Evaluation and Findings Report

for the

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

Submitted by

Eugene Water & Electric Board

for the

Carmen-Smith Hydroelectric Project (FERC No. 2242)

Pursuant to
Oregon Administrative Rules Chapter 340, Division 48

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Glossary

Acronym and Abbreviation	Explanation
°C	degrees Centigrade
°F	degrees Fahrenheit
§401 Application	Clean Water Act §401 Application for Water Quality Certification
7DMX	7-Day average daily maximum
AMP	Aquatics Management Plan
Applicant	Eugene Water & Electric Board
Application	Clean Water Act Section 401 Application for Water Quality Certification
ATS	Aquatic Technical Subgroup
BLM	United States Bureau of Land Management
Bull Trout	*Salvelinus confluentus*
CFS	Cubic Feet per Second
Chinook Salmon	*Oncorhynchus tshawytscha*
Corps	US Army Corps of Engineers
Cutthroat Trout	*Oncorhynchus clarki*
CWA	Clean Water Act
DO	dissolved oxygen
DPS	Distinct population segment
EPA	U. S. Environmental Protection Agency
EQC	Oregon Environmental Quality Commission
EWEB	Eugene Water & Electric Board
FERC, Commission	Federal Energy Regulatory Commission
FLA	Final License Application
GBT	Gas Bubble Trauma
HBI	Hilsenhoff Biotic Index
Heat Source	ODEQ Temperature Model used to assess thermal loading
IGDO	intergravel dissolved oxygen
kVA	kilovolt-ampere
LA	Load Allocation established for each pollutant source identified in the Total Maximum Daily Load
License	FERC license
MVA	Megavolt-ampere
MSL	Mean sea level
NEPA	National Environmental Policy Act.
NMFS	National Marine Fishery Service
NTU	Nephelometric Turbidity Units
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
OERS	Oregon Emergency Response System
OHD	Oregon Health Division
OWRD	Oregon Water Resources Department
pH	Hydrogen Ion Concentration

PME measures	Protection, Mitigation, and Enhancement measures
PSZ	Potential stranding zone
Rainbow Trout	*Oncorhynchus mykiss*
SA	Settlement Agreement
TLMP	Transmission Line Management Plan
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VMP	Vegetation Management Plan
Water Year	October 1-September 30
WQMP	Water Quality Management Plan

1.0 INTRODUCTION

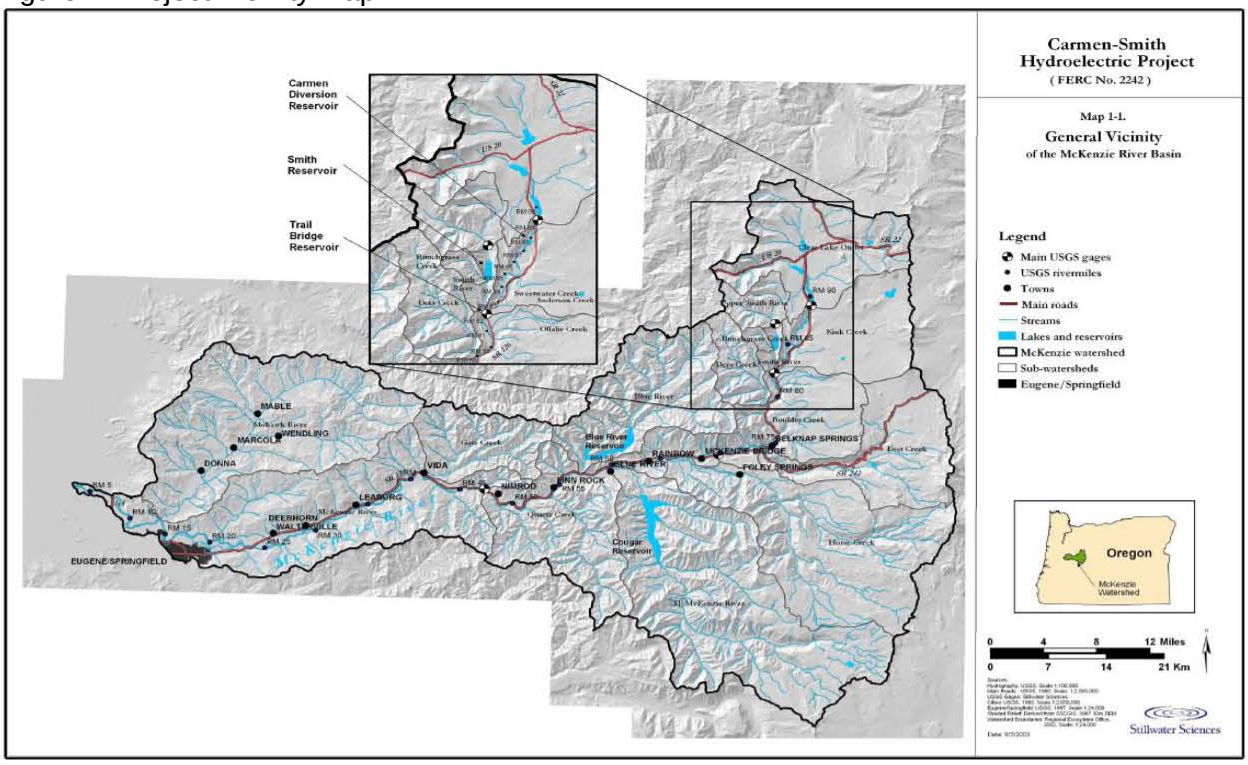
The Oregon Department of Environmental Quality (ODEQ) has prepared this Evaluation & Findings Report in response to an application for water quality certification submitted by the Eugene Water & Electric Board (EWEB) for their Carmen-Smith Hydroelectric Project (Project, FERC Project 2242). The purpose of this report is determine what effects, if any, the relicensed Project will have on water quality. As allowed by Section 401 of the Clean Water Act, ODEQ may, based on its evaluation, condition the operation of the Project, as necessary, to comply with Oregon water quality standards, applicable portions of the Clean Water Act, and other relevant provisions of state law.

EWEB first submitted an application to ODEQ for water quality certification on January 8, 2009. Based on a request by ODEQ for additional information, EWEB withdrew its application in October 2009 and submitted a revised application containing the requested additional information on January 21, 2010. ODEQ has one year from receipt of the revised application to render a decision on EWEB's request for water quality certification.

EWEB began the process of relicensing the Project in 2002. In November 2006, EWEB filed a Final License Application (FLA) with the Federal Energy Regulatory Commission (FERC) to relicense the Project. The existing license expired on November 30, 2008. Since that time, the Federal Energy Regulatory Commission (FERC) has authorized the continued operation of the Project through an annual license which expires on November 30, 2010, or the issuance of a new operating license, whichever occurs sooner. The expected term of a new FERC License is 50 years.

The Project is located above river mile 82 on the McKenzie River about 70 miles east of Eugene, Oregon. The Project is located in Linn and Lane Counties. A vicinity map is presented as Figure 1.

Figure 1: Project Vicinity Map



Source: EWEB, 2003. Used by permission.

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 authorized to implement 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 among state agencies in the reauthorization of federally licensed hydroelectric projects, including state certification of water quality.

Oregon Administrative Rules (OAR) 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:

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

3.0 SUMMARY OF APPLICATION

3.1 Applicant Information

3.1.1 Name and Address of Project Owner (Applicant)

Eugene Water & Electric Board
P.O. Box 10148
Eugene, Oregon 97440-2148
Phone: (541) 685-7000

3.1.2 Name and Address of Owner's Official Representative

Mr. Michael J. McCann, PE
License Implementation Project Manager
P.O. Box 10148
Eugene, Oregon 97440-2148

Phone: (541) 685-7379
Facsimile: (541) 685-7379

Ms. Christine Champe
Stillwater Sciences
850 G Street, Suite K
Arcata, California 95521

Phone: (707) 822-9607 x221
Facsimile: (707) 822-9608

3.1.3 Documents Filed in Support of § 401 Application

EWEB has filed the following documents in support of its § 401 certification application for the relicensing of the Project:

Initial Consultation Document for the Carmen-Smith Hydroelectric Project (FERC No. 2242). Final report. Prepared by Stillwater Sciences, Arcata, California for EWEB, Eugene, Oregon. September 2003.

Quality Assurance Project Plan (QAPP): 2004-2005 McKenzie River water quality monitoring study. Stillwater Sciences, Berkeley, California for Eugene Water & Electric Board, Eugene, Oregon. EWEB, April 2004.

Final Study Plans. Final Study Plans were developed in consultation with the Aquatics Technical Subgroup (ATS) and were prepared by Stillwater Sciences. Final Study Plans related to water quality included the following:

- Water Quality, April 27, 2004
- Aquatic Habitats and Instream Flows, July 23, 2004
- Fluvial Geomorphic Processes and Channel Morphology, April 27, 2004
- Hydrologic Regimes, April 27, 2004
- Sediment Budget April 27, 2004

Final Environmental Reports. Information collected during completion of the above referenced studies was presented in a series of Final Reports submitted individually or as appendices to the FLA. The Final Reports, prepared by Stillwater Sciences, Arcata, California, on behalf of EWEB, include the following:

- Water Quality, February 2006
- Aquatic Habitats and Instream Flows, February 2006
- Fluvial Geomorphic Processes and Channel Morphology, March 2006

- Hydrologic Regimes, February 2006
- Sediment Budget, March 2006

DRAFT License Application for the Carmen-Smith Hydroelectric Project (FERC Project No. 2242). Stillwater Sciences, Arcata, California for EWEB, Eugene, Oregon. May 2006.

Final License Application for the Carmen-Smith Hydroelectric Project (FERC Project No. 2242). Stillwater Sciences, Arcata, California for EWEB, Eugene, Oregon. November 2006.

Settlement Agreement for the Relicensing of the Carmen-Smith Hydroelectric Project, FERC Project No. 2242 Final report. Prepared by Stillwater Sciences, Arcata, California for EWEB, Eugene, Oregon. October 2008.

Spill Prevention Control and Countermeasure Plan and Emergency Response Plan, EWEB, December 10, 2008.

Application for Certification Pursuant to Section 401 of the Federal CWA for the Carmen-Smith Hydroelectric Project. Stillwater Sciences, Arcata, California for EWEB, Eugene, Oregon. January 2009.

Withdrawal of §401 Water Quality Certification Application dated January 8, 2009. EWEB, Eugene, Oregon. October 30, 2009.

Revised Application for Certification Pursuant to Section 401 of the Federal CWA for the Carmen-Smith Hydroelectric Project. Stillwater Sciences, Arcata, California for EWEB, Eugene, Oregon. January 2010.

3.1.4 Notification of Complete Application

On March 18, 2009, ODEQ notified EWEB that it deemed the Application for § 401 Certification received on January 8, 2009, for the relicensing of the Carmen-Smith Hydroelectric Project to be administratively complete for processing.

3.2 Waters of the State

3.2.1 Waters Affected by the Project

The Project is located primarily on the mainstem portions and tributaries to the McKenzie River in the Upper McKenzie River watershed. Principal water bodies affected by Project operations are described below.

McKenzie River, full flow reach
The McKenzie full-flow reach begins below Trail Bridge Dam at RM 82. The Project is operated such that net daily inflow into Project reservoirs roughly equals the net daily outflow into the McKenzie full flow reach below Trail Bridge Dam. Under current operating conditions, the maximum ramping rate, up or down, in this reach is two inches per hour.

Trail Bridge Reservoir

Trail Bridge Reservoir receives flow from the Smith River Bypass Reach, Lower Carmen Bypass Reach, Sweetwater Creek, and discharge from the Carmen Power Plant. Trail Bridge Reservoir re-regulates the peaking inflow from Carmen Powerhouse with the objective of delivering flows below the Project approximately equal to the sum of net inflows upstream of the Project. Under present operating conditions, the maximum daily and weekly elevation variation is seven feet from April 20 through Labor Day; daily and weekly elevation changes are unrestricted during the rest of the year.

Smith River Bypass

The Smith Bypass Reach extends approximately 2 miles from the base of Smith Dam to Trail Bridge Reservoir. Bunchgrass Creek enters Smith River near the base of Smith Dam which impounds all flow in Smith River. With the exception of spill events from Smith Dam and a small contribution from groundwater accretion, Bunchgrass Creek accounts for nearly all the unregulated flow in Smith Bypass Reach.

Smith Dam and Reservoir

Smith Dam is located approximately 2.5 miles upstream from the historical confluence of the Smith and McKenzie Rivers. Smith Dam impounds the entire flow of the Smith River which has a mean annual discharge of 89 cfs. However, inflow to the Smith Reservoir is dominated by flows diverted from Carmen Diversion Reservoir.

Carmen Diversion Reservoir

Carmen Dam impounds the McKenzie River and Ice Cap Creek to form Carmen Diversion Reservoir. Water from this reservoir is diverted to Smith Reservoir through a 11,380 foot long circular concrete-lined tunnel. Flows which exceed the capacity of the diversion tunnel, which ranges from 650 cfs to 850 cfs, are spilled into the former Upper Carmen Bypass streambed.

Upper Carmen Bypass

The Upper Carmen Bypass Reach includes the former McKenzie River stream channel from the base of Carmen Diversion Dam downstream to Tamolich Falls. This reach is located in highly permeable volcanic rocks of the High Cascades. Surface flows in this reach typically infiltrate into the subsurface completely before reaching Tamolich Falls. Under current operating conditions, only flows which exceed the delivery capacity of the Carmen Diversion Tunnel are released into the Upper Carmen Bypass Reach. Consequently, the streambed in the Upper Carmen Bypass Reach is largely dewatered except during spill events.

