that do not contribute to TDG noncompliance. ODEQ would reconsider at such time the need for TDG monitoring of operations.

With respect to the construction phase, with the exception of the Construction Bypass Period, water will be passed through the dam in the same manner as currently conducted by the Corps, via the outlet structure. Thus, during most of construction, there would be no expected change in TDG levels downstream of Applegate Dam.

During the Construction Bypass Period, there is minimal concern for elevated TDG in the spillway caused by the short plunge of discharge water as it leaves the terminus of the temporary siphon-pump system and travels down the spillway apron to the plunge pool below. It is not known that there is a TDG issue with high volume discharge over the spillway from full height, let alone this proposed short plunge at reduced summertime discharge flows. Nonetheless, it is appropriate to monitor TDG of these flows to be certain that excessive TDG concentrations do not occur, and if they occur, to address them. Symbiotics indicates that if excessive TDG levels are experienced, that the siphon-pump pipe terminus can be moved up or down to moderate TDG and DO levels. This seems to be a reasonable approach for this short-term activity.

ODEQ Findings

ODEQ is reasonably assured that the construction and operation of the proposed Project will comply with the Total Dissolved Gas (TDG) standard provided that Symbiotics meets the following conditions:

1. Throughout the life of the FERC license, during both the Project's construction and operation phases, Symbiotics shall operate its hydroelectric facilities in a "run-of-release" mode, whereby Symbiotics will neither cause deviation from requirements dictated by the U.S. Army Corps of Engineers (Corps) for magnitude, frequency, and ramping rates of streamflow, nor adversely impact the Corps' management of water quality being discharged from Applegate Dam.

2. Symbiotics shall employ an Environmental Coordinator to provide daily oversight of all phases of construction and to ensure fulfillment of all environmental obligations during construction.

3. Construction Bypass Period: The approximate one-month period that flow will need to be bypassed around the dam to allow installation of a steel liner in the existing penstock tunnel and connection of the turbine draft tubes to the primary stilling basin wall shall be performed between July 1 and August 31 in accordance with ODFW guideline for timing of in-water work. In order to bypass flows around the dam during this Construction Bypass Period, Symbiotics shall:

    a. Implement an automated siphon-pump system that will draw water from any forebay depth as is necessary to meet downstream temperature and flow targets to the extent that would otherwise be possible using the existing Corps temperature and flow regulating facilities.

    b. Submit, once final engineering is completed, a detailed pumping plan to ODEQ, ODFW, and other appropriate resource agencies for a 60-day review and comment period. The pumping plan shall include the below identified components unless otherwise approved in writing by ODEQ:

i. Provide two or more pumps with combined pumping capacity to meet the given year's seasonal instream flow targets. These primary pumps shall be powered by a dependable power source.
ii. If at any time siphoning is not feasible and the primary pumps must be utilized to pass flows past the dam, a capable redundant pump system must be on standby to fully back-up the primary pumps in the event the primary pumps fail or falter. These secondary pumps shall be automated to immediately initiate and maintain flow levels and shall be powered by a dependable power source independent from that of the primary pumps.
iii. The siphon-pump system shall be equipped with a failsafe alarm system that will immediately alert the Environmental Coordinator and other appropriate personnel of any significant, unintended flow reduction. Such flow reduction shall be immediately corrected and reported to ODEQ and ODFW.
iv. The elevation of the siphon-pump pipe terminus on spillway apron shall be immediately adjusted up or down as needed to adaptively correct any TDG or DO standard noncompliance attributable to spillway discharge.

4. TDG Monitoring and Reporting

To adequately assess water quality and ensure compliance with Oregon water quality standards, Symbiotics shall implement an Adaptive Water Quality Monitoring and Reporting Plan (AWQMRP), including the following monitoring and reporting requirements for TDG. ODEQ may require modifications to the AWQMRP as it deems appropriate to assess or confirm water quality standard compliance. Symbiotics may request modifications to the AWQMRP, subject to ODEQ written approval. All monitoring shall be performed in accordance with an ODEQ-approved Quality Assurance Plan.

c. Monitoring Requirements:

Construction Phase				
Parameter	**Station Location[1]**	**Frequency**	**Duration**	**Method**
TDG, % Saturation	CS-1, CS-2 and CS-3	Hourly	One week prior to and during flow bypass	Hydrolab or other remote sensing

[1] Monitoring Station Locations:
CS-1: Reservoir upstream of construction at the water depth(s) from which reservoir releases will originate. This station will likely either be suspended from the Corps' intake tower or from a nearby, floating buoy in the reservoir. The reported value for CS-1 shall be a flow-weighted average of reservoir release depths monitored.
CS-2: Spillway Pool; when siphoning or pumping over spillway.
CS-3: Applegate River 30 meters downstream of primary stilling basin, likely mounted to the stream bank retaining wall on the powerhouse side of the river. If this site is infeasible, it would be situated further downstream, but within 0.1 miles of the Project construction area.

b. Reporting Requirements:

i. A TDG monitoring reports shall be submitted within 30 days following completion of construction bypass discharge. The report shall include an analysis of the required monitoring data including tabular and graphical representation of hourly TDG percent saturation for each station monitored.
ii. During the Construction Bypass Period, Symbiotics shall immediately (within 24 hours) notify the ODEQ Medford Office to report of any instances when the siphon-pump system has failed or faltered, contributing to reduced downstream

water quality. Such instances shall be followed up with a letter within 72 hours of the incident specifically describing the incident, its cause, and the mitigating or correcting measures implemented or scheduled to be implemented.

5.2.6 Biocriteria

Water Quality Standard

The biocriteria standard is intended to complement the other parameter-specific criteria in the following manner. The parameter-specific criteria are designed to give full protection to the most sensitive beneficial use, with the implicit assumption that if the most sensitive beneficial use is protected, then all uses will be protected. However, the application of these criteria is very limited in considering multiple stressors and cumulative effects. By contrast, the biological criteria enable the assessment of total impact to the community in situ. The applicable State standard for Biological Criteria is as follows:

340-041-0011
Biocriteria
Waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

Several definitions are applicable to the biocriteria standard:
340-04l-0002 Definitions
Definitions applicable to all basins unless context requires otherwise:
(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 any 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 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.