Lower Carmen Bypass Reach

The Lower Carmen Bypass Reach begins at the base of Tamolich Falls and continues approximately 2.5 miles to the upper end of Trail Bridge Reservoir near the Carmen Powerhouse. Although Carmen Diversion Dam typically impounds most flow in the Upper Carmen Bypass reach, year-round flows emerge from a plunge pool, informally identified as Blue Pool, near the base of Tamolich Falls. Records from a pressure transducer located approximately 0.8 miles downstream of Blue Pool indicate a mean monthly flow at this location of 168 cfs. Additional groundwater accretion occurs along this reach and is augmented by the surface drainages of Kink Creek and two unnamed lesser tributaries. Measurements indicate mean monthly flows of 239 cfs at the lower pressure transducer near the base of this reach (Stillwater Sciences, 2006d).

Spawning Channel

In 1962, EWEB completed construction of a spawning channel located along the east side of the McKenzie River approximately 640 feet downstream of Trail Bridge Powerhouse. The channel was constructed to provide upstream Chinook salmon spawning habitat following the construction of Trail Bridge Dam. The channel is approximately 1,000 feet long by 30 feet wide, with a 500-foot long spawning section. Approximately 50 to 80 cfs are diverted to the channel from the full flow reach of the McKenzie River. This water is returned to the river below the channel at the fish entrance to the channel.

3.2.2 Water Rights Held by Applicant

In June 2004, the Oregon Water Resources Department certificated five water rights for water storage and four water rights for non-consumptive hydroelectric power generation. All except one of the water rights incorporate by reference the terms and conditions of the State Water Resources Board of Oregon resolution dated July 17, 1958, and an agreement between the City of Eugene, acting by and through EWEB, and the State of Oregon, acting by and through the Oregon State Game Commission and the Fish Commission, dated August 1, 1958. The Water Resources Board resolution identifies beneficial uses including hydroelectric purposes in the Project area and establishes a framework for future appropriations of water in the upper McKenzie River basin. In accordance with ORS 537.410(2) and 540.610(2)(a) and (4), the water rights granted to EWEB are perpetual and are exempt from forfeiture.

A summary of the water rights is presented in Table 1 below.

Table 1: Project Water Rights Held By Applicant

Application	Permit	Certificate	Location	Purpose	Capacity
R-32144	R-2138	80726	Carmen Diversion Reservoir	Storage	261 ac-ft
R-32145	R-2139	80727	Smith Reservoir	Storage	14,000 ac-ft
R-44210	R-5117	80782	Smith Reservoir	Storage	1,000 ac-ft
R-32142	R-2137	80724	Trail Bridge Reservoir	Storage	1,700 ac-ft
R-33883	R-2364	80729	Trail Bridge Reservoir	Storage	563 ac-ft
32146	25515	80987	Carmen Powerhouse	Power	1,900 cfs
33884	26808	80730	Carmen Powerhouse	Power	950 cfs
32143	25514	80725	Trail Bridge Powerhouse	Power	1,400 cfs
33885	26809	80781	Trail Bridge Powerhouse	Power	380 cfs

3.2.3 Consumptive Use

EWEB operates a public water supply system which serves the domestic needs of Project facilities including all residences used by operators and their families. The water supply system, identified as PWS ID #41-05556, withdraws approximately 0.03 cfs of water from a pair of infiltration galleries adjacent to the north bank of the McKenzie River in the vicinity of the Project. The water supply system is regulated by the Department of Human Services (DHS), which administers the federal Safe Drinking Water Act (SDWA) for Oregon (EWEB, 2006).

3.2.4 Beneficial Uses

Designated beneficial uses for the Willamette River and its tributaries are given in OAR 340-041-0340, Table 340A and apply to all waters within the Project area. These uses are listed in Table 2.

Table 2: Beneficial Uses

Beneficial Use	**McKenzie River**
Public domestic water supply[1]	X
Private domestic water supply[1]	X
Industrial Water Supply	X
Irrigation	X
Livestock Watering	X
Fish & Aquatic Life[2]	X
Wildlife and Hunting	X
Fishing	X
Boating	X
Water Contact Recreation	X
Aesthetic Quality	X
Hydro Power	X
Commercial Navigation & Transportation	
1 With adequate pretreatment and natural quality that meets drinking water standards	
2 See also Figures 340A and 340B for fish use designations for this basin.	

3.3 Project Lands

The FERC project boundary encompasses about 620 acres, all but 60 acres of which are located on land administered by the Willamette National Forest. The 19 mile long transmission line right-of-way is 70 feet wide and traverses a mix of federally owned public land and privately owned parcels. The transmission line connects the Carmen substation at the Carmen Powerhouse with the Cougar tap operated by the Bonneville Power Administration (BPA) located near the South Fork of the McKenzie River.

3.4 Ecological Setting

3.4.1 General Locale

The Project is located along the McKenzie and Smith Rivers in Linn and Lane Counties approximately 70 miles east of the City of Eugene. The McKenzie River originates at Clear

Lake at RM 90 at an elevation of 3,012 feet (USGS 1988) in the steep western slopes of the Oregon Cascade mountains. The McKenzie River flows south losing elevation rapidly through a high-gradient channel and over a series of waterfalls before reaching Carmen Diversion Reservoir, the upper-most Project development located at RM 89 at an elevation of about 2,623 feet. Water from Carmen Diversion Reservoir is diverted to Smith Reservoir, an impoundment on the Smith River with a full pool elevation of 2,605 feet, and is subsequently discharged through the Carmen Powerhouse into Trail Bridge Reservoir, the lowest Project impoundment on the McKenzie River located at RM 82 with a full pool elevation of 2,092 feet.

Measurements at the Belknap Springs meteorological station indicate the mean monthly temperature in the vicinity of the Project ranges from 33.6 F in December and January to 65.1 F in August (OCS, 2003). The region receives about 76 inches of precipitation annually, more than 85 percent of which occurs during the period from October through April.

3.4.2 Geology

The upper McKenzie River Basin is underlain by Tertiary and Quaternary age volcanic rocks with younger Quaternary deposits of valley and alluvial fill material located within the margins of stream channels and drainages. The Project is located near the boundary between the Western Cascades and High Cascades geomorphic provinces. Land west of the McKenzie River is dominated by Western Cascades terrain and is characterized by older, highly weathered volcanic rock, deeply incised drainages, a thicker soil base, and higher drainage density due to lower surface permeability. Western Cascade drainages within the Project area include Deer Creek, Smith River, and Bunchgrass Creek.

Within the Project area, High Cascades terrain extends eastward from the Smith River. This boundary represents the western extent of volcanic flows which began in the early Quaternary and continued until as recently as 1,500 years ago (Stillwater Sciences, 2006d). Younger High Cascades volcanics are characterized by highly porous, erosionally resistant surface rocks which have undergone little environmental weathering and produce small amounts of sediment available to streams. The high permeability of High Cascades rocks promotes rapid infiltration of surface water resulting in low drainage density, moderated peak flows, and poor stream channel development. High Cascades drainages in the Project area include the McKenzie bypass reach, Sweetwater Creek, Kink Creek, Ollalie Creek, and Anderson Creek.

Within the Project boundary are lesser areas of mapped sediments derived principally from glacial terrain, Quaternary alluvium, and mass-wasting erosional processes. Sediment deposits in the Project area are located primarily along the margins of stream channels and are derived primarily from parent material located within the Western Cascades terrain.

3.4.3 Hydrology

Hydrology in the Upper McKenzie Basin is influenced by the geologic characteristics of the basin terrain. The Project area is located near the junction of the High Cascades and Western Cascades geomorphic terrains. Western Cascades terrain consists of older, deeply incised landforms shaped by physical erosive processes. Western Cascade drainages are characterized by high surface conductivities which can produce high peak runoff relative to base flows. Hydrographs placed in Western Cascade drainages reflect maximum runoff rates in

December and May corresponding to peak precipitation events and periods of late Spring snow melt, respectively.

In contrast, High Cascades terrain consists of younger, unweathered rocks overlain by thin, poorly developed soils. Thin soils and porous geology result in high surface and subsurface conductivities. As a result, High Cascades basins lack well developed surface drainage systems but support large springs and a broad aquifer network. Flows in High Cascade drainages are moderated by the high surface and subsurface conductivities and strong contributions from springs and groundwater accretion sources. Flows in these drainages, therefore, exhibit less variability and higher overall base flow.

3.4.4 Threatened and Endangered Species in the McKenzie River

Fish species present in the Project area with special protection status are identified below.

Bull Trout

Bull trout (*Salvelinus confluentus*) are native to the Pacific Northwest and western Canada. Compared with other salmonids, bull trout have more specific habitat requirements that appear to influence their distribution and abundance. They need cold water to survive, so they are seldom found in waters where temperatures exceed 15C to 18C. They also require stable stream channels, clean spawning and rearing gravel, complex and diverse cover, and unblocked migratory corridors. Bull trout populations may exhibit resident or migratory life-history strategies.

Two populations of bull trout exist within the Project boundary: the mainstem McKenzie local population and the Trail Bridge Reservoir local population. On June 10, 1998, the United States Fish and Wildlife Service (USFWS) issued a final rule listing the Columbia River and Klamath River populations of bull trout as threatened under the authority of the Endangered Species Act of 1973.

The Oregon Environmental Quality Commisison (EQC) established a temperature criterion of 12.0ºC year-round to protect spawning and migration life stages of bull trout.

Spring Chinook Salmon

Spring Chinook (*Oncorhynchus tshawytscha)* in the upper McKenzie River basin belong to the Upper Willamette River (UWR) Chinook Evolutionary Significant Unit (ESU). This Chinook ESU includes all naturally spawned populations of spring-run Chinook salmon in the Clackamas River and in the Willamette River including its tributaries above Willamette Falls, Oregon and in the Project area also includes the spring run Chinook salmon from the McKenzie River Hatchery. Since 1953, the number of Spring Chinook passing Willamette Falls has remained relatively unchanged. However, an increasing percentage of returning fish are of hatchery origin. Spring run Chinook populations above Leaburg Dam are considered the strongest in the ESU, but with hatchery-origin fish accounting for more than 20 percent of returning fish, it is unclear if this population is self-sustaining (NMFS, 2005).

On March 24, 1999, the National Marine Fisheries Service (NMFS) listed the UWR Chinook ESU as threatened. This listing was maintained and expanded, and protective regulations were promulgated on June 28, 2005.

Coastal Cutthroat Trout

Coastal Cutthroat Trout (*Oncorhynchus clarki clarki)* within the Southwest Washington/Lower Columbia River distinct population segment (DPS) include populations of migratory and resident fish as well as an anadromous migratory segment. In 1999, USFWS and NMFS published a rule which proposed listing the Coastal Cutthroat Trout DPS as threatened. USFWS subsequently assumed sole regulatory jurisdiction of this species. Based on evidence that populations of Coastal Cutthroat Trout are not likely to become endangered in the foreseeable future, the USFWS withdrew the listing proposal on June 26, 2002. The USFWS currently lists the Coastal Cutthroat Trout DPS as a species of concern.

4.0 PROJECT DESCRIPTION

4.1 Current Project Developments

4.1.1 Carmen Development

The Carmen Development consists of Carmen Diversion Dam and Reservoir, a diversion tunnel, Smith Dam and Reservoir, an emergency spillway on Smith Dam, a power tunnel and penstock, and Carmen power plant and substation. A description of these features is presented below.

Carmen Diversion Dam and Reservoir

Carmen Diversion Dam is the uppermost development of the Project, located at RM 89 approximately 3 miles downstream of Clear Lake, the headwaters of the McKenzie River.

Carmen Diversion Dam was constructed in 1962 and impounds flows of the McKenzie River and Ice Cap Creek to create Carmen Diversion Reservoir. The reservoir has a capacity of 261 acre-feet at a full pool design elevation of 2,625 feet above mean sea level (MSL). Carmen Diversion Dam, located along the south side of the reservoir, is 25 feet in height with a crest length of 2,100 feet.

A summary of Carmen Diversion Dam physical and hydrological characteristics is presented in Table 3.

Table 3: Carmen Diversion Reservoir and Dam Data

Basin	
Drainage area	97 square miles
Reservoir	
Elevation at full pool	2,625 ft msl
Volume at full pool	260.9 ac-ft
Area at full pool	30.6 ac
Dam	
Construction	Zoned earth and rock
Embankment length	2,100 ft
Embankment height	25 ft (above streambed)
Crest elevation	2,634 ft
Spillway	
Type	Weir and fuse plug
Spillway crest elevation	2,625 ft msl (weir); 2,631 (fuse plug)
Crest length	63 ft (overflow); 100 ft (fuse plug)
Design discharge	19,749 cfs

Diversion Tunnel

The Carmen Diversion Tunnel, located west of Carmen Diversion Dam near the southwest corner of the reservoir, diverts water from the Carmen Diversion Reservoir to the Smith Reservoir. The tunnel is circular and measures 9.5 feet in diameter and 11,380 feet in length. The tunnel discharges to Smith Reservoir approximately 60 feet below surface. A difference of 20 to 25 feet of elevation difference exists across the tunnel at normal reservoir elevations. Flow through the tunnel is dependent on this difference in head and can be further managed by a manually operated head gate near the tunnel intake. Flow through the tunnel generally ranges from 650 cfs in summer months to 750 cfs in winter months.

Debris is partially excluded from the tunnel by two trash racks measuring 12 feet by 18 feet. The entrance to the tunnel is unscreened and permits the passage of fish from Carmen Diversion Reservoir to Smith Reservoir.

Smith Dam and Reservoir and Spillway

Smith Dam is a 235 foot tall earth and rock impoundment located approximately 2 miles upstream of Trail Bridge Reservoir. The Smith Dam has a crest length of 1,100 feet and impounds 15,050 acre-feet of water at a normal pool elevation of 2,605 feet MSL.

An emergency spillway is located near the west abutment of Smith Dam. The concrete spillway chute is 20 feet wide by 306 feet long and slopes at a 15 percent grade from the height of the ogee crest (2,583 feet MSL) to the end of the spillway (2,532 feet MSL). Water is discharged from this point and falls the remaining 135 feet to a scoured basalt pool near the confluence with Bunchgrass Creek. The emergency spillway is controlled by a 24 foot radius radial gate which may be operated manually, automatically, or remotely. The emergency spillway is activated to provide continuous base flows to Trail Bridge Reservoir in the event the Carmen Power Plant experiences a prolonged disruption in operation.

A summary of physical and hydrological characteristics associated with the Smith Reservoir and Dam development is presented in Table 4.

Table 4: Smith Reservoir and Dam Data

Basin	
Drainage area	18.4 square miles
Reservoir	
Elevation at full pool	2,605 ft msl
Volume at full pool	15,050 ac-ft
Area at full pool	170 ac
Dam	
Construction	Zoned earth and rock
Embankment length	1,100 ft
Embankment height	235 ft (above streambed)
Crest elevation	2,616 ft
Spillway	
Type	gated ogee crest
Spillway crest elevation	2,583
Crest length	20 ft
Design discharge	15,513 cfs (with turbines operating)

Smith Power Tunnel and Penstock

The intake structure to the Smith Power Tunnel is located near the southeast corner of the reservoir. The structure consists of a vertically oriented 12.5 foot diameter cylindrical concrete tower. The inlet gate consists of an 8.5 foot by 17.5 foot vertical gate located near the base of the tower. The invert elevation of the inlet gate is 2,494.4 feet MSL, or approximately 111 feet below the normal full pool elevation. The gate inlet is equipped with trash racks to exclude large debris but is not screened to exclude fish.

Water is conveyed from Smith Reservoir to the Carmen Power Plant through a 7,275 foot long horseshoe-shaped power tunnel approximately 14 feet in diameter. A 270 foot tall, partially subsurface surge chamber is located at the end of the power tunnel. A 12 foot diameter steel-lined penstock extending from the surge chamber bifurcates into two eight-foot diameter parallel penstocks which are connected to the two 55 MW Francis turbines within the Carmen Powerhouse. The maximum proven flow through the Smith Power Tunnel is approximately 2,800 cfs.

Carmen Power Plant and Substation

The Carmen Powerhouse is located on the west bank of the McKenzie River near the upstream end of Trail Bridge Reservoir. The powerhouse consists of two 55 MW Francis turbines below the deck of the powerhouse. In 1983, the stators of the two 45 megavolt-ampere (MVA) generators located above the powerhouse deck were rewound increasing the generation capacity to 55 MVA. The power plant substation includes two oil-filled power transformers rated at 50 MVA and 60 MVA. The substation is connected with the Trail Bridge power plant via a 15 kilovolt-ampere (kVA) distribution line and also to a Bonneville Power Administration (BPA) transmission line by a Project transmission line as described in Section 4.1.3 below.

The Carmen Power Plant is operated as a peaking and load following facility designed to provide generation capacity during peak hours, typically between 6:00 am and 10:00 pm. Although both units may be operated simultaneously, typically just one unit is operational at a

time. One unit flow ranges from 1,500 to 1,800 cfs. The combined flow during two unit operation generally ranges from 1,800 to 2,400 cfs (EWEB, 2009b)

The Carmen Power Plant tailrace has no tailrace barrier.

4.1.2 Trail Bridge Development

Trail Bridge Dam, Reservoir, and Spillway

Trail Bridge Dam impounds the McKenzie River at RM 82.4 just downstream of the confluence with the Smith River. Trail Bridge Reservoir is a re-regulating facility fed by discharge from the Carmen Power Plant and unregulated flows from the Smith River, Bunchgrass Creek, Sweetwater Creek, the lower McKenzie bypass reach, and other tributaries to these streams. Trail Bridge Dam regulates the flows released to the full flow reach of the McKenzie River.

Trail Bridge Dam consists of a rock and earth-filled dam approximately 1,800 feet in length. Studies performed in 1988 indicated the spillway was undersized to pass flows associated with a probable maximum flood (PMF). In 2004, a portion of the dike section was lowered and armored to accommodate an emergency spillway capable of passing PMF flows.

A summary of physical and hydrologic characteristics of the Trail Bridge Reservoir and Dam development is presented as Table 5.

Table 5: Trail Bridge Reservoir and Dam Data

Basin	
Drainage area	184 square miles
Reservoir	
Elevation at full pool	2,090 ft msl
Volume at full pool	2,263 ac-ft
Area at full pool	73.4 ac
Dam	
Construction	Zoned earth and rock
Embankment length	700 ft
Embankment height	80 ft (above streambed)
Crest elevation	2,100 ft
Spillway	
Type	gated ogee crest
Spillway crest elevation	2,060.5
Crest length	30 ft
Design discharge	28,300 cfs

Trail Bridge Intake, Spillway, and Power Plant

The intake to the Trail Bridge Power Plant is located several hundred feet upstream of the dam face near the base of the reservoir at a depth of about 70 feet below mean high pool elevation. The entrance to the intake is not screened but is equipped with trash racks to reduce the entry of larger debris. Water enters a 12 foot diameter concrete power tunnel which joins to the penstock at a 13 foot by 12 foot intake gate located near the west wall of the spillway. The penstock bifurcates leading to a bypass valve and the power plant.

A 30 foot wide concrete spillway is located at the east side of the Trail Bridge Dam abutment. The 251 foot long spillway is operated by a 33 foot radius radial spill gate.

The Trail Bridge Power Plant consists of one 11,700 h.p. 212 rpm Kaplan turbine and one generator rated at 10.5 MVA with a nameplate capacity of 9.975 MW.

Spawning Channel
In 1962, EWEB constructed a spawning channel to provide spawning habitat for returning Chinook salmon under an agreement with the Oregon Fish and Game Commission. The channel is located parallel with the east side of the McKenzie River below Trail Bridge Dam and is designed to provide optimum flow and gravel substrate conditions to promote and support spawning and fry emergence. The upstream side of the headworks structure supports a steel trash rack. The channel is approximately 1,000 ft long and provides flows in the range of 50 to 80 cfs with an average water depth and velocity of 1.5 ft and 2.5 fps, respectively.

4.1.3 Transmission Lines

The power plants at Trail Bridge and Carmen are connected by a 11.5 kV distribution line approximately one mile in length. A 19-mi, 115-kV transmission line connects the Carmen Substation to the Bonneville Power Administration (BPA) Cougar-Eugene 115-kV transmission line at the Cougar-EWEB Tap (Cougar Tap) located near Cougar Dam. From the Cougar Tap, power is routed to Eugene on the BPA transmission line.

4.1.4 Lands, Roads, and Facilities

Day Use Areas
The following day use areas are operated by EWEB and the USDA Forest Service within the Project boundary:

- Carmen Diversion Reservoir Day Use Area
- Smith Reservoir Day Use Area
- Trail Bridge Reservoir Day Use Area

Campgrounds
The following campgrounds were constructed by EWEB as part of project development:

- Ice Cap Creek Campground
- Lakes End Campground
- Trail Bridge Campground

They are located outside of the Project boundary and are operated by the USDA Forest Service.

Project Roads
Six roads specifically identified in the original Project license and included in the FERC Project boundary include:

- Spawning Channel Access Road
- Deer Creek-Trail Bridge Road

- Connecting Road-Carmen Plant
- Smith River Lo-Level Road
- Trail Bridge Campground Road
- Carmen Diversion Access Road

4.2 Current Project Operation

The Project is operated primarily as a peaking and load-following facility intended to match power production with daily load demand. The Carmen Diversion Reservoir, the uppermost Project development, diverts up to 850 cfs of McKenzie River flows through a diversion tunnel into Smith Reservoir. EWEB operates the Carmen power plant in peaking mode. The Carmen power plant discharges to Trail Bridge Reservoir, the Project's re-regulating facility, which also receives unregulated flows from the lower Carmen bypass reach, Smith bypass reach including Bunchgrass Creek, Sweetwater Creek, and several lesser tributaries. Flows from Trail Bridge Dam are regulated to comply with minimum flow and ramping restrictions in the full flow reach of the McKenzie River.

4.2.1 Carmen Development

The Carmen Power Plant is the principal generation facility at the Project and includes two 55-MW Francis-type turbines. The Carmen Power Plant draws water from Smith Reservoir. At a full pool elevation of 2,605 msl, Smith Reservoir produces approximately 513 feet of static head in the penstock above the power plant. With both units operating, the maximum documented flow through the Carmen powerhouse is 2,800 cfs. However, because of the limited capacity of the Trail Bridge re-regulating reservoir and the desire to shape electrical output to match the duration of consumer load, EWEB typically limits operation to one unit with flows of approximately 1,500 to1,800 cfs

On February 3, 2009, EWEB applied to FERC for a license amendment to reduce the authorized installed capacity (AIC) of the Project from 114,503 kW to 87,820 kW. The request was made to adjust the rated output of the Carmen plants to reflect a normal operating head of 490 feet, rather than the gross static head of 513 feet. Further, EWEB requested an AIC adjustment to 4,600 kW at Trail Bridge power plant to reflect output based on a best gate opening and a nominal head of 72 feet. FERC agreed to adjust downward the AIC of the two Carmen units to 41,610 kW each, but adjusted the AIC rating of the Trail Bridge turbine to 8,775 kW to reflect historical generation output. On July 20, 2009, FERC ordered the AIC of the Project revised to 91,995 kW. (FERC 2009a).

Currently, there are no minimum flow requirements in the Upper McKenzie and Smith Bypass reaches. During periods of high flow, EWEB may spill water into the Upper McKenzie Bypass Reach when flows into the reservoir exceed the capacity of the diversion tunnel (i.e., 650 to 850 cfs). In response to flood events, line outages, or power plant maintenance, EWEB activates the emergency spillgate at Smith Dam to manage reservoir levels.

4.2.2 Trail Bridge Development

The primary purpose of Trail Bridge Reservoir is to re-regulate flows discharged to the full flow reach of the McKenzie River. The elevation of Trail Bridge Reservoir fluctuates up to 12 feet

per day in response to incoming flows. At a full pool elevation of 2,090 msl, Trail Bridge Reservoir develops 86 feet of static head above the Trail Bridge penstock. The power house includes one 10.5 MW Kaplan-type turbine with a maximum rated hydraulic capacity of 1,780 cfs (EWEB, 2006). The power plant is operated in run of river mode with inflows to the Project roughly matching outflows through the Trail Bridge plant.

4.3 Proposed Changes to Project and Operation

In November 2006, EWEB filed a FLA with FERC for relicensing of the Project. In October 2008, EWEB along with representatives of three State and three Federal agencies, three tribal nations, and seven non-governmental organizations (NGOs) entered into a Settlement Agreement (SA) intended to balance the interests of stakeholders, affected resources, and the operations of the Project. The SA includes proposed License Articles and various resource management plans. EWEB on behalf of itself and the other settlement parties submitted the SA as an offer of settlement to FERC as a supplement to the FLA to provide the substantive provisions for the new license to be issued by FERC. Under a new FERC license which reflects the FLA as supplemented by the SA, the fundamental power generation strategy at the Project (load following to match power production with daily demand) will remain essentially unchanged. However, many aspects of Project operations are proposed to be modified under a new License to reflect the terms of the SA and certain Project modifications proposed by the Applicant in the FLA.

Changes to the Project and Project operations based on the FLA as supplemented by the SA which may affect water quantity and/or quality are summarized in the following sections.

4.3.1 Project Modifications Proposed By Applicant

Table 2-1 of the FLA identifies several Project modifications related to water quality which the Applicant proposes to undertake upon issuance of a new FERC License. These include physical changes to Project infrastructure and modifications to the management of operations, and are summarized in the following sections.

Water Quality Management Plan

In the FLA, EWEB proposes the development of a Water Quality Management Plan (WQMP) as a project-wide modification under a new FERC License. The primary objective of the WQMP is the implementation of conditions placed on the Project pursuant to the 401 certification. The WQMP will include objectives, performance standards, and monitoring and reporting requirements necessary to implement the conditions of the 401 water quality certification.

In accordance with proposed License Article 25 of the SA, EWEB shall submit a WQMP to ODEQ for approval within 12 months of License issuance. Upon approval by ODEQ, EWEB must file the WQMP with FERC and implement the WQMP upon Commission approval.

Transmission Line Management Plan

EWEB identifies the development of a Transmission Line Management Plan as a project-wide modification under a new FERC License. A principal component of the plan is the realignment of a 0.7 mile segment of the 115-kV transmission line away from the Deer Creek riparian zone. Temperature monitoring indicates the presence of the transmission line reduces vegetative shade which contributes to Project-related warming in this reach. Following realignment of the transmission line corridor, EWEB will revegetate the riparian area.

EWEB shall prepare the Transmission Line Management Plan in accordance with Article 22 of the SA. EWEB shall submit the plan to FERC within 12 months of license issuance and complete realignment of the 115-kV transmission line out of the riparian zone within 3 years of License issuance.

Additional Staff Housing

Increased Project staffing under a new FERC License will necessitate expansion of the residential facilities located within the Project boundary. The additional facilities will require augmentation of the existing on-site septic system and modification of the Project water supply system.

Minimization of Spill from Carmen Reservoir

To reduce the magnitude and occurrence of unregulated spills from Carmen Diversion Dam, EWEB proposes to delay raising the seasonal elevation of Smith Reservoir from mid-April to mid-June to capture a larger portion of late Spring McKenzie River flows. Since flow through the Diversion Tunnel is a function of static head, lower pool elevations at Smith Reservoir will increase the diversion of late season flows which would otherwise be spilled. (EWEB 2006).

Turbine Runner Replacement

Under a new FERC License, EWEB will replace both Francis turbine runners at the Carmen Power Plant. EWEB expects the rebuilt turbines will result in more efficient operation and will reduce gas entrainment in tailrace discharge to levels which will comply with ODEQ numeric criteria.

EWEB will evaluate the need to replace the Kaplan turbine runner at the Trail Bridge Power Plant. The decision to upgrade the turbine runner will be based, in part, on projected efficiency improvements and lifecycle analysis of existing equipment. Measurements recorded during the 2004-2005 study seasons indicate TDG levels in Trail Bridge tailrace discharge comply with ODEQ numeric criteria for this parameter.

4.3.2 Modifications Required By Settlement Agreement

Modifications to the Project required under the terms of the Settlement Agreement are discussed below.