Current Water Quality Condition

In its response to the *Applegate Dam Hydroelectric Project FERC No. 11910 First Stage Consultation Document,* ODEQ identified that the potential effect of the proposed project on aquatic life below the proposed project should be presented, including algae and invertebrates. ODEQ expressed concern for potentially excessive releases of sediment during construction of the Project, which may impact primary and secondary benthic production in the river via increased substrate embeddedness as sediment is deposited. While Symbiotics has proposed erosion control and soil stockpiling measures to reduce this potential and to monitor downstream turbidity during construction, the potential still exists for some sediment to be released. In response to this concern, Symbiotics collected baseline information on the current status of

benthic macroinvertebrates, periphyton, and substrate embeddedness, examining downstream of Applegate Dam and a control site above Applegate Reservoir (Symbiotics 2005).

Symbiotics' benthic surveys, conducted in 2004 and 2005, yielded the following general conditions for the Applegate River downstream of Applegate Dam:

1) Surficial substrate was primarily cobble and relatively unarmored at all sites, averaging about 1-1.5 cobble diameters to the embedded layer.
2) Periphyton data indicated somewhat enriched conditions within one mile below Applegate Dam. Nutrient enrichment is typical in streams located below reservoirs.
3) Dominant benthic invertebrates included the dipterans Chironomidae, Simuliidae and Tipulidae, the mayflies Baetidae and Ephemerellidae, the caddisflies Lepidostomatidae and Hydropsychidae and Oligochaeta. These taxa dominate the benthic fauna of many North American streams.
4) Chironomids dominated the benthic macroinvertebrate community during most times of the year at most sites, both above and especially below Applegate Reservoir. Increased abundance of chironomids in lotic systems below reservoirs is very typical.
5) Two federally listed species, the Clatsop philocascan caddisfly and the Siskiyou caddisfly, were absent from the collections.
6) Water quality conditions were judged to be fairly good overall with some nutrient enrichment apparent below Applegate Dam, probably arising from reservoir sources.

Operations - Potential Impacts and Proposed Measures

Symbiotics proposes to operate the Project in a manner such that the Corps will continue to dictate the magnitude, frequency, and ramping rates of flow passed through Applegate Dam. In other words, operation of the hydroelectric project will not result in modification of reservoir level management from that dictated and under the control and responsibility of the Corps. Additionally, under Symbiotics' proposal, the Corps will continue to dictate the timing and proportion of reservoir water that is withdrawn from different depths with the existing multiple level intake tower. Effectively, operation of the dam for hydropower production would be done in a manner that would not be expected to influence water quality within the reservoir or entering the penstock tunnel.

The water quality discharging from the penstock tunnel via the turbines would not be expected to be adversely impacted with the exception of possibly DO, as discussed in Section 5.2.2. A reduction in DO levels could impact the biological integrity of the river downstream of the dam; however such potential DO impacts have already been addressed in Section 5.2.2. Thus, aside from possibly DO, there would be no expected change in the water quality or quantity passing through the dam, and no resultant water quality impacts to the downstream biological community.

Construction - Potential Impacts and Proposed Measures

As discussed in previous sections, Symbiotics proposes to continue run-of-release operations and maintain status quo water quality downstream of the dam during construction activities, including during the bypass period. Symbiotics proposes sediment and erosion control measures (Section 5.2.3) to minimize sediment impacts to avoid harm to downstream biological communities and spawning redds.

ODEQ Evaluation

Considering Symbiotics' run-of-release proposal and ODEQ's proposed requirements for DO management, spill plan implementation, and measures to address construction related concerns for sediment, turbidity and pH, ODEQ does not expect that the proposed Project will impact the downstream biological communities relative to the Corps current operation of Applegate Dam.

ODEQ Findings

ODEQ is reasonably assured that the proposed Project will comply with the Biocriteria standard provided that Symbiotics meets the following conditions:

1. Conditions previously specified for DO management, spill plan implementation, and measures to address construction related concerns for sediment, turbidity and pH.

5.2.7 Oily Sheen; Oily Coatings

Water Quality Standard

This standard is intended to protect aquatic life from being coated with oil films as well as protect against objectionable waterway conditions characterized by discoloration, scum, oily sleek or floating solids. Many industrial and domestic wastewater discharges could cause these conditions to occur in receiving streams. Spills of petroleum products or hazardous materials could also bring about the conditions. The impact of such discharges or spills could vary from human annoyance to adverse effects or mortality on aquatic life. Oil spills are regulated by several state and federal agencies depending upon respective jurisdictions in Oregon. ODEQ oil spill rules, OAR 340 Division 47, apply statewide.

340-041-0007
Statewide Narrative Criteria
(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, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor, and other deleterious factors at the lowest possible levels.
(13) Objectionable discoloration, scum, oily sheens, or floating solids, or coating of aquatic life with oil films may not be allowed.

Current Water Quality Condition

Current conditions relative to oily sheens or oily coatings in the Project vicinity are not identified in the 401 application. The Applegate River is not identified on the 2004/2006 as water quality limited for this standard. ODEQ is not aware of or suspect that such conditions currently exist in the downstream vicinity of the dam.

Operations - Potential Impacts and Proposed Measures

ODEQ requested that Symbiotics provide a site-specific plan describing proposed site specific oil and hazardous substances storage, spill prevention, and cleanup measures to be implemented in order to prevent any form of contamination at the Project site during the construction and operation phases. Symbiotics provided such a plan, Appendix E to the 401 application, entitled Hazardous Substances and Spill Prevention and Cleanup Plan (Symbiotics 2006b). ODEQ requested minor revisions to the plan and Symbiotics has responded back with an updated plan (Symbiotics 2007).

During operations, the spill plan identifies that petroleum products will be required in small quantities of five gallons or less for general plant maintenance. These materials will be placed on a concrete containment pad with 6-inch lips within the Powerhouse. The spill plan identifies methods and materials used for cleanup and spill containment, as well as Oregon Emergency Response System and other agency notification procedures.

Construction - Potential Impacts and Proposed Measures

During construction, in addition to lubricants, engine fuels will be at the Project site. A fuel truck may be used to service heavy construction equipment, but no diesel fuel will be stored on site and all fueling will take place in a staging area more than 200 feet from the river. Other hazardous materials that may be used in the Project area include concrete curing compounds, concrete form oils, cutting torch gases, cleaning solvents, and propane for temporary heat. Symbiotics identifies that the hazardous substances will be stored in an on-site trailer during construction activities.