Fish Passage

Upstream Passage Facilities at Trail Bridge Dam

Within six years of the new FERC License and consistent with Articles 30 and 31 of the SA, EWEB shall complete construction of a volitional fish ladder and powerhouse tailrace barrier designed to provide safe, timely, and effective upstream passage of fish above Trail Bridge Dam.

Downstream Passage at Trail Bridge Dam
Within six years of the new FERC License and consistent with Article 32 of the SA, EWEB shall complete construction of a vertical fixed plate V-screen and bypass system for the downstream passage of fish at Trail Bridge Dam. The fish screen and bypass system are to be designed to provide safe downstream passage for juvenile salmonids past Trail Bridge Dam.

Upstream Passage at Carmen Diversion Dam
Section 4.2.1 of the Aquatics Management (AMP) requires EWEB to implement block releases of water from Carmen Diversion Dam into the upper Carmen bypass reach to support fish, wildlife and aquatic habitat. If by the tenth year of a new FERC License, but not later than the fifteenth year, efforts to increase the native cutthroat trout population below the dam are successful as provided in AMP Section 4.3.1.2, EWEB shall construct, operate, and maintain a fish ladder consistent with proposed License Article 4 of the SA designed to allow the safe, timely, and effective upstream passage of native migratory cutthroat trout above Carmen Diversion Dam.

Fish Protection at Carmen Power Plant
To investigate whether tailrace discharge at the Carmen Power Plant causes significant delay, substantial mortality, or serious injury to migrating fish, EWEB shall, within six months following the demonstrated successful migration of Spring Chinook salmon above Trail Bridge Dam as provided in AMP Section 4.1.4, prepare a plan to study these effects. If the findings of the study confirm the standard for significant delay or substantial mortality and serious injury is exceeded, EWEB shall prepare a plan to implement modifications and/or additions to the Project to address identified significant delay, substantial mortality or serious injury. The study and, if necessary, any subsequent adaptive management plans shall be developed and implemented consistent with proposed License Article 33 of the SA.

Bull Trout Access to Sweetwater Creek
To aid the upstream migration of bull trout into Sweetwater Creek, EWEB shall maintain Trail Bridge Reservoir at a minimum pool elevation of 2,083 feet from August 15 through October 31 as provided in AMP Section 4.1.5.

Trail Bridge Spillway Pool Fish Removal
Within 12 months of a new FERC License, EWEB shall develop a plan designed to aid in the safe and effective removal of adult Chinook salmon and adult bull trout from the Trail Bridge spillway pool following spill events as provided in AMP Section 4.1.6.

Trail Bridge Dam Spillway Minimum Gate Opening
To prevent fish entrapment, EWEB will maintain a minimum gate opening of one-half foot while operating the Trail Bridge spillway gate. Gate openings less than one-half foot may be maintained for no more than one hour while transitioning to fully open and fully closed positions as provided in AMP Section 4.1.7.

Upstream Passage at Spawning Channel
Consistent with proposed License Article 35 of the SA and AMP Section 4.1.8, EWEB shall design, construct, operate and maintain upstream fish passage facilities at the Carmen-Smith Spawning Channel with construction to be completed within seven years of a new FERC License.

Instream Flows
Upper Carmen Bypass Reach
Within six years of a new FERC License and consistent with proposed License Article 3 of the SA, EWEB shall release a minimum block flow of 30 cfs from Carmen Diversion Dam into the Upper Carmen Bypass Reach. Within three years of a new FERC License, EWEB shall complete construction on a release structure at Carmen Diversion Dam. The release structure shall be designed to allow flow releases up to 60 cfs.

Lower Carmen Bypass Reach
EWEB shall take the following actions to maintain a minimum target flow of 160 cfs in the Lower Carmen Bypass Reach as provided in AMP Section 4.2.2:

- Fund the Installation, operation, and maintenance of a USGS gauge approximately 0.2 miles upstream of Trail Bridge Reservoir as provided in AMP Section 4.2.2.3. The funding shall provide for installation of data acquisition capability and provide for real-time and public accessibility of data capability.
- Provide additional flow releases at Carmen Diversion Dam according to the schedule presented in Table 4-1 of the SA in AMP Section 4.2.2.1 to maintain a Minimum target flow of 160 cfs at the above referenced USGS gauge in the Lower Carmen Bypass Reach.
- Monitor the elevation in Blue Pool using the existing pressure transducer for a minimum of five years following initiation of block releases from Carmen Diversion Dam as provided in AMP Section 4.2.2.4.

Smith Bypass Reach
Within six years of a new FERC License, EWEB shall provide the minimum instream flows from Smith Reservoir into the Smith Bypass Reach as provided in AMP Section 4.2.3 as follows:

- Provide a minimum block release of 10 cfs year round;
- Provide a minimum block release of 35 cfs from August 16 through October 31;
- Provide a minimum instream flow of 30 cfs from November 1 through April 15;
- Provide a minimum instream flow of 25 cfs from April 16 through August 15;
- Provide a channel maintenance flow of at least 500 cfs for a minimum duration of five hours at least once every five years unless a flow of such a magnitude and duration has already occurred during the five-year period.

EWEB will also fund the installation and operation of a USGS stream gage located in the Smith bypass reach as provided in AMP Section 4.2.3.

Spill Reduction and Ramping in the Smith Bypass Reach
To reduce spills from Smith Dam and limit Project-induced downramp in the Smith Bypass Reach, EWEB will implement the following measures as provided in AMP Section 4.2.4.

- ***Automated Gate on Carmen Diversion Tunnel***
  EWEB will install a remotely operated automated gate mechanism to regulate flow through the Carmen Diversion tunnel at Carmen Diversion Reservoir. Operation of the automated gate will decrease the time necessary to implement management decisions in response to changing field conditions.

- ***Speed No Load Operation of Carmen Powerhouse***
  When power generation is interrupted, EWEB may operate the Carmen Power Plant at "speed no load" operation to divert up to 300 cfs from Smith Reservoir into Trail Bridge Reservoir to avoid the possibility of spills at Smith Dam.

- ***Turbine Bypass Valve***
  EWEB will install a 1,000 cfs bypass valve at the Carmen Power Plant within three years of a new operating license. In the event of a sudden generation outage, the bypass valve will allow the uninterrupted flow of water into Trail Bridge Reservoir and, therefore, reduce the occurrence of unregulated releases at the Smith Dam spillway gate.

- ***Smith Spillway Gate Management***
  EWEB will manage releases from the Smith Dam spillway gate to comply with a 3-inch per hour maximum downramp rate in the Smith Bypass Reach at the end of Project-induced spill events and for other spill events to the extent reasonably practicable as measured at a new USGS gauge to be located in the Smith Bypass Reach.

Habitat Protection, Mitigation, and Enhancement (PME) Efforts

Habitat PME – Lower Carmen Bypass

Consistent with proposed License Article 5 of the SA and AMP Section 4.3.2, EWEB will undertake efforts to augment the area of spawning habitat available to Chinook salmon in the lower Carmen bypass reach. The objective of this PME is the creation and maintenance of 300 square meters of additional spawning habitat, if reasonably practicable, through the initial placement of 200 tons of gravel. EWEB will also place and maintain large woody debris (LWD) between Trail Bridge Reservoir and Kink Creek at the rate of 80 pieces per mile.

Habitat PME – Upper Carmen Bypass

Consistent with proposed License Article 4 of the SA, EWEB will initiate the Upper Carmen Bypass Reach Protection, Mitigation, and Enhancement Plan as provided in the AMP Section 4.3.1. The principal goals of this effort are to support the native cutthroat trout population, control the population of non-native brook trout, maintain adequate spawning gravel, and, if cutthroat trout monitoring criteria are met, provide volitional upstream passage at Carmen Diversion Dam.

Habitat PME – Smith Bypass Reach

Consistent with proposed License Article 8 of the SA, EWEB will undertake measures in the Smith bypass reach to increase the area of Chinook spawning habitat to 320 square meters, if reasonably practicable, and to maintain this habitat for the duration of the License term. Measures required by the SA including AMP Section 4.3.5 include construction of 30 engineered spawning habitat structures, the addition of an initial 2,000 tons of gravel, and addition of LWD. During a subsequent phase of this PME, EWEB will provide flows to distribute and smooth spawning gravels. During the third step of this PME, EWEB will monitor the spawning area for three years. If the spawning area is less than the objective in AMP Section

4.3.5, EWEB will undertake activities to increase available habitat. If subsequent efforts do not achieve the objective in AMP Section 4.3.5, EWEB will contribute to a fund to finance Chinook salmon, cutthroat trout and bull trout habitat enhancement opportunities in the Project area.

Habitat PME – Carmen Diversion, Smith, and Trail Bridge Reservoirs
Consistent with proposed License Articles 6, 7, and 9 of the SA, EWEB will develop plans to increase the quantity and quality of habitat for juvenile and adult salmonids in the three Project reservoirs as provided in AMP Sections 4.3.3, 4.3.4 and 4.3.6. The plan will provide for the placement of both shallow- and deep-water engineered structures to accommodate habitat needs during various salmonid life stages. Pursuant to the License articles, EWEB shall construct no more than 15 structures in Carmen Diversion Reservoir, twenty structures in Smith Reservoir, and forty structures in Trail Bridge Reservoir.

Habitat PME – Carmen-Smith Spawning Channel
Consistent with proposed License Article 10 of the SA and AMP Section 4.3.7, EWEB shall develop a plan within three years of a new License to enhance and maintain suitable Chinook spawning and rearing habitat in the Carmen-Smith Spawning Channel for the term of the License. EWEB will take actions designed to achieve this objective through gravel augmentation, maintenance of existing gravel retention structures, providing appropriate escape cover in channel margins, and maintaining appropriate channel flows.

Flow Fluctuations
Flow Fluctuations – Trail Bridge Reservoir
Consistent with proposed License Article 11 of the SA and AMP Section 4.4.1, EWEB will manage the elevation of Trail Bridge Reservoir subject to the following schedule:

Maximum Daily Elevation Fluctuations
- Seven-feet from March 15 though October 31
- Twelve-feet from November 1 through March 14

Maximum Ramping Rate
Downramp:
- Twelve inches per hour from March 15 through August 31
- Fourteen inches per hour from September 1 through October 31
- 24 inches per hour from November 1 through March 14

Upramp:
- 38 inches per hour, year-round.

Flow Fluctuations – Downstream of Trail Bridge Dam
Consistent with proposed License Article 13 of the SA and AMP Section 4.4.3, EWEB shall manage releases from Trail Bridge Dam to comply with the following ramping restrictions in the main stem McKenzie River:

Upramp:
- Normal operations: 0.20 feet per hour
- Maintenance: 0.40 feet per hour (scheduled maintenance requires two weeks advance notification).

Downramp:

- 0.20 feet per hour, year-round

Daily and weekly variation, upramp and downramp:

	Daily	Weekly
• April 1 through August 31	0.30 feet	0.30 feet
• September 1 through October 31	0.20 feet	0.20 feet
• November 1 through March 31	0.60 feet	0.60 feet

Flow Fluctuations – Stranding in Trail Bridge Reservoir
Consistent with proposed License Article 12 of the SA and AMP Section 4.4.2, EWEB shall implement an adaptive approach toward the management of Trail Bridge Reservoir intended to limit the loss of Chinook salmon through stranding by reservoir fluctuations to less than two-percent of annual Chinook salmon fry production based on a 3-year rolling average. The stranding reduction plan requires EWEB to implement the following actions:

- Physically modify stranding zones;
- Evaluate effectiveness of the physical modifications;
- Monitor stranding for a minimum of five years;
- Adaptively manage reservoir facilities, operations and/or other actions if stranding exceeds two-percent standard;
- Provide annual summaries of elevation data to the Fisheries Work Group (FWG) and FERC.

5.0 WATER QUALITY STANDARDS AND REGULATIONS

Water quality standards are comprised of three elements. These include the beneficial uses that shall be protected, the water quality criteria intended to protect those uses and the antidegradation policy which protects existing water quality from degradation. To support all beneficial uses, water quality criteria may apply to specific waterbodies and reaches within those waterbodies. This section of the Evaluation and Findings Report identifies the beneficial uses which have been designated for waters of the McKenzie River and the numeric criteria necessary to support those uses. It also identifies 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 6.0.

5.1 Beneficial Uses

The Federal Clean Water Act (CWA) and Oregon water quality standards require that water quality be protected and maintained such 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 existing and potential beneficial uses that are recognized as significant with regard to water quality protection; (2) develop and adopt numeric and narrative criteria necessary to protect and sustain existing and potential beneficial uses; (3) establish and enforce discharge effluent limitations for each source permitted to discharge treated wastes into public waters to ensure 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 water quality degradation 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 Willamette Basin, where the proposed Project would be located, are listed in OAR 340-041-0340, Table 340A, and Figures 340A and 340B. These uses include public and private domestic and industrial water supply; irrigation; livestock watering; fish & aquatic life; wildlife & hunting; fishing; boating; water contact recreation; aesthetic quality; and hydropower.

5.2 Biologically-Based Numeric Criteria

The Fish and Aquatic Use maps in Figures 340A and 340B of OAR 340-041 provide definition about which temperature criteria apply in the McKenzie River. For the purposes of Oregon water quality standards, temperature is measured as the seven day rolling average of the daily maximum temperature (340-041-0002[56]). For ease in 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 dictate which dissolved oxygen criteria apply.

5.3 Antidegradation Policy

Oregon's antidegradation policy (OAR 340-041-0004) applies to all surface waters. The goal of the antidegradation policy is to prevent unnecessary further degradation of water quality and to protect, maintain, and enhance the quality of existing surfaces waters to ensure the full protection of all existing beneficial resources. For waters which meet applicable water quality standards, the policy states that the existing water quality shall be maintained and protected unless the Environmental Quality Commission (EQC) makes certain rigorous findings of need. For water bodies which do not meet certain criteria, the policy prohibits further degradation.