ODEQ Evaluation

ODEQ requested minor clarifications and revision of the Symbiotics' 2006 spill plan, and Symbiotics adequately addressed the ODEQ in its revised 2007 plan. Proper implementation of the June 2007 Hazardous Substances and Spill Prevention and Cleanup Plan would provide adequate protection against spills, including spills of oily materials that could cause oily sheens or coatings.

ODEQ Findings

ODEQ is reasonably assured that the construction and operation of the proposed Project will comply with the Oily Sheen/Coatings standard provided that Symbiotics meets the following conditions:

1. Symbiotics shall maintain and implement the Hazardous Substances and Spill Prevention and Cleanup Plan (June 2007) or future revisions thereof approved by ODEQ. In the event of a spill or release or threatened spill or release to the Applegate River, Symbiotics shall immediately implement the plan and notify the Oregon Emergency Response System (OERS) at 1-800-452-0311.

2. Symbiotics shall employ an Environmental Coordinator to provide daily oversight of all phases of construction and to ensure fulfillment of all environmental obligations during construction.

5.2.8 Antidegradation

Water Quality Standard

Water quality standards have three main elements; the beneficial uses that are protected by the standard, numeric and narrative criteria that are protective of those uses and an antidegradation policy that governs how and when existing water quality may be lowered. When the Department considers issuing a permit or a water quality certificate that would allow the existing water quality to be diminished in some way, the Department action must comply with the antidegradation provisions of the water quality standards. Portions of the antidegradation language that might be applied to this water quality certification are included below. The rule can be found in its entirety at OAR 340-41-0004.

340-04l-0004
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** 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.
(4-6** are not applicable**)
***(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** 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 affect 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 streamflow and assimilative capacity during otherwise low streamflow 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.

Current Water Quality Condition

As noted in Section 4.3 above, several river miles of the Applegate River are included on the state's 2004/2006 list of water quality impaired waters. The Applegate River is listed as impaired for temperature during the summer from immediately downstream of Applegate Dam on down to the river's confluence with the Rogue River at RM 0.0. A TMDL for temperature was approved by EPA on February 11, 2004. With respect to DO, there is no approved TMDL in place within the Applegate River, but the river is identified as seasonally water quality limited approximately 15 miles downstream of Applegate Dam from RM 31.5 to RM 0.0 from October 15 through May 15.

Given the Applegate River's water quality limited status, the water quality impaired waters provisions (340-041-0004(7) apply for DO and temperature.

Operations - Potential Impacts and Proposed Measures

During operations, given the proposed run-of-release operations for the Project, ODEQ, as discussed in Sections 5.2.1 through 5.2.7, does not expect that the Project operations will lower water quality downstream or in the reservoir relative to temperature, sedimentation, turbidity, pH, TDG, or biocriteria. Thus, the proposed Project is considered compliant with the antidegradation policy relative to these parameters.

Relative to the oily sheens and coatings standard, Symbiotics proposes very limited storage and use of petroleum product and adherence to a Hazardous Substances and Spill Prevention and Cleanup Plan. With requirement to implement the spill plan, ODEQ does not expect degradation relative to this standard.

The remaining standard of potential concern during operations is DO. With respect to DO, Symbiotics does not expect that turbine discharge will appreciably reduce DO concentration of water discharging from the dam relative to discharge through the existing outlet structure. However, in response to an additional information request from ODEQ to address such potential, Symbiotics has proposed to adaptively monitor and manage the proposed Project for potential DO reduction to ensure compliance with both the DO standard and the antidegradation policy.

Symbiotics proposed the following implementation measures to address potential operational impacts to DO:

- Monitor DO in relation to water temperature and streamflow prior to operations to characterize any change in DO levels under the current discharge through the existing outlet structure. The data would be used to set-up a predictive DO model.
- Monitor DO over a range of conditions during at least the first five years of operation and compare the data against that predicted by the DO model for without-turbine operation.
- Evaluate DO data and model-predicted values to identify any noncompliance with the DO standard downstream of the dam.
- Provide reports to ODEQ including all raw data; identification of the extent and timing of any DO violations and their cause; and recommendations for implementation of operational or engineering countermeasures. The proposed countermeasures would be subject to additional monitoring and would require ODEQ approval prior to implementation.
- Implement any approved countermeasures.

Construction - Potential Impacts and Proposed Measures

With the exception for the Construction Bypass Period of approximately one month, Symbiotics will have no capacity to alter the Corps discharge in terms of quantity or quality. Symbiotics proposes to implement an erosion and sediment control plan, a spill plan, and hire an environmental coordinator to provide daily oversight during construction. ODEQ has identified a number of proposed certification conditions specified in Sections 5.2.1 through 5.2.7 to guard against adverse water quality impacts and standards violations.

During the Construction Bypass Period, Symbiotics has proposed a siphon-pump bypass system to convey the appropriate quantity and quality of water from the reservoir to the downstream side of the dam. The proposed requirements of Sections 5.2.1 through 5.2.7 also guard against water quality degradation during this period of construction.

ODEQ Evaluation

The antidegradation policy guards against degradation of existing water quality. Potential project impacts to the antidegradation policy include only decreases to existing water quality. Actions that maintain or improve the existing water quality are addressed by other water quality standards and are not considered impacts to the antidegradation policy.

As identified under OAR 340-041-0004(3), 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. Thus, if a decrease in DO is 0.1 mg/l or less and such decrease would have no adverse impacts on the Applegate River's threatened coho salmon species, then the proposed Project would be considered compliant with the antidegradation policy since it would not be considered degradation. If, however, such decrease would have an adverse impact to the coho, or if the decrease was in excess of 0.1 mg/l, then the DO decrease would be considered degradation and would be subject to further antidegradation review. The additional review would come under OAR 340-041-0004(7) since the Applegate River directly downstream of the Applegate Dam is seasonally water quality limited for temperature.

ODEQ has included requirements under Section 5.2.8 (dissolved oxygen standard) requiring Symbiotics to conduct extensive DO, temperature and discharge monitoring and analysis to identify any reduction in DO that may potentially occur relative to current dam DO discharge conditions. Additionally, ODEQ is also requiring that the Project be shutdown if it is determined that the Project is contributing to DO violations of either the DO standard or the antidegradation standard, to be followed up with implementation of corrective measures before restarting.

With respect to the "up to a 0.1 mg/l decrease" provision of the antidegradation policy, Symbiotics identifies compliance determination concerns as follows:

> Symbiotics wishes to emphasize that achieving compliance with the Antidegradation Policy may be compromised by two factors mentioned previously: 1) the inability of DO monitoring devices to detect changes within the 0.1 mg/l limit prescribed under the Antidegradation Policy (most devices have an accuracy of no less than +/-0.2 mg/l), and 2) supersaturation of dissolved gases, including DO, may be occurring under existing outflow conditions, and therefore a potential lowering of DO concentrations in the Project outflow may simply be related to this phenomenon. Hence, lowering of DO as a consequence of reducing gas saturation to a more acceptable level (e.g. from 105% to 100%) could be considered a water quality benefit. It is proposed that concurrent monitoring of total dissolved gas (TDG) occur during operation to test this. Symbiotics trusts that ODEQ will consider such factors when assessing Project compliance with the Antidegradation Policy's DO criteria.

Symbiotics raises some potentially applicable concerns regarding monitoring device detection limits and reduction of excessive TDG. ODEQ acknowledges that are issues that should be given consideration when assessing compliance with the DO criteria under the antidegradation policy. The requirement of Section 5.2.8 to submit an adaptive DO management plan includes requirements to propose plan elements relative to procedures for reviewing data to identify DO violations to both the DO standard and the antidegradation standard. This will also provide Symbiotics with an opportunity to propose practical analysis methods

With respect to TDG monitoring, as discussed relative to TDG compliance during the operations phase, ODEQ does not see a need to require TDG monitoring. However, ODEQ is by no means adverse to Symbiotics opting to volitionally monitor TDG during pre-construction, construction (besides the Construction Bypass Period), or operations phases to evaluate the above identified concern relative to compliance determination for the antidegradation policy.

ODEQ Findings

ODEQ is reasonably assured that the construction and operation of the proposed Project will comply with the antidegradation policy provided that Symbiotics meets the following conditions:

1. Throughout the life of the FERC license, during both the Project's construction and operation phases, Symbiotics shall operate its hydroelectric facilities in a "run-of-release" mode, whereby Symbiotics will neither cause deviation from requirements dictated by the U.S. Army Corps of Engineers (Corps) for magnitude, frequency, and ramping rates of streamflow, nor adversely impact the Corps' management of water quality being discharged from Applegate Dam.

2. Adaptive Dissolved Oxygen Management Plan: Within 12 months of FERC license issuance, Symbiotics shall submit for Oregon Department of Environmental Quality (ODEQ) approval a proposed Adaptive Dissolved Oxygen Management Plan. Upon ODEQ approval, Symbiotics shall implement the plan. The plan shall specify Symbiotics':

    a. Data collection and reporting methods and procedures;
    b. Procedures for reviewing data to identify any Project-related contributions to dissolved oxygen violations of the dissolved oxygen and antidegradation standards;
    c. Corrective measures that will be implemented to prevent additional dissolved oxygen violations;
    d. Plan and schedule for implementation of corrective measures;
    e. Procedures for notifying ODEQ of any violations, subsequent shutdowns, and recommencement of operations following implementation of corrective measures.

3. Project Shutdown due to Dissolved Oxygen Violations: If either ODEQ or Symbiotics determine that Project operations are contributing to downstream dissolved oxygen violations of the dissolved oxygen standard or the antidegradation standard, Symbiotics shall immediately discontinue Project operations. Recommencement of operations shall not take place until corrective measures have been successfully implemented.

4. Monitoring Equipment Malfunction Prevention and Response Plan: No later than three months prior to the commencement of Project construction activities, Symbiotics shall submit for ODEQ approval a Monitoring Equipment Malfunction Prevention and Response Plan to address water quality monitoring equipment malfunctions during both construction and operation phases of the Project. Upon ODEQ approval, Symbiotics shall implement the plan. The plan shall specify the following:

    a. Procedures and measures that will be implemented to prevent monitoring equipment malfunctions;
    b. Procedures for identifying the occurrence and nature of any monitoring equipment malfunctions that may occur;
    c. Plan, schedule, and corrective measures that will be implemented to address monitoring equipment malfunctions;
    d. Procedures for notifying ODEQ of the occurrence and nature of monitoring equipment malfunctions, corrective measures implemented, and recommencement of operation.
    e. Procedures and timelines for Project shutdown as may be necessitated by Condition X, below.

5. Project Shutdown due to Monitoring Equipment Malfunctions: In the event that a water quality monitoring equipment malfunction occurs, Symbiotics shall shutdown operations if so directed by ODEQ or described in the approved Monitoring and Equipment Malfunction Plan due to ODEQ concern for likely Project-related contribution to water quality standards violation for a parameter that can no longer be monitored due to the equipment malfunction.

6. If either ODEQ or Symbiotics determine that Project operations are contributing to downstream violations of the antidegradation policy relative to dissolved oxygen, Symbiotics shall, within 60 days of request, develop and submit for ODEQ approval a plan and schedule to prevent further violations. Upon approval of the remedial plan by ODEQ, Symbiotics shall implement the plan in accordance with the approved schedule.

7. Monitoring and Reporting: As identified for dissolved oxygen in Section 5.2.2

6.0 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, ODEQ must find that the project complies with applicable provisions of Sections 301, 302, 303, 306 and 307 of the 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 Pollutant Discharge Elimination System (NPDES) permits issued to the point sources. Point source discharges at hydroelectric projects may include cooling water discharges, discharges from hatchery operations, and sewage discharges.

Symbiotics has identified that there will be no wastewater facilities servicing the powerhouse, thus no wastewater discharge requiring a NPDES permit. During construction, contractors will be responsible for providing temporary, non-discharging, wastewater facilities. Similarly, Symbiotics proposes no fish hatchery facilities, thus there is no need for a hatchery operations NPDES permit.

The ultimate design of the proposed Project may include cooling water discharge. Thus, a cooling water NPDES discharge may be required. In Symbiotics' June 20, 2007 response to an additional information request from ODEQ, the company provided a detailed analysis of the potential discharge of cooling water in the event water is used to cool the two proposed Francis turbines. Based upon Symbiotics' analysis, under a worst-case scenario the warming effect to the river would be about 0.0225oC for a minimum reservoir discharge rate of 75 cfs. As the turbines discharge proportionately greater amounts of reservoir water, the roughly two-hundredths of a degree Celsius proportionately decreases. This level of warming, even under worst-case, would be undetectable to standard monitoring instruments. It is questionable whether a NPDES permit would be needed for such a discharge, however inclusion of the following § 401 certification condition will cover the potential need:

> Prior to constructing or operating the Project, Symbiotics shall obtain all necessary NPDES and state permits and authorizations.