5.4 Water Quality Impairment in the McKenzie River

Waterbodies which fail to meet certain water quality criteria are designated as water quality limited pursuant to CWA §303(d). The U.S. Environmental Protection Agency (EPA) requires States to develop total maximum daily loads (TMDLs) for waters identified as water quality-limited. A TMDL identifies the maximum pollutant load which a water body may receive from combined point and non-point sources and still meet water quality standards necessary to support all designated beneficial uses. TMDLs quantify wasteload allocations (WLAs) for point sources and load allocations (LAs) for non-point sources. For hydroelectric projects located on a water quality-limited waterbody, a § 401 certification may serve as the means for implementing LAs assigned to the project. Rules for developing, issuing and implementing TMDLs are in OAR 340-042-0025—0080.

The DEQ 2004/2006 Integrated Report presents a database of water quality limited waters in Oregon. Table 6 identifies the sections of rivers in or near the Project boundary currently identified as water quality limited in the 2004/2006 Integrated Report.

Table 6: Water Quality Limited Status of the McKenzie River and Deer Creek

River	River Mile	Parameter	Period	Criteria	Beneficial Use	Status	Assessment
McKenzie	7.5 to 34.1	Temp	9/1 - 6/15	13 C	Spawning	TMDL needed	Added 2004
McKenzie	36 to 54.6	Temp	9/1 - 6/15	13 C	Spawning	TMDL needed	Added 2004
McKenzie	0 to 54.6	Temp	Year round	16 C	Core cold water	TMDL needed	Added 2004
Deer Cr.	0 to 8.3	Temp	Summer	18 C	Rearing	303(d) listed	Added 1998
Deer Cr.	0 to 2.6	Temp	9/1 - 6/15	13 C	Spawning	TMDL needed	Added 2004
Deer Cr.	0 to 2.6	Temp	Year round	16 C	Core cold water	TMDL needed	Added 2004

McKenzie River reaches included on the state's 2004/2006 303(d) list are shown in Table 6.

In order to issue a § 401 Water Quality Certificate, ODEQ will evaluate a § 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 in 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.

5.5 Water Quality Standards Not of Concern

Water quality standards identified in Table 7 are typically not negatively affected by the operation of hydroelectric facilities. For this reason, and as further explained below, ODEQ is reasonably assured that the water quality standards identified in Table 7 below will be met during operation under a new License.

Table 7: Water Quality Standards Not Affected by Proposed Project Operations

Criterion	**Standard**	**ODEQ Evaluation**
Fungi OAR 340-041-007(10)	*The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or that are injurious to health, recreation, or industry may not be allowed.*	The Project does not discharge substances or engage in activities which promote fungal growth.
Taste & Odors OAR 340-041-007(11)	*The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the palatability of drinking water or the palatability of fish or shellfish may not be allowed*.	Project operations have not historically and are unlikely under a new License to result in objectionable taste and odor characteristics, or conditions which adversely impact the palatability of water, fish, or shellfish.
Aesthetic conditions OAR 340-041-007(14)	*Aesthetic conditions offensive to human sight, taste, smell or touch may not be allowed.*	Project operations have not historically are unlikely under a new License to cause or contribute

		to aquatic conditions that would be offensive to the human senses of sight, taste, smell, or touch.
Radioisotopes OAR 340-041-007(15)	*Radioisotope concentrations may not exceed maximum permissible concentrations in drinking water, edible fishes or shellfishes, wildlife, irrigated crops, livestock and dairy products, or pose an external radiation hazard.*	The Project does not utilize, store, or produce radioactive material.
Bacteria OAR 340-041-009	*Limits in-water concentration of bacterial cells, discharge of raw sewage, animal waste runoff, sewer overflows, and other sources of bacterial pollution.*	The Project does not discharge sewage or animal wastes into Project waters or engage in other activities which may contribute to bacterial pollution.
Total Dissolved Solids OAR 340-041-0032 & OAR 340-041-0345	*Standard generally prohibits TDS concentrations which exceed basin-specific criterion of 100 mg/l.*	The Project does not contribute organic or inorganic substances in molecular, ionized, or micro-granular form which may affect TDS in Project waters.

5.6 Water Quality Standards Subject to Detailed Analysis

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

This evaluation is limited to the effects the operation of the Project under a new License may have on water quality. The implementation of aquatic PMEs or other activities which necessitate in-water work may require separate water quality certifications issued by ODEQ or pre-authorized pursuant to an Army Corps of Engineers Section 404 dredge and fill permit.

Based on information provided by the Applicant coupled with a general understanding of the impact of hydroelectric operations on water quality, ODEQ has identified water quality standards which may be influenced by Project operations as proposed by the Applicant. Table 8 identifies the water quality standards potentially impacted by the operation of the Project under a new FERC License.

Table 8: Water Quality Standards Subject to Detailed Analysis

Criterion	Description of Standard	ODEQ Evaluation
Sediment OAR 340-041-007(12)	The formation of bottom or sludge deposits deleterious to habitat and aquatic life are not allowed.	Project developments and operations alter sediment transport in the Project area.
Oily sheen, oily coatings OAR 340-041-0007(13)	Objectionable discoloration, scum, oily sheen, floating solids or coating aquatic life with oil films is not allowed.	Oil is used in project turbines and transformers. EWEB also maintains fuel storage tanks for backup generators and vehicle fueling.
Biocriteria OAR 340-041-0011	Waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.	Changes in flow regimes may alter the ecological integrity necessary to support an adaptive biological community.
Dissolved Oxygen OAR 340-041-0016	Sufficient concentrations of dissolved oxygen are necessary to support aquatic life.	Passing reservoir discharge water through the Project turbines may reduce aeration (oxygenation).
Nuisance Algae Growth OAR 340-041-0019	Algal growth which impairs the recognized beneficial uses of the water body is not allowed.	Increased retention time in Project impoundments may support the growth of phytoplankton.
pH OAR 340-041-0021 & OAR 340-041-0345	pH values may not fall outside the basin-specific range of 6.5-8.5.	Project developments may alter conditions which influence hydrogen ion activity in Project waters.
Temperature OAR 340-041-0028	Water temperature must support all life stages of temperature-sensitive aquatic communities.	Stream temperature can be negatively impacted by lower flows in bypass reaches. Project developments which reduce effective shade may also contribute to higher water temperature.
Total Dissolved Gas OAR 340-041-0031	Protects aquatic life from gas bubble trauma caused by water that is supersaturated with atmospheric gases.	Atmospheric gases may become entrained in waters discharged from turbines.
Turbidity OAR 340-041-0036	Numeric criterion generally prohibits turbidity increases which exceed 10-percent above background.	Modifications to scheduled flows under a new FERC License may increase turbidity.
Antidegradation OAR 340-041-0004	Protects existing water quality by preventing unnecessary additional water quality degradation.	Must be addressed when a project is proposed that may lower existing water quality conditions, even though standard violations are not anticipated.
Toxic material OAR 340-041-0033	*Discharge of toxic material that affects aquatic life or human uses is not allowed.*	The Project may not discharge toxic material in amounts which violate toxic substances criteria.
Three Basin Rule OAR 340-041-0350	*New and/or increased waste discharges are prohibited in three Oregon basins, including the McKenzie above RM15.*	The Project is located in the McKenzie River Subbasin above RM15 in a watershed used as a source for high quality municipal water.

6.0 WATER QUALITY COMPLIANCE EVALUATION

Pursuant to Section 401 of the CWA, States are required to determine if actions authorized by federal permits will comply with state water quality standards. In this section, ODEQ evaluates the effect which Project operations proposed under a new FERC License may have on the water quality standards identified in Table 8.

The general format for evaluating water quality standards is given below:

1. The applicable water quality standard is presented.
2. An interpretation or application of the standard is discussed in the context of Project operations and conditions under a new FERC License.
3. Existing water quality is reviewed and discussed.
4. The Applicant's position regarding compliance with the standard is presented.
5. ODEQ's evaluation of Project compliance is presented.
6. ODEQ's findings are presented. The Certification will set forth applicable requirements and conditions deemed necessary to reasonably assure proposed actions will comply with water quality standards and support designated beneficial uses.

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.

6.1 Bottom Deposits and Sediment

6.1.1 Applicable Standard

The standard is given in OAR 340-041-0007(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.

6.1.2 Application of Standard

This regulation prohibits the creation of bottom or sludge deposits that are deleterious or injurious to designated beneficial uses.

Deposits such as sediment may have several adverse effects: (1) toxicity, (2) blanketing bottom dwelling aquatic life, (3) depletion of dissolved oxygen, and/or (4) hindering the intergravel dispersion of oxygen into buried fish eggs.

6.1.3 Present Conditions

Sediment production in the Upper McKenzie basin occurs principally through landslides, soil creep, and surface erosion. Production rates and mechanisms vary significantly with geologic terrain. Sediment yield in steep drainages of the Western Cascade ranges from 54 tons per

square mile per year (t mi^{-2} yr^{-1}) to 134 t mi^{-2} yr^{-1}. In contrast, sediment production in High Cascade source areas ranges from 4 t mi^{-2} yr^{-1} to 9 t mi^{-2} yr^{-1} (Stillwater Sciences 2006f).

Project impoundments trap downstream sediment transport resulting in reduced sediments available to habitat in Project bypass reaches. Smith and Trail Bridge Reservoirs reportedly trap an estimated 11,960 tons per year and 3,990 tons per year, respectively. Reduced sediment availability below these impoundments can result in a general coarsening of streambed materials as finer grained materials are transported downstream. Little sediment has accumulated behind Carmen Diversion Dam due to characteristically low sediment production rates of High Cascade terrain drainages.

Several Project developments may contribute to the sediment budget within and downstream of the Project. These include:

- The 115-kV transmission line which connects the Carmen substation with the BPA tap near Cougar Reservoir is aligned along the lower 0.8 miles of Deer Creek much of which is in or near the active stream channel. Maintenance to control vegetation near towers may present an opportunity to enhance sediment mobilization in stream margins.
- Spillway discharge released from the Smith Dam emergency spillway has eroded an area near the base of the steep south-facing hillside. The base of the spillway terminates in a scoured plunge pool. The exposed surface of the spillway watercourse currently appears to be erosionally resistant volcanic rock. However, the stability of areas adjacent to the spillway is uncertain and may periodically introduce material into the scoured spillway.
- USDA Forest Road 2600730 is located adjacent to the Smith River bypass reach. A number of dispersed camp sites, not supported by the Project, exist between the road and the stream. Flows in Smith are dominated by inflow from Bunchgrass which typically decline to several cfs in summer. Little visual evidence exists of increased sedimentation from anthropogenic activity in this reach. However, disturbed soils adjacent to this reach remain susceptible to erosional transport in response to periodic emergency spills from Smith Dam.
- Shorelines along Smith and Trail Bridge Reservoirs are susceptible to chronic erosion due to wind- or boating-induced waves. Wave-induced erosional effects are likely of greater concern at Trail Bridge Reservoir. Elevation fluctuations at this re-regulating facility daily expose coastline margins which may contribute to accelerated sedimentation.

6.1.4 Applicant Position

Vegetation management along the 115-kV transmission line corridor does not contribute to increased sedimentation within lower Deer Creek. Slopes adjacent to the utility corridor right-of-way are characterized by thick soils and dense understory vegetation which display little evidence of accelerated erosion.

The Applicant estimates the material displaced at the base of the Smith Dam spillway contributes less than one-percent of the annual sediment budget in this reach. The estimate for this volumetric rate is based on an assumed soil thickness of one-meter over an affected area of one-half acre averaged over the period of 41 years preceding the study.

Visual observations coupled with aerial photograph interpretation demonstrate an absence of sedimentation originating from stream margins adjacent to the Smith River bypass reach. The Applicant further maintains that flows in this reach are insufficient to mobilize embankment soils or materials near the base of the roadbed prism.

The Applicant states that the potential for shoreline erosion is low and does not threaten resources of concern.

6.1.5 ODEQ Evaluation

The Department believes that any contribution to the sediment budget of Deer Creek due to the presence and/or maintenance of the 115-kV transmission line corridor is indistinguishable from background conditions which exist in this reach. Studies performed by Stillwater Sciences (2006f) indicate Deer Creek accounts for nearly 58 percent of all sediment production within the 250 square mile Upper McKenzie basin Study Area. Furthermore, the broad valley geometry of lower Deer Creek promotes active and semi-active sediment storage. Given these characteristics, ODEQ believes sediment input from routine tower maintenance does not significantly influence the sediment budget in lower Deer Creek.

Within three years of a new License, EWEB shall relocate the 115-kV transmission line from the active channel portion of lower Deer Creek pursuant to proposed License Article 22 of the SA. ODEQ believes that completion of this action will further reduce the potential for Project-related sediment impacts within Deer Creek.

Releases from the Smith Dam emergency spillway consist of high energy spills with enormous erosive force. Historic spills have removed most unanchored material from within the margins of the spillway resulting in the present channel of exposed armored bedrock terminating in a scoured pool near the junction of Bunchgrass Creek. EWEB expects to reduce the operational frequency of the emergency spillway gate at Smith Dam by implementing measures in AMP Section 4.2.4 including the *Operational Guidelines for Smith Reservoir and Bypass Reach* presented as Attachment C of the Aquatics Management Plan. Little source sediment remains in the spillway. ODEQ believes that reduced operation of the spillway structure, coupled with the limited availability of sediment material remaining in the spillway, will further reduce the potential for downstream sediment transport. These operational changes envisioned under a new License will presumably also reduce erosion potential along USDA Forest Road 2600730 adjacent to the Smith River bypass reach.

Some redistribution of shoreline sediments likely occurs in response to wave action and/or changes in reservoir levels. ODEQ believes the net movement of these sediments is low particularly when compared to overall reservoir sedimentation rates. Reconnaissance surveys performed by Stillwater did not confirm mass movement of shoreline sediments nor was evidence suggesting the formation of gullies. ODEQ concurs with this assessment and believes the movement of shoreline sediments will not impair designated beneficial uses or violate the narrative criterion for bottom deposits and sediment.