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 Oregon Administrative Rules Chapter 340, Division 41. The Environmental Protection Agency 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.

7.0 EVALUATION OF OTHER APPROPRIATE REQUIREMENTS OF STATE LAW

Once a Project is determined to qualify for § 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.

7.1 Division of State Lands

ORS 196.810 requires that permits be obtained from the Oregon Division of State Lands (DSL) prior to any fill and removal of material from the bed or banks of any stream. Such permits, when issued, may be expected to contain conditions to assure protection of water quality so as to protect fish and aquatic habitat. The proposed new license will include some construction activities that may require a removal-fill permit from DSL which is administratively coordinated with issuance of a dredge and fill permit by the U.S. Army Corps of Engineers under § 404 of the Clean Water Act. To ensure compliance with this requirement of state law, as well as for the protection of designated beneficial uses, the § 401 Certificate will require the following condition:

> Prior to constructing or operating the Project, Symbiotics shall obtain all necessary NPDES and state permits and authorizations.

7.2 Department of Fish and Wildlife

The state laws summarized below are administered by the 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 496.435** 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 635-007-0510** General Fish Management Goals

Manage fish to take full advantage of the productive capacity of natural habitats and address losses in fish productivity due to habitat degradation through habitat restoration.

- **OAR 635-007-0521-0524** Natural Production Policy

Protect and promote natural production of indigenous fishes.

- **OAR 635-007-0525-0529** Wild Fish Management Policy

Protect genetic resources of wild fish.

- **OAR 635-007-0536-0538** Wild Fish Gene Resource Conservation Policy

Manage wild fish to maintain their adaptiveness and genetic diversity.

- **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

Require or recommend mitigation for losses of fish and wildlife habitat. Applying these state laws, ODFW, in its recommendations to FERC under Section 10(j) of the Federal Power Act, identified certain measures as necessary for the protection, mitigation and enhancement of fish resources.

ODEQ has not yet determined specific § 401 Certificate conditions to address appropriate requirements of state law for fish and wildlife. ODFW has identified that significant fish loss and injury will occur with the proposed Project due to turbine entrainment of reservoir fish, including anadromous coho salmon, spring chinook salmon, and steelhead which ODFW sometimes places upstream of Applegate Dam.

7.4 Department of Environmental Quality

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. No onsite systems is proposed at the Project facilities, therefore no § 401 certification condition is necessary in relation to ORS 454.705 et seq.

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 ODEQ for review and approval prior to construction. One of the purposes of these statutes and rules promulgated pursuant thereto is to prevent contamination of surface or groundwater. Per Section 5.2.7 of this evaluation, ODEQ will require a spill plan to guard against downstream violation of the oily sheens and coatings standard. Requirement of this plan will also address requirements of these state statutes.

7.5 Department of Water Resources

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.

ODEQ has not yet determined specific § 401 Certificate conditions to address this requirement of state law. ODEQ expects that significant fish loss and injury will occur with the proposed Project due to turbine entrainment of reservoir fish, including anadromous coho salmon, spring chinook salmon, and steelhead which are sometimes placed upstream of Applegate Dam by ODFW.

8.0 PUBLIC COMMENT

8.1 Issuance of Public Notice, Opportunity to Comment

On July 2, 2007, following development of this evaluation and findings document, ODEQ issued a notice of public hearing for the proposed issuance of a § 401 certification for the proposed

Applegate Dam Hydroelectric Project. An informal question and answer session was held at the ODEQ Medford office, followed by a formal hearing, on July 27, 2007 to discuss the proposed certification conditions. The opportunity to submit written comments was held open until 5 p.m. on August 6, 2007.

8.2 Public Comment Received

ODEQ received oral testimony from three parties at the hearing, and received two sets of written comments by mail. Upon review and consideration of the oral and written comments, ODEQ prepared a document summarizing the public comment and ODEQ's responses (attached). In consideration of and in response to the public comments received, ODEQ revised the proposed certification conditions that were available for public viewing.

9.0 CONCLUSIONS AND RECOMMENDATION FOR CERTIFICATION

ODEQ has evaluated Symbiotics' Project proposal identified in its § 401 application and supporting documents and considered public comments. ODEQ 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, Oregon Administrative Rules, Chapter 340, Division 41 and other appropriate requirements of state law, given the proposed § 401 requirements identified in this document.

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 Applegate Dam Hydroelectric Project, consistent with the findings of this document.

10.0 REFERENCES

Bureau of Land Management (BLM). 1998. Applegate-Star/Boaz watershed analysis. Version 1.3. Medford District, Ashland Resource Area. September, 1998. Medford, Oregon. 230 pp.

Federal Register. 2002. Listing endangered and threatened species: finding on petition to delist coho salmon in the Klamath River Basin; reopening of public comment period. National Marine Fisheries Service, Department of Commerce. June 13, 2002. Vol. 67, No. 114:40679-40680.

ODEQ. 2006. Best Management Practices for Storm Water Discharges Associated with Construction Activities: Guidance for Eliminating or Reducing Pollutants in Storm Water Discharges. Oregon Department of Environmental Quality. DEQ Northwest Region Document. February, 2006. 49 pp.

ODFW. 2000. Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources. Oregon Department of Fish and Wildlife. June, 2000. 12pp.

Symbiotics. 2005. Applegate Dam Hydroelectric Project FERC No. 11910 Benthic Aquatic Invertebrate Study. Final Report. Prepared by Ecosystems Research Institute. Logan, Utah. December, 2005. 13 pp.

Symbiotics. 2006a. Applegate Dam Hydroelectric Project FERC No. 11910 Soil Erosion Control Plan. Prepared by Ecosystems Research Institute. Logan, Utah. August, 2006. 32 pp.

Symbiotics. 2006b. Applegate Dam Hydroelectric Project FERC No. 11910 Hazardous Substances and Spill Prevention and Cleanup Plan. Prepared by Ecosystems Research Institute. Logan, Utah. August, 2006. 3 pp.

Symbiotics. 2007. Applegate Dam Hydroelectric Project FERC No. 11910 Hazardous Substances and Spill Prevention and Cleanup Plan. Prepared by Ecosystems Research Institute. Logan, Utah. June, 2007. 4 pp.