6.1.6 ODEQ Findings

ODEQ is reasonably assured Project operation under a new FERC license will not violate the state narrative criteria for bottom deposits and sediment provided the following measures are implemented:

- EWEB shall implement the spillway reduction measures described in AMP Section 4.2.4 including the *Operational Guidelines for Smith Reservoir and Bypass Reach.*

- EWEB shall develop and implement a Transmission Line Management Plan (TLMP) in accordance with proposed License Article 22 of the SA. The TLMP must implement Best Management Practices which specifically address reducing excess sedimentation and turbidity as provided in the SA Vegetation Management Plan (VMP) Section 4.6. EWEB must obtain all permits, certifications, and authorizations, as necessary, prior to performing realignment activities.

- To reduce the potential for erosion, EWEB shall perform restoration and/or enhancement efforts in or near riparian areas in accordance with the methodology and performance standards presented in the VMP.

6.2 Objectionable Discoloration, Scum, and Oily Sheens

6.2.1 Applicable Standard

The standard is given in OAR 340-041-0007(13):

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

6.2.2 Application of Standard

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

6.2.3 Present Conditions

The Carmen-Smith Project operates numerous pieces of equipment which contain oil or other chemical liquids. The Project also stores petroleum fuels, greases, and lubricants at several locations. An inventory of petroleum and chemical products used or stored at the Project is presented in Table 9 (EWEB 2008c).

Table 9: Inventory of Project Petroleum and Chemical Storage

Location	Equipment	Product Type	Total Volume (gal.)
Carmen Substation	Main Transformers	Insulating Oil	14,000
	Potential Transformers	Insulating Oil	92
	Emergency Generator Fuel Tank	Diesel	180
Carmen Power Plant	Governor oil system	Lube oil	1,100
	Generator & turbine bearings	Lube oil	1,560
	Lube oil storage tanks	Lube oil	1,600
Trail Bridge Power Plant	Governor oil system	Lube oil	700
	Generator & turbine bearings	Lube oil	570
	Lube oil storage tanks	Lube oil	1,400
Trail Bridge Dam	Emergency Generator Fuel Tank	Diesel	100
Smith Dam	Generator Fuel Tank	Diesel	110
	Step-down transformer	Transformer oil	100
Project Office	Aboveground fuel tanks	Gasoline & diesel	1,000
Hazardous Material Building	New and used petroleum and chemical products	Oils, antifreeze, solvents, gasoline, diesel	330

EWEB has developed a Spill Prevention Control and Countermeasure (SPCC) Plan, dated December 10, 2008, pursuant to the federal requirements given in 40 CFR 112. The objective of the SPCC Plan is to prevent the discharge of oil and/or hazardous substances into Project waters. The SPCC Plan proposes to accomplish this objective through spill prevention strategies, engineered secondary containment features, and contingency plans to guide decision-making in the event of a release. Oregon requirements to address spill response and cleanup of hazardous materials are also given in ORS 466.605.

6.2.4 Applicant Position

EWEB believes the spill prevention and response procedures contained in the SPCC Plan are adequate to safeguard aquatic resources from adverse consequences related to spills of hazardous materials. EWEB recorded one reportable release, in July 2005, when changing reservoir levels overturned a boat docked overnight by a contractor. The accident spilled a small quantity of fuel. EWEB reported the incident to the Oregon Emergency Response System (OERS). The incident was subsequently cleaned up.

EWEB has recorded no other incidences of reportable releases related to the operation and maintenance of the Project. Furthermore, EWEB has no records documenting visual evidence of oil sheens from Project facilities.

6.2.5 ODEQ Evaluation

Under normal operations, the incidental leakage of oils and greases from otherwise properly maintained turbines and generators would not reasonably result in a sheen or cause adverse or objectionable conditions. Greases and lubricants are used in small quantities in dam gates and other installations near open water. The appropriate application of these products is not expected to result in adverse or objectionable conditions.

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

6.2.6 ODEQ Findings

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

SPCC Plan
EWEB must implement the spill prevention and response measures as presented in the SPCC Plan. EWEB must periodically update the SPCC Plan as required by federal regulations or as warranted to reflect changes in Project operation, use of materials, or strategic change in response procedures.

Best Management Practices
During use of materials which may, if spilled, cause adverse or objectionable conditions in violation of this water quality standard, EWEB must employ Best Management Practices appropriate to the task being performed. All materials must be used in a manner and for a purpose which reflects their intended application. EWEB may consult the manufacturer for guidance related to appropriate application methodology, recommended cleanup procedures, appropriate storage, and acceptable disposal protocols.

Notification
In the event of a spill or release or threatened spill or release to waters of the state of petroleum or other hazardous substances at or above reportable quantities as specified in applicable state and federal regulations, EWEB must implement the spill response procedures in the SPCC Plan, notify OERS, and comply with ORS Chapters 466 and 468, as applicable.

Recordkeeping
For the term of the new FERC License, EWEB shall retain records for the period of time required by law which document: modifications to the SPCC Plan; reportable releases; visual observations and/or photographic documentation of hazardous material releases which impact aquatic resources; remedial activities undertaken by EWEB or a contractor to address hazardous material releases; correspondence and/or conversation records which document agency notification, as warranted regarding hazardous material releases; other records deemed appropriate.

6.3 Biocriteria

6.3.1 Applicable Standard

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

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

6.3.2 Application of Standard

This narrative criterion recognizes that compliance with individual criteria may not fully capture synergistic effects resulting from multiple stressors and cumulative impacts on aquatic species and resident biological communities. The biocriteria standard complements parameter-specific standards by extending broad protections to all designated beneficial uses with the implicit assumption that if the most sensitive beneficial use is protected, then all uses will be protected. Application of the biological criteria standard is intended to assess the overall impact to the aquatic community from water quality changes attributable to an anthropogenic activity. In practice, the biological criteria standard uses biomonitoring techniques to assess biological health, integrity, and complexity of resident biological communities within the Project area relative to comparable reference locations.

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

(5) "Appropriate Reference Site or Region" means a site on the same waterbody, or within the same basin or ecoregion that has similar habitat conditions, and represents the water quality and biological community attainable within the areas of concern.
(6) "Aquatic Species" means plants or animals that live at least part of their life cycle in waters of the state.
(17) "Designated Beneficial Use" means the purpose or benefit to be derived from a water body, as designated by the Water Resources Department or the Water Resources Commission.
(19) "Ecological Integrity" means the summation of chemical, physical and biological integrity capable of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region.
(50) "Resident Biological Community" means aquatic life expected to exist in a particular habitat when water quality standards for a specific ecoregion, basin, or water body are met. This must be established by accepted biomonitoring techniques.
(75) "Without Detrimental Changes in the Resident Biological Community" means no loss of ecological integrity when compared to natural conditions at an appropriate reference site or region.

6.3.3 Present Conditions

In August and September 2004, the Applicant conducted a series of benthic macroinvertabrate (BMI) surveys within the Project area (Stillwater Sciences 2006c). The purpose of the surveys was to assess the relative biological integrity of aquatic environments above and below Project developments. The Applicant maintains that the abundance and complexity of BMI populations are directly influenced by water quantity and quality and are, therefore, appropriate and reliable indicators of biological integrity and overall water quality.

The Applicant conducted BMI surveys within a single study season at nine locations within the Project area, including five along the mainstem McKenzie River, two sites along Smith River, and two sites in Deer Creek. BMI sampling locations are identified in Figure A-3.

Samples were analyzed to determine the number of distinct taxa represented at each sampling location. Multimetric scores were used to assess overall biological integrity of representative

portions within the Project area. The Applicant states the findings of the 2004 investigation demonstrate no impairment to resident benthic communities within the Project area compared to locations upstream or downstream of the Project. Compared with the findings of a study conducted of habitat complexity in Western Montane Highlands sub-region of the Cascades eco-region by the McKenzie Watershed Council (MWC 2002), data from the Applicant suggests a general lack of habitat complexity within the Project area. However, this finding may be a reflection that fewer low-gradient riffles exist within the locality of the study area due to locally steeper hydraulic gradients.

The Applicant acknowledges that Project developments affect the distribution, abundance, and movement of migratory fish.

6.3.4 Applicant's Position

The Applicant maintains that the studies completed in 2004 demonstrate the Project has not reduced or impaired the ecological integrity of benthic communities within the Project area. Based on the findings of the 2004 investigation, the Applicant believes the abundance and complexity of BMI assemblages within the Project area are generally comparable to benthic communities found elsewhere within the Western Montane Highlands sub-region of the Cascades ecoregion. The Applicant states that waters in the Project area support a variety of native and introduced fish which further underscores the relative health of benthic communities. The Applicant cites proposed aquatic habitat enhancement PMEs (e.g., LWD placement) as measures intended to increase the complexity of benthic biological communities. EWEB cites other PMEs, such as increased flows and volitional fish passage at Trail Bridge Dam, as measures which will enhance support for aquatic beneficial uses.

6.3.5 ODEQ Evaluation

The biocriteria standard extends broad protections to all beneficial uses. This standard complements other criteria-specific water quality standards while examining cumulative impacts from multiple stressors associated with Project developments and operations. Evaluation is based both on compliance with the other water quality standards and on the water-quality related PME measures from the Carmen-Smith Settlement Agreement.

Biological metrics suggest that benthic production is stable and sufficient to sustain existing healthy fisheries at current levels. Currently, Project developments and operations may impact the ecological integrity necessary to fully support all designated beneficial uses. Specifically, Project developments and operations restrict the historic range and distribution of native resident and migratory fish, alter the natural hydrograph, reduce or dewater habitat, diminish gravel and large wood recruitment, alter ramping rates, affect water quality, and reduce sediment transport. Many Project-related impacts are addressed directly through SA measures and are discussed below.

<u>Instream Flow</u>

Providing increased flows to Project bypass reaches will increase the protection of physical habitat necessary to support aquatic life, the safeguarding of emergent fry from stranding, and the enhancement of overall water quality. The SA provides a schedule of flow releases to enhance connectivity, meet temperature criteria, and provide flows to support beneficial uses within the Project area. ODEQ recognizes that placement of additional water in these reaches as described in AMP Section 4.2 will provide support for aquatic beneficial uses by reducing

flow fluctuations, promoting benthic macroinvertebrate communities as forage sources, and stabilizing water quality.

Smith Bypass Reach: The Smith River is fully impounded by the Smith Dam. Except for infrequent spills from the Smith Dam spillway, all water in the reach below the dam consists of flow from Bunchgrass Creek and a small amount of groundwater accretion. Seasonally low flows in this reach expose rock barriers and may affect water quality. Within six years of the new License, EWEB will provide block releases to the Smith bypass reach in accordance with the schedule provided in Aquatics Management Plan Section 4.2.3. Instream flows in the Smith River bypass reach are intended to support spawning habitat for Chinook salmon and other native fish species.

Upper Carmen Bypass Reach:
Flows below Carmen Diversion Dam are unscheduled and generally occur when reservoir inflow exceeds the capacity of the diversion tunnel. Records indicate that between 1960 and 2003, Carmen Dam spilled an average of 76 days per year. (Stillwater Sciences 2006b). During this period of record, Carmen Dam reported spills during at least 20 percent of the time between December and May. Surface water percolates rapidly into the subsurface within this reach such that surface flows rarely extend downstream to Tamolich Falls. Several isolated pools which support fish are present below the dam, but the surface hydrology and irregular flow frequency generally limit aquatic connectivity. Providing year round base flows will increase aquatic habitat and is designed to support an increase in the native cutthroat trout population above Tamolich Falls.

Flows which emerge below Tamolich Falls year round consist largely of groundwater accretion with an additional component of surface water from the sinking portion of the Upper Carmen bypass reach. For this reason, reduced flow caused by the Carmen Dam development indirectly influences instream flows observed in the Lower Carmen bypass reach. EWEB will provide minimum block flow releases from Carmen Diversion Dam in accordance with the schedule provide in AMP Section 4.2.1.

ODEQ believes the schedule of prescribed releases from Carmen Dam will benefit efforts to increase the native cutthroat trout population in the Upper Carmen bypass reach and are necessary to fully support the beneficial uses identified in this stream segment. These releases will further provide a year round component of the Lower Carmen target base flows to support increases in native salmonid populations.

Lower Carmen Bypass Reach: The SA establishes a minimum target flow of 160 cfs to increase habitat and support increases in native salmonid populations. EWEB will manage releases from Carmen Diversion Dam in accordance with AMP Section 4.2.2 designed to maintain target minimum flows below Tamolich Falls. The SA also provides that EWEB will fund the installation, operation, and maintenance of a USGS stream gauge approximately 0.2 miles above Trail Bridge Reservoir. EWEB shall also operate a pressure transducer to gage river elevation near Blue Pool for at least five years. ODEQ believes these gages will provide the ability to more accurately track flows.

Spill Reduction and Ramping in Smith Bypass Reach: In support of PME measures and prescribed flow releases in the Smith bypass reach, EWEB will undertake the following

operational modifications when EWEB determines it is reasonably necessary to avoid spills at Smith Dam:

A remotely operated gate will be installed at the inlet to the Carmen diversion tunnel to reduce flow to Smith Reservoir in the event the Carmen powerhouse is taken off line.

EWEB will install a 1,000 cfs synchronous turbine bypass valve to route flow around the Carmen powerhouse in the event of an outage.

EWEB will operate the Smith Reservoir emergency spill gate to limit downramp rates to no more than three inches per hour at the end of Project-induced spill events and at the end of other spill events to the extent reasonably practicable.

Reducing the occurrence of high-volume emergency spills in the Smith River bypass will sustain PME efforts to enhance and increase the fishery in this reach. Further, moderating downramp rates will have a positive affect on benthic production, aquatic resources, and water quality in the Smith River bypass reach.

Habitat Protection, Mitigation, and Enhancement Measures

Project dams and managed flows alter the mechanisms by which bypass reaches recruit, distribute, and assemble material necessary to maintain habitat structure. The Carmen-Smith Settlement Agreement specifies a number of PME measures to improve gravel recruitment, management of large wood, and passage of sediment within Project bypass reaches. ODEQ believes these PME measures will collectively support and enhance fishery and aquatic life, and support water quality and habitat improvements in stream segments. PME measures are set forth in the Carmen Smith Settlement Agreement Sections 4.3 and 4.5.