Attachment 1

Summary of Public Comment Received and ODEQ Responses
for the
Applegate Dam Hydroelectric Project
Proposed 401 Certification Conditions

Oral Testimony – Provided on July 27, 2007 at a public hearing held at the Medford ODEQ Office:

1. Applegate River Watch Group, represented by Rita Jann Geeslin, P.O. Box 144, Jacksonville, OR, 97530

    a. If at any time there is a question that the monitoring system is not functioning correctly or if a monitoring report indicates that the quality of the water is being decreased that Symbiotics be required to shut down operations until the problem is corrected or until the monitoring system is corrected so that we have assurance that the quality of the river is being maintained at the optimal level.

Response: The proposed 401 conditions include requirements for frequent water quality monitoring (hourly) and reporting (quarterly and annually) of water quality conditions during the pre-construction phase, construction phase, and operational phases. The proposed conditions require that Symbiotics' monitoring reports include identification of any water quality standard violations and provide all raw water quality data for ODEQ review and analysis. Additionally, the proposed conditions require Symbiotics to develop and submit for approval, plans and schedules to address any water quality standard violations that are identified by either Symbiotics or ODEQ, followed by implementation of the remedial actions in accordance with the timelines of the approved schedule.

While ODEQ does not expect that there is significant risk for large-scale project-related contributions to water quality standards violations, the Department is concerned that there is some risk that needs to be monitored and analyzed, thus the requirements to monitor, analyze and address violations if they occur. ODEQ's primary concern relative to potential water quality impacts relates to DO directly downstream of the dam in the late summer and early fall. Relative to temperature, ODEQ does not believe that Symbiotics will have the capacity to modify downstream temperatures given that the U.S. Army Corps of Engineers (Corps) will continue to dictate how the multi-port temperature control structure is operated. ODEQ does recognize, however, that the proposed conditions, as structured, could allow a period of time for project-related contributions to DO violations to continue to occur following their identification and up until approved remedial measures are implemented or until project-related contribution to violation has otherwise waned. While ODEQ does not expect that either the magnitude or seasonal persistence of such contribution to DO standard violation would be extensive, ODEQ recognizes that turbine shutdown would be more protective of the river's water quality. Considering also that the river is water quality limited for DO, ODEQ finds the request for project shutdown reasonable and appropriate to better protect the river from

degradation at those times the project has been determined to be contributing to violations of the DO standard. ODEQ will modify the proposed 401 conditions for the DO standard, as well as the DO component of the antidegradation standard, to require immediate shutdown of project operations in the event it is determined that the project is contributing to violations of these standards. Additionally, ODEQ will include a condition that Symbiotics submit a dissolved oxygen management plan for ODEQ approval that specifies details of how violations will be identified, corrected by Symbiotics, and identifies specifics regarding ODEQ notification of violations.

With respect to the request that the project necessarily be required to shutdown in the event of a monitoring system malfunction, ODEQ disagrees, since in many such instances ODEQ would not expect that project would be likely contributing to violations of the monitoring parameter not being monitored. For instance, if a multi-parameter water quality probe's pH meter goes out, but the meter's other probes continue to function, ODEQ would not consider it warranted to shutdown power production since pH is not a parameter of significant concern. ODEQ would, however, want full monitoring potential restored in a reasonable period of time. As another example, DO is a parameter of significant concern, however not during all seasons. Thus, if DO monitoring capacity was temporarily lost during the winter or early spring, a time when ODEQ would not expect that the project was contributing to DO violations, the Department would not deem the situation warranting shutdown of power production. ODEQ does, however, see value in retaining discretionary authority to require shutdown of the turbines considering such factors as the technical aspects of the monitoring malfunction, the water quality parameters in question, the season in question, the historical record of data collected to-date, the frequency of recurring malfunctions of monitoring equipment, and Symbiotics' timely detection and remedy of malfunctions. The proposed conditions will be revised to include ODEQ discretionary authority to require turbine shutdown during times of monitoring equipment malfunction. ODEQ will also require that Symbiotics develop a plan aimed at prevention of water quality monitoring equipment malfunctions and identifies how such malfunctions will be readily identified, corrected and notified to ODEQ.

2. Steve Clements, 2346 Sterling Creek Rd., Jacksonville, OR, 97530

    a. The 401 should require that Symbiotics fund a private independent monitoring firm instead of self-monitoring. That data would then go to DEQ and the agencies for interpretation.

Response: In Oregon and throughout the United States, the implementation of pollution-control laws has been greatly facilitated because these laws extensively require that businesses and other regulated entities self-monitor, keep records, and report problems and violations to the governmental regulatory agencies. Policy reasons for requiring such self-monitoring include:

- *Government resources for official inspections are scarce. Without self-monitoring, inspectors alone would catch only a small percentage of violators, and ignorance and non-compliance might be the norm.*

- *The legal duty to self-monitor creates self-knowledge from which come both the ability and a strong incentive to achieve compliance "voluntarily." Widespread compliance becomes the social norm, because the people closest to and in direct charge of their own pollution know soonest their problem and often best how to control it at the source.*
- *Self-monitoring means less government bureaucracy (including less official control and scrutiny). Wide-spread self-control of behavior brings more freedom from stressful entanglements with government. This result is less costly to society and may be popular. Because usually there is no violation to be reported, the regulated entities may see their duty of self-monitoring as a modest burden at worst and perhaps even helpful.*

ODEQ requested and received a Quality Assurance Plan (QAP) from Symbiotics covering all monitoring which was generated in support of the 401 application. The QAP identifies an integrated system of activities involving planning, quality control, quality assessment, reporting and quality improvement that Symbiotics employs with its monitoring to ensure that standards of quality are met with specified levels of confidence. An attachment to Symbiotics' QAP identifies Standard Operating Procedures, including field quality control program aspects such as monitoring instrument calibration, field data notation, and filed measurements. An additional attachment to the QAP identifies the company's Ethical Conduct and Data Integrity Agreement which the company's staff and quality assurance officer must read, acknowledge, and sign each year identifying their personal ethical and legal responsibilities including the potential punishments and penalties for improper, unethical or illegal actions. Intentional tampering with a monitoring device, falsification, or failure to report are defined by law as offenses and could result in criminal prosecution, and provides a very significant deterrent to any such practices.

While the Department would consider allowance for Symbiotics funding a private independent monitoring firm to perform the required monitoring, ODEQ does not intend to require such. ODEQ will, however, amend the proposed conditions that require monitoring to specifically require that monitoring be performed in accordance with an ODEQ-approved QAP. In the event that Symbiotics elects to contract for the required monitoring, Symbiotics will need to first provide for ODEQ consideration and approval a QAP for the contractor.