Fish Passage

Project dams and other developments currently interrupt or prevent the safe, timely, and effective passage of migratory fish within portions of the Project area. Impacts from these developments restrict the historic range and distribution of native salmonids which rely on migration to complete essential life history requirements. ODEQ applies the biological criteria to changes caused by Project effects which obstruct the chemical or physical connectivity necessary to fully support all designated beneficial uses. Project developments which impact the volitional movement of fish within the Project area are discussed below:

Carmen-Smith Spawning Channel: The spawning channel was constructed in 1962 to create spawning habitat for Chinook salmon. A velocity barrier in the McKenzie River directs most upwardly migrating fish into the engineered channel located about 400 feet downstream of Trail Bridge Dam. To facilitate upstream migration into the spawning channel, EWEB will reduce the step height at the entrance to the spawning channel to no more than six inches.

Trail Bridge Dam: Trail Bridge Dam currently prevents all upstream fish movement. Outmigrating fish may be subject to entrainment at the turbine intake, Howell-Bunger valve, or spillway gate. Under a new License, EWEB shall construct, operate, and maintain a volitional fish ladder and tailrace barrier at Trail Bridge Dam. EWEB shall also provide a fish screen and bypass system designed to provide for timely downstream passage of outmigrating fish from Trail Bridge Reservoir.

Sweetwater Creek: Bull trout access the lower portion of Sweetwater Creek through a 1992 fish passage culvert. To aid upstream migration, EWEB shall maintain the surface of Trail Bridge Reservoir at 2,083 feet MSL from August 15 through October 31 to aid bull trout migration through the Sweetwater Creek culvert.

Carmen Powerhouse: EWEB will develop a plan within six months of the new FERC License issuance to evaluate whether flows from the Carmen Powerhouse result in significant delay, substantial mortality, or serious injury to migrating fish.

Carmen Diversion Dam: Upstream migration beyond Carmen Diversion Dam is prevented. Outmigration may occur during spill events. In support of habitat PME measures described in AMP Section 4.3.1, EWEB will construct a small fish ladder at Carmen-Diversion Dam designed to facilitate upstream passage of native cutthroat trout in the Upper Carmen bypass reach if the criteria in AMP Section 4.3.1.2 are met.

Smith Bypass Reach: A natural obstacle about 2,200 feet upstream of Trail Bridge Reservoir may limit movement of fish in the Smith River bypass reach during late summer flow conditions. Although not a Project development, this obstacle emerges as a potential obstruction to fish movement. Scheduled block releases of water from Smith Dam may ensure adequate flows to facilitate timely passage beyond this potential obstruction.

Smith Dam: Upstream movement of all fish species is prevented by Smith Dam located about 2.5 miles upstream of Trail Bridge Reservoir. Outmigration of fish from this impoundment is subject to entrainment in either the Smith intake or emergency spillway. ORS 509.585(2) currently prohibits the placement of artificial barriers in waters of the state which are, or were historically, inhabited by migratory fish without providing appropriate alternate upstream and downstream passage. On August 29, 2008, EWEB applied to ODFW for a fish passage waiver in accordance with ORS 509.585(7). The application proposed to balance the loss of historical habitat range resulting from Smith Dam with negotiated alternatives to passage intended to provide a net benefit to species in the Project area compared to providing fish passage at the dam. ODFW concluded that the proposed measures will yield a net benefit to migratory species present in the Project area compared to providing fish passage at the dam. ODFW anticipates the measures, which increase habitat complexity and provide greater spawning area, will greatly increase spring Chinook smolt production. In October 2008, the Oregon Fish and Wildlife Commission entered into a fish passage waiver agreement with EWEB.
Upstream and downstream passage at the Project dams is addressed in the Carmen Smith Settlement Agreement Section 4.1. PME measures consisting of fish screens, fish ladders, and mitigation-in-lieu of passage have been accepted in the Carmen Smith Settlement Agreement by the Parties to increase native salmonid populations in Project-affected waters.

Flow Fluctuation

EWEB operates The Carmen-Smith Hydroelectric Project as a peaking and load following facility using diverted and stored water in different modes to maximize power generation from available resources. The Carmen and Smith Reservoirs are used for diversion and storage, respectively. Trail Bridge Reservoir is a re-regulating facility which moderates downstream releases to the McKenzie River from reservoir inflow, including peaking discharge from the Carmen powerhouse.

The operation results in Project-induced changes in river and reservoir elevations which may have impacts on aquatic life, benthic production, and water quality. Flow alterations may directly impact benthic communities by displacing early development stage invertebrates and food sources. Downramping events can also dewater shallow habitat causing desiccation of immobile species. These effects may collectively impact macroinvertebrate community composition and abundance and alter prey opportunities for juvenile salmonids (EWEB 2006). Rapid downramp events may lead to fish stranding in shallow margins which lack adequate escape opportunities to deeper water.

EWEB conducted a study to identify effects of Project-induced flow fluctuations on aquatic resources in the Project area. The studies identified certain portions of the Smith River which are subject to a backwater effect caused by periodic changes in reservoir elevation. The studies concluded no dewatering of salmonid redds occurred in response to changes in reservoir elevation. Further, Project-induced ramping effects in the full flow reach of the McKenzie River downstream of Trail Bridge Dam produced negligible response in aquatic conditions near observed spawning areas. Project operations may influence benthic macroinvertebrate production in Project river reaches, but have little effect on prey availability to juvenile salmonids. Stranding of juvenile salmonids in the shallow margins of Trail Bridge Reservoir was documented and occurred primarily in three potential stranding zones. EWEB will evaluate physical modifications of these zones and other actions designed to enhance egress opportunity and reduce stranding potential.

Management of Project-induced flow fluctuations is addressed in AMP Section 4.2. ODEQ believes the flow fluctuation management strategies presented in the Carmen-Smith Settlement Agreement will reduce the impact of flow modifications on aquatic resources for the term of the new License.

6.3.6 ODEQ Findings

ODEQ is reasonably assured that the operation of the Project under a new FERC License will comply with the Biological Criteria water quality standard provided the following measures are implemented:

Fish Passage
EWEB shall construct, operate, and maintain, as applicable, all fish passage and PMEs as set forth in the AMP Section 4.1.

Habitat Protection, Mitigation, and Enhancement
EWEB shall implement the habitat protection, mitigation, and enhancement measures set forth in proposed License Articles 5 through 10 and as set forth in the AMP Section 4.3.

Instream Flows
EWEB shall meet the instantaneous in-stream flows as set forth in the AMP Section 4.2 for fish and other aquatic species. By December 31 of each year, EWEB shall submit to ODEQ an annual report regarding flow releases and in-stream flows as provided in AMP Section 4.2 including Sections 4.2.1.2 and 4.2.4 with average hourly flows passed and diverted at the Project developments for the previous water year.

Flow Fluctuations

EWEB shall operate, monitor, and adaptively manage flow fluctuations in Trail Bridge Reservoir and in the McKenzie River downstream of Trail Bridge Reservoir in accordance with the schedules set forth in the AMP Section 4.4. EWEB shall further implement the fish stranding reduction plan in AMP Section 4.4.2 to reduce stranding mortality in Trail Bridge Reservoir caused by Project-induced reservoir fluctuations.

Water Quality

As provided by proposed License Article 25, EWEB shall prepare and submit to ODEQ for approval a Water Quality Management Plan (WQMP) within 12 months of License issuance. The WQMP shall address the conditions presented in this Section 401 water quality certification. EWEB shall submit the WQMP to FERC and implement the WQMP upon Commission approval.

6.4 Hydrogen Ion Concentration (pH)

6.4.1 Applicable Water Quality Standard

The applicable pH standard is given in 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. Basin-specific criteria are given in 340-041-0345:

Water Quality Standards for the Willamette Basin

(1) pH (hydrogen ion concentration). pH values may not fall outside the following ranges:

(a) All basin waters (except main stem Columbia River and Cascade lakes): 6.5 to 8.5;

(b) Cascade lakes above 3,000 feet altitude: 6.0-8.5.

6.4.2 Application of 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 Willamette 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 do not

discharge pollutants that alter the acidity or alkalinity of water. If plants impact the pH of the water in the area, 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.

This standard applies to the Project-affected waters for surface waters in waterways and streams, and in Project impoundments. The Project does not encompass or affect marine waters. The Project does not encompass or affect Cascade lakes above 3000 feet altitude.

6.4.3 Present Conditions

The Applicant performed a series of water quality monitoring events in 2004 and 2005 to characterize water quality parameters, including pH, in the vicinity of the Project. Monitoring was conducted under a range of conditions which included synoptic seasonal profiles within reservoirs, synoptic surveys at locations along rivers and bypass reaches, diel water quality surveys, a longitudinal survey along the Carmen bypass reaches during a staged release from Carmen Diversion Reservoir, and measurements recorded during inter-gravel dissolved oxygen (IGDO) monitoring.

Synoptic Reservoir Survey: pH

The Applicant vertically characterized pH at certain locations within Carmen Diversion, Smith, and Trail Bridge Reservoirs during four synoptic surveys conducted in May, August, October, and December 2004. For reference, *in-situ* measurements were also conducted at two locations in Clear Lake during the August 2004 synoptic event.

Table 10: Hydrogen Ion Concentration in Project Reservoirs

Location	pH min.	pH max	n
Clear Lake (north)	7.0	7.1	11
Clear Lake (south)	7.0	7.2	8
Carmen-Diversion (south)	7.3	7.8	20
Carmen-Diversion (east)	5.9	8.6	18
Carmen-Diversion (north)	7.4	8.3	15
Smith Reservoir (north)	7.4	7.8	53
Smith Reservoir (intake)	7.4	7.9	47
Trail Bridge Reservoir (east)	7.4	7.9	25
Trail Bridge Reservoir (west)	7.5	7.9	46
ODEQ Numeric Criteria	6.5	8.5	

With the exception of three individual measurements, all pH readings at all reservoir locations ranged from 7.0 to 8.3 standard units (SU). The narrow range is indicative of well-mixed reservoirs and is within the range of ODEQ numeric criteria for this parameter. A single reading of 8.6 SU was recorded in October 2004 east of the spillway in Carmen Diversion Reservoir. The reading, recorded near maximum depth, corresponded with supersaturated oxygen and likely reflects the effects of algal respiration. Two pH measurements of 5.9 SU were recorded in

December 2004, also east of the spillway in Carmen Diversion Reservoir. These low readings correspond with nearly anoxic conditions at the base of the reservoir possibly related to inverse stratification caused by ice cover. With the exception of these few measurements, pH measurements recorded from reservoirs in the vicinity of the Project demonstrate compliance with ODEQ numeric criteria for this parameter.

Synoptic River and Bypass Reach Survey: pH

Seasonal pH measurements were recorded at 15 river and bypass locations. This study included synoptic measurements recorded in the epilimnion and hypolimnion of Clear Lake and Project Reservoirs. A single measurement recorded in October 2004 from the McKenzie River downstream of Ollalie Creek (Site 0-9) was also reported in this study.

Measurements recorded during the 2004 survey of rivers and bypass reaches confirm pH measurements ranged from 7.1 to 8.0 SU. The range of recorded pH measurements is well within the range of ODEQ numeric criteria for this parameter. Seasonal pH measurements remained relatively stable at each location, varying no more than 0.5 SU at each site.

Diel pH Surveys

Algal respiration is a function of productivity which generally follows a diel cycle. Excessive nutrient loading may drive productivity causing high DO levels during the day. Photosynthetic production removes dissolved carbon dioxide and places upward pressure on alkalinity which may result in excessive hydrogen ion concentrations.

To assess relative productivity, diel measurements of certain water quality parameters, including pH, were recorded at 5-minute intervals over 72 hours at locations above and below Carmen-Diversion and Smith Reservoirs, and in the McKenzie River below Trail Bridge Reservoir above and below the spawning channel. Measurements were recorded in August 2004. Duplicate pH measurements were recorded above and below the Smith Reservoir in August 2005. Diel measurements of pH were also recorded at three longitudinal locations along the Carmen bypass reach during a staged release from Carmen Diversion Reservoir in May 2005.

Measurements recorded during the diel pH survey above and below Project reservoirs and developments confirm pH measurements ranged from 7.2 to 8.2 SU. The range of recorded pH measurements is well within the range of ODEQ numeric criteria for this parameter. Diel pH measurements remained relatively stable at each location, varying no more than 0.7 SU at each site. The slight diel variation identified at each location may be related to higher solubility of carbon dioxide during higher daytime temperatures.

6.4.4 Applicant's Position

The Applicant believes that operation of the Project does not cause changes in water chemistry which may exceed the Willamette Basin-specific criteria for pH. Sampling data collected from Project reservoirs and bypass reaches are offered in support of this position. Operations proposed under a new License will provide higher block and minimum flows in bypass reaches. EWEB believes that higher flows should serve to moderate water temperature, DO, and other parameters which influence hydrogen ion concentration.

6.4.5 ODEQ Evaluation

Monitoring data collected by EWEB in 2004 and 2005 indicate that current Project developments and operation generally exert little influence on the pH of waters in the Project area. Measurements confirm that seasonal variations recorded at locations within the Project boundary are generally small and within a similar range observed above and below the Project. Observed fluctuations may be attributed to daily and seasonal environmental patterns which are known to influence acidic balance. Overall, pH measurements are well within the range of Willamette Basin-specific numeric criteria intended to support all designated beneficial uses.

Three pH measurements recorded east of the spillway in Carmen-Diversion Reservoir exceeded the numeric criteria range for this parameter. All measurements were recorded at or near maximum reservoir depth at that location. In October 2004, a single pH measurement of 8.6 SU was recorded which reasonably likely reflected local algal productivity. In December 2004, two pH measurements of 5.9 SU were recorded during anoxic conditions which reasonably likely were related to heavy ice. Measurements recorded concurrently with these readings elsewhere in the reservoir suggest these are localized values and not representative of a broader trend in water quality.