3. Daniel Newberry, P.O. Box 1029, Jacksonville, OR, 97530

    a. Regarding monitoring, it would be beneficial to the local community if the water quality monitoring information was made available for public review. This would result in fewer questions if people were informed. Possibly put on a website or some other means, whatever makes the most sense.

Response: ODEQ does not expect that there would be wide-spread interest in reviewing the water quality information such that it would warrant requiring that Symbiotics post the monitoring information on the Internet. However, once the monitoring information is submitted to ODEQ, the information would be available for public review and copying at

the ODEQ office. However, the raw data itself may not be all that useful to the general public in terms of identifying water quality compliance if that is the purpose of the public's review. It will be the reports that distinguish between non-project-related standards violations and project-related standards violations, if any, that would be most informative regarding project impacts. In addition to the raw data, these reports would also be available at the ODEQ office for review and copying.

b. What are the requirements for evaluation of data? Is this specified in the proposed conditions? Is DEQ going to be evaluating the monitoring data on a periodic basis in addition to Symbiotics? Whose responsibility will it be for looking over the data and looking for trends and that sort of thing?

Response: The specific requirements for evaluation of the data are identified in the proposed "Reporting Requirements" conditions that were available for public comment. These requirements identify specific analyses to be performed and reported by Symbiotics within prescribed timelines, including compliance determinations. ODEQ will review these reports upon their submission. In addition to the processed data and evaluations, the proposed conditions also require submission of the raw water quality data such that ODEQ may confirm Symbiotics' analyses and/or conduct additional analyses.

With respect to the greater concern for DO compliance, ODEQ does propose to add another certification condition that will call for submittal and approval of an adaptive DO management plan. Among the elements to be included in the plan, will be specific identification of Symbiotics' methods, procedures, and analyses directed at identifying any Project-related DO violations that may occur.

c. Suggest that DO level comparison should include not just concentration but also percent of saturation.

Response: ODEQ concurs that DO percent saturation, in addition to DO concentration, will be important relative to evaluating any DO impacts. Reporting of DO percent saturation will be included in the final 401 conditions.

d. Supports the comments of the first two testimonies.

Response: ODEQ notes the support. Responses to the first two testimonies provided above.

<u>Written Comments – Received in response to a request for comments:</u>

4. Luke Ruediger, 17607 Elliot Creek Rd., Jacksonville, OR 97530.

a. The Applegate River watershed should be restored instead of degraded to meet water quality standards and to protect important fish populations. The river is water quality limited for temperature and DO.

Response: ODEQ agrees that the watershed should not be degraded and efforts to restore the watershed should be put in place to protect sensitive beneficial uses such as fish. The river is seasonally water quality limited for temperature and DO. A TMDL has been developed for temperature and is planned for DO. ODEQ's TMDL process is

designed to restore degraded water quality while supporting designated beneficial uses. Like fish, aquatic life, recreation and other uses, hydroelectric power generation is an allowable state-designated beneficial use for the Applegate River. The proposed 401 certification conditions, together with revisions developed in response to these public comments, provide reasonable assurance that the project will not contribute to violations of water quality standards or TMDL load allocations.

b. Concern expressed for impacts to fisheries, recreation, private property, and scenic quality.

Response: ODEQ is reasonably assured that the project, as conditioned by the 401 certification, will not contribute to violations of water quality standards and will protect Applegate River designated beneficial uses, such as fish, recreation and aesthetic quality of the river. Private property is not a designated beneficial use of state waters. Project impacts on private property are outside the scope of a water quality certification.

c. Concern for impacts associated with DO levels, sedimentation, contamination, and water temperatures during both construction and operation.

Response: ODEQ is reasonably assured that the revised proposed conditions of the 401 certification will protect against water quality standards violations relative to DO, sedimentation, contamination and stream temperatures. These conditions address both the construction and operational phases of the project. In the event it is determined that the project is contributing to violations of water quality standards, the 401 certification conditions require adaptive management to immediately correct such violations. Additional requirements are being added to the certification conditions requiring shutdown of operations if it is determined that the project is contributing to DO violations, and requiring that corrective measures be implemented prior to recommencing operations.

d. DEQ identified at public hearing that data is inadequate for DO, water temperatures, and sedimentation. DEQ should require at least 12 months of data collection prior to issuance of the certification as opposed to post issuance of the certification during the pre-construction and construction phases.

Response: ODEQ identified that additional data, collected pre-construction, during construction, and during operation, would be needed to identify whether or not the project will contribute to violations of the dissolved oxygen standard or the antidegradation standard relative to dissolved oxygen. In response to public input, ODEQ is modifying the proposed conditions to require immediately shutdown operations if it is determined that either of these standards is being violated. However, ODEQ does not believe that there is insufficient information to issue a 401 certification relative to DO or the other identified parameters given the conditioning included in the certification to protect against project-contribution to standards violations.

e. Instead of Symbiotic collecting monitoring data, either DEQ or an unbiased third party should conduct the monitoring.

Response: See response for comment 2.a.

f. Symbiotics should be required to shut down operations if violations are found.

Response: See response for comment 1.a.

g. Construction should be carefully monitored.

Response: During construction, the 401 certification will require monitoring and reporting of streamflow, temperature, DO, turbidity, pH, and total dissolved gasses. In addition, Symbiotics will be required to employ an environmental coordinator to provide daily oversight of all phases of construction and to ensure fulfillment of all environmental obligations during construction. The coordinator will oversee implementation of erosion and sediment control measures and inspections, implementation of the spill prevention plan, and implementation of the pumping plan during the construction bypass activities.

h. Care should be taken to avoid impacts to bald eagles, fish, and Siskiyou Mountain Salamander.

Response: As conditioned by the 401 certification, ODEQ is reasonably assured that the project will not cause water quality impacts that would adversely affect bald eagles, fish, or the Siskiyou Mountain Salamander.

i. Water quality and fisheries should take precedence over marginal corporate profits and fluctuating power output.

Response: Opinion noted. ODEQ is reasonably assured that the 401 conditions will protect water quality and fisheries relative to potential water quality impacts attributable to the project.

j. The project is at odds with authorized recreation and fish enhancement uses.

Response: Like recreation, fish and aquatic life, Oregon has designated hydropower production as a designated beneficial use for the Applegate River. Thus, hydropower production is an allowable use for the Applegate River. ODEQ does not expect that the hydro project will modify water quality such that recreation or fish enhancement will be compromised.

k. Any modifications to the dam should require installation of upstream fish passage to restore native fisheries to the quality of habitat above the dam.

Response: While a 401 certification must require compliance with all water quality standards, an affirmative 401 certification action does not need to require fish passage. The fisheries agencies, including the National Marine Fisheries Service, the U.S. Fish & Wildlife Service, and the Oregon Department of Fish & Wildlife, among other stakeholders, have provided the licensing entity, the Federal Energy Regulatory Commission (FERC), significant comment regarding needs for fish passage, fish screening, and other facilities or measures to protect or restore fisheries. Ultimately, FERC will need to make a determination regarding necessary license requirements for fish protection and restoration in any license it issues for the project.

5. Kai Steimle, Aquatic Ecologist, Symbiotics, LLC, 1001 SW 5th Ave., Ste 1100, Portland, OR 97204

a. Clarification of pre-construction and construction phase DO monitoring requirements is desired. The requirements should be clear.

Response: While the proposed 401 conditions include a requirement for submitting Pre-Operation DO Assessment Reports, including raw data and analysis of the data, ODEQ inadvertently neglected to specifically identify DO in the pre-construction and construction tables of parameters to be monitored. The revised conditions will rectify this omission.

b. Is temperature monitoring at CS-2 only required during pumping or siphoning over the spillway? Advise if this is not the correct interpretation.

Response: Yes, this is the correct interpretation. The construction monitoring table will be revised to better clarify this requirement.

c. Symbiotics would prefer to maintain the monitoring of the reservoir station during the Operations Phase Monitoring period to aid evaluation of project water quality impacts.

Response: Instead of monitoring the blended flow of the penstock monitoring chamber, such proposal would require monitoring multiple depths within the reservoir corresponding to the multi-level intake tower ports where reservoir water is withdrawn for blending. The proposed penstock monitoring structure would not be available prior to construction, leaving no option but to monitor within the reservoir during the pre-construction and construction phases. However, the option to monitor the mixed flow within the penstock monitoring chamber following construction, during operations. While ODEQ expects that opting to monitor the single blended-flow site of the monitoring chamber would be less burdensome and explicitly more representative than monitoring multiple reservoir depths, ODEQ recognizes that it would provide the most straightforward and consistent ("apples-to-apples") comparison of water quality before and after project construction and operation. To allow for this more consistent comparison, and in response to Symbiotics' request, ODEQ will revise the location definition of OS-1 to match that of CS-1.

d. Symbiotics proposes moving site OS-1 to match the site of CS-1, whereby monitoring would occur in the reservoir at the elevations corresponding to the five intake ports of the multi-level intake tower. The company feels that this would provide the most straightforward and accurate comparison of water quality before and after project construction and operation.

Response: Noted and addressed in the response to the previous comment.

e. The draft certification conditions include the following requirements relative to DO Assessment Reports:

> *"These reports shall include an analysis of the required dissolved oxygen monitoring data including tabular and graphical representation of daily minimum dissolved oxygen concentrations, and identification of the change in daily dissolved oxygen minimums between the two monitoring stations."*

Symbiotics is unclear which two monitoring stations are being referred to. For comparison purposes, as mentioned previously, OS-1 should be moved to the reservoir to match CS-1. For monitoring the quality of water entering the Applegate River, Symbiotics believes that it would be more appropriate to monitor just below the stilling basin (site CS-3 before operation; site OS-3 during operation). With these two suggestions, Symbiotics suggests that for both operation and prior to operation that these two sites be used for a straightforward comparison and to better capture the quality of water that aquatic organisms are exposed to following spill from the primary stilling basin.

Response: Consistent with the response to comment 5.c., OS-1 location will be re-defined to match that of CS-1. The intended DO differential that ODEQ would like measured is between CS-1 and CS-3 during pre-construction and construction and between OS-1 and OS-3 during operations. The final 401 conditions will be revised to clearly reflect this.

f. Relative to the DO Assessment Reports, the draft certification conditions also include the following requirements:

"The reports shall also include tabular and graphical representation of the daily average dissolved oxygen differentials, a comparison of measured dissolved oxygen concentration change between stations OS-2 and OS-3 with that measured or predicted for non-turbine discharge."

Symbiotics believes, as indicated in the previous comment, that the comparison of concentration change should compare CS-1 with CS-3 (OS-3) both before and after construction and operation.

Response: ODEQ acknowledges the error and will revise the condition to require comparison of DO change between OS-1 and OS-3, where OS-1 will now be the same location as CS-1 and OS-3 will be the same as the location CS-3.

g. Symbiotics is supportive of applying the proposed monitoring and modeling efforts, including during pre-construction, but is concerned with how the strict antidegradation standard will be applied to probabilistic predictions given confidence intervals surrounding modeled predictions. Symbiotics proposes to work collaboratively with ODEQ to evaluate model performance and develop standards for compliance with the antidegradation standard.

Response: The reporting requirements for the Operational DO Assessment Reports provides that multiple methods may be used to determine non-turbine discharge DO levels during the operational phase. The methods identified include use of a technically defensible model, pre-operation measured data, measured data generated during temporary turbine shutdown, or a combination of these methods. ODEQ recognizes, that depending upon the modeling confidence interval, that the modeling approach may later be determined not a feasible approach. However, at this time, ODEQ does not desire to rule it out as a potential approach to be considered. In the end, other methods or a new method may prove best suited for determining non-turbine discharge DO levels such that an antidegradation compliance determination can be made.

As identified in the responses to earlier comments within the document, ODEQ will add a certificate condition relative to monitoring for and evaluating potential project-related

contributions to DO violations of both the DO and antidegradation standards. This condition will call for Symbiotics' development and submittal of an adaptive DO management plan prior to commencement of project operations. This will provide Symbiotics and ODEQ opportunity to consult with one another and to identify valid compliance determination methods.

h. Symbiotics believes that any project-related reduction in DO that still maintains at least 100% saturation should not be considered degradation with respect to the antidegradation standard, and should be considered when determining compliance.

Response: ODEQ agrees that a reduction from greater than 100% DO saturation to a different saturation level of 100% or more would not be considered a water quality reduction with respect to the antidegradation standard and should be considered when determining compliance.