The AMP envisions numerous physical and operational changes to the Project. The implementation of certain PMEs which may potentially alter water quality characteristics, including pH, is discussed below.

<u>Flow Releases and Instream Flows</u>
ODEQ believes that the release of larger volumes of water into bypass reaches will enhance certain beneficial environmental conditions which will further stabilize pH in bypass reaches.

Project operation has diverted water from the upper Carmen bypass reach allowing vegetation to encroach upon historic stream channels. Minimum flow releases contemplated for this reach under AMP 4.2.1 will submerge accumulated organic material. ODEQ believes the decomposition of organic material may have certain transient effects on water quality including reduced pH in this reach. ODEQ will require monitoring of certain water quality parameters, including pH, in this reach to ensure water quality is maintained to support all designated beneficial uses.

Flow releases to the Smith bypass reach will significantly alter not only the magnitude but also the source of water currently present in this reach. ODEQ will require monitoring in this reach to assess water quality once flows are established.

<u>Flow Fluctuations</u>
AMP Section 4.4.2 requires EWEB to reshape the topography of Trail Bridge Reservoir at certain locations in conjunction with a plan to reduce overall fish stranding potential during ramping cycles at this reregulation facility. Removal actions will increase reservoir depths within the potential stranding zones (PSZ) and expose new surface material to the water column. Deeper water coupled with altered substrate conditions may affect vegetation potential and, therefore, respiration cycles which influence certain water quality parameters, including pH. ODEQ will require water quality monitoring below Trail Bridge Dam to measure for impacts following completion of this modification.

In-Water Work
The implementation of PMEs which necessitate activities such as the removal or placement of material within waters of the state may require a CWA §404 removal-fill permit issued by the Army Corps of Engineers (Corps). To ensure compliance with Oregon water quality standards, ODEQ may condition activities permitted by the Corps through a CWA §401 certification.

6.4.6 ODEQ Findings

ODEQ is reasonably assured that operation of the Project under new FERC License will comply with the pH standard provided the following measures are implemented:

Instream Flow and Gauging
EWEB shall implement the block releases and minimum instream flows for all bypass reaches as set forth in AMP Section 4.2. EWEB shall install, operate, and maintain for the term of the new License gages located in the lower Carmen bypass reach and Smith bypass reach as set forth in AMP Sections 4.2.2.3 and 4.2.3.4, respectively.

Planned Maintenance at Trail Bridge Powerhouse
EWEB shall follow the ramping restrictions given in AMP Section 4.4.3 before and after planned maintenance activities at Trail Bridge Powerhouse.

Monitoring and Reporting
Within 12 months of a new License, EWEB shall submit a WQMP to ODEQ for review and approval. EWEB shall submit the WQMP to FERC upon approval by ODEQ. Upon approval of the WQMP by FERC, EWEB shall implement the WQMP.

The WQMP must address the following monitoring and reporting requirements for pH:

1. Prior to initiating scheduled releases required by AMP Section 4.2.1, EWEB shall establish a fixed monitoring station at a location approved by ODEQ near the lower extent of the continuously wetted stream channel in the upper Carmen bypass reach. EWEB must initiate monitoring at this location within 3 months of initiating scheduled releases from Carmen Diversion Dam. EWEB must conduct pH monitoring at this location in accordance with the schedule presented in the WQMP.

2. Within two years of a new License, EWEB shall establish a permanent water quality monitoring location in the McKenzie River near USGS gage #14158850. EWEB must monitor pH at this location in accordance with the WQMP.

3. Data must be collected under an ODEQ-approved QA/QC plan, and compilations of data must be provided annually electronically to ODEQ by December 31, or as soon as the data can be reasonably verified, whichever is later, in a format described in the WQMP.

6.5 Dissolved Oxygen

6.5.1 Water Quality Standard

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

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

(1) For water bodies identified as active spawning areas in the places and times indicated on the following Tables and Figures set out in OAR 340-041-0101 to OAR 340-041-0340: Tables 101B, 121B, 180B, 201B and 260B, and Figures 130B, 151B, 160B, 170B, 220B, 230B, 271B, 286B, 300B, 310B, 320B, and 340B, (as well as any active spawning area used by resident trout species), the following criteria apply during the applicable spawning through fry emergence periods set forth in the tables and figures:

(a) The dissolved oxygen may not be less than 11.0 mg/l. However, if the minimum intergravel dissolved oxygen, measured as a spatial median, is 8.0 mg/l or greater, then the DO criterion is 9.0 mg/l;

(b) Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 11.0 mg/l or 9.0 mg/l criteria, dissolved oxygen levels must not be less than 95 percent of saturation;

(c) The spatial median intergravel dissolved oxygen concentration must not fall below 8.0 mg/l.

(2) For water bodies identified by the Department as providing cold-water aquatic life, the dissolved oxygen may not be less than 8.0 mg/l as an absolute minimum. Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 8.0 mg/l, dissolved oxygen may not be less than 90 percent of saturation. At the discretion of the Department, when the Department determines that adequate information exists, the dissolved oxygen may not fall below 8.0 mg/l as a 30- day mean minimum, 6.5 mg/l as a seven-day minimum mean, and may not fall below 6.0 mg/l as an absolute minimum (Table 21);

Figure 340B indicates the water bodies in the vicinity of the Project are designated as bull trout spawning and rearing habitat. Based on this designated beneficial use, the biologically-based numeric criteria are summarized below:

- The dissolved oxygen may not be less than 11.0 mg/l. However, if the minimum intergravel dissolved oxygen, measured as a spatial mean, is 8.0 mg/l or greater, then the DO criterion is 9.0 mg/l.
- Where the conditions of barometric pressure, altitude, and temperature preclude the 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.
- The spatial mean intergravel dissolved oxygen concentration must not fall below 8.0 mg/l.

For the Willamette Basin, the bull trout DO spawning criterion (11.0 mg/l) applies from August 15 to May 30 (ODEQ, 2004). During the balance of the year, the cold-water DO criterion of 8.0 mg/l applies to waters within the Project area.

6.5.2 Application of Water Quality Standard

Dissolved oxygen (DO) is one of the principal parameters used to determine water quality in support of aquatic life. Maintaining adequate concentrations of DO is vital to the support of fish, invertebrates, and other aquatic life. Some aquatic species such as the salmonids are 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 because salmonids spawn in gravel redds. The critical DO levels for the developing embryos occur in the gravels 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.

6.5.3 Present Conditions

The Applicant performed a series of water quality monitoring studies in 2004 and 2005 to characterize water quality parameters, including DO, in the vicinity of the Project. Monitoring was conducted under a range of conditions which included synoptic seasonal profiles within reservoirs, synoptic surveys at locations along rivers and bypass reaches, diel water quality surveys, a longitudinal survey along the Carmen bypass reaches during a staged release from Carmen Diversion Reservoir, and measurements recorded during IGDO monitoring. Findings from the studies are intended to characterize Project impacts on DO and may be used to assess potential water quality impacts under a new License.

Reservoirs and Clear Lake

Dissolved oxygen was measured in Clear Lake in August 2004. Maximum levels were recorded in the thermocline presumably in response to algal photosynthesis (Stillwater Sciences 2006c). Clear Lake is located at an elevation of 3,012 feet MSL which reduces potential DO solubility. Except for measurements recorded near the reservoir bottom (i.e., 100 feet or greater), the percent saturation of DO remained above 95 percent through most of the water column.

Carmen Diversion Reservoir exhibits well-mixed water quality characteristics because of its small storage volume, shallow depth, and low retention time. Dissolved oxygen in this reservoir met or exceeded the 11.0 mg/l numeric criterion at all locations at all times of the year with one exception. During the December 2004 synoptic monitoring event, anoxic conditions were recorded near the base of the reservoir near the interpretative viewpoint station located east of the spillway. EWEB reported heavy surface ice which may have reduced circulation and oxygen exchange at this location. Similar conditions were not observed elsewhere which suggests these measurements reflect localized effects related to seasonal conditions.

Dissolved oxygen met or exceeded the 11.0 mg/l numeric criterion or the 95 percent saturation target in Smith Reservoir at depths up to 50 feet.

Trail Bridge Reservoir is a relatively fast flushing reregulating facility with generally well-mixed water quality characteristics throughout the water column. Dissolved oxygen met or exceeded the 11.0 mg/l numeric criterion or exceeded saturation at all measurement locations. Concentrations of dissolved oxygen in this reservoir may be influenced by the discharge from turbines at the Carmen powerhouse. In August 2004, DO measurements ranged from 115 percent to 122 percent saturation. The super-saturation of atmospheric gases may have negative physiological consequences on fish and other aquatic organisms. ODEQ evaluates the effects of Project operation on TDG in Section 6.8 of this Evaluation and Findings Report.

Bypass Reaches

Upper Carmen Bypass Reach

Under current operating conditions, water in this reach is limited to irregular spills and incidental seepage below the dam. In accordance with AMP Section 4.2, EWEB will provide block releases of at least 30 cfs year round beginning by the sixth year of a new License. No data are available to evaluate current water quality conditions below the dam. However, as indicated above, DO in Carmen Diversion Reservoir generally meets or exceeds the 11.0 mg/l DO spawning criterion.

Lower Carmen Bypass Reach

DO remained above the 11.0 mg/l criterion in the lower Carmen bypass reach (Site 0-5) upstream of the Carmen powerhouse during the synoptic river surveys conducted in 2004 and during the five-day block release from Carmen Diversion Reservoir in April and May 2005.

Smith River Bypass

Dissolved oxygen did not meet applicable numeric criteria at Smith River monitoring sites above and below the reservoir during the May and October synoptic monitoring events. Water quantity and quality above Smith Reservoir are not impacted by Project developments or operations. Flows in the Smith bypass reach consist largely of inflow from Bunchgrass Creek. During summer months, average monthly flows in this reach decrease below 10 cfs (Stillwater Sciences 2006d). Under a new License, EWEB will release block flows to the Smith bypass reach as described in AMP Section 4.2.3.

To protect fry emergence, ODEQ requires spatial mean IGDO concentration of at least 8.0 mg/l and a water column DO of 9.0 mg/l when water column DO is below 11.0 mg/l. Since studies indicated water column DO did not meet the ODEQ criterion in certain Project reaches, EWEB conducted a survey to verify support for designated beneficial uses by demonstrating compliance with the IGDO criterion. Measurements were recorded at two locations in August 2004, but were subsequently deemed unrepresentative (EWEB 2010b). Measurements recorded in August and September 2005 confirmed water column DO and IGDO above 10.0 mg/l at all sampling locations.

Tributaries

Sweetwater Creek

Measurements recorded at two locations in Sweetwater Creek confirmed DO above 11.0 mg/l at two locations. Paired IGDO measurements ranged from 11.2 mg/l to 11.3 mg/l and differed from water column values by no more than 0.9 mg/l.

Deer Creek
A short section of the 11.5-kV transmission line is aligned within the riparian corridor of lower Deer Creek. EWEB currently maintains the tree canopy height within the transmission corridor to avoid conflicts with existing power lines. Deer Creek DO levels downstream of the transmission lines were below 11.0 mg/l during the August and October 2004 synoptic DO surveys. However, DO was at or near saturation during these periods. The depressed DO concentrations recorded in lower Deer Creek are likely related to locally elevated stream temperatures which reached 17ºC during the August event.

Measurements were recorded in September 2005 at five locations in Deer Creek below the transmission lines (Site 8-2). Average water column DO and IGDO at these Deer Creek monitoring location was 9.1 mg/l.

McKenzie River
Dissolved oxygen generally met the 11.0 mg/l numeric criterion at all McKenzie River monitoring locations within the Project area. Further, dissolved oxygen was at or near saturation at all these locations. Certain measurements above and below the Project reported DO slightly below the numeric criterion. However, these measurements were recorded outside the Project area and, therefore, appear unrelated to Project operation.

The water column DO met the ODEQ 11.0 mg/l numeric criterion at all three McKenzie River monitoring locations. IGDO at these locations ranged from 11.1 mg/l to 11.6 mg/l. Water column DO and IGDO differed by no more than 1.0 mg/l at each paired monitoring location.

6.5.4 Applicant's Position: Dissolved Oxygen

EWEB believes Project operations are not associated with exceedances of the DO criteria. With the exception of depressed DO in one sample collected in the lower site on Deer Creek, and in the deepest portions of the Project reservoirs at certain times of the year, DO levels remained above the DO criteria and support all identified fish and wildlife uses.

6.5.5 ODEQ Evaluation: Dissolved Oxygen

Reservoirs
Each of the three Project reservoirs supports populations of coastal cutthroat trout, rainbow trout, and brook trout. Bull trout and hatchery-origin spring Chinook salmon are also found in Trail Bridge Reservoir and spawn in its tributaries. Mountain whitefish are documented in Trail Bridge and Smith Reservoirs (Stillwater Sciences 2006a). Project reservoirs are utilized by salmonid species for all life stage activities except spawning.

Reservoir profiling conducted by EWEB confirms DO meets the applicable numeric DO criterion throughout most of the metalimnion and epilimnion of all three Project reservoirs. ODEQ is reasonably assured that dissolved oxygen in Project reservoirs will continue to meet this criterion under the terms of a new operating License.

Bypass Reaches
Upper Carmen Bypass Reach
Flow below Carmen Diversion Dam is limited to low volume discharge and irregular spill events. Fish below the dam consist largely of brook trout and scuplin species. A goal of the Aquatics Management Plan is to increase the cutthroat trout population in this reach. In support of this

goal, EWEB measured water quality parameters, including DO, at certain locations in and below Carmen Diversion Dam during an extended controlled release in May 2005.

Measurements recorded in Carmen Diversion Reservoir indicate local DO maxima occur during peak daylight hours in a pattern consistent with photosynthetic oxygen production. DO values remained consistently above the numeric DO criterion of 11.0 mg/l during the study. However, no measurements were recorded along the channel or near the likely downstream terminus of surface flows which may reasonably be expected to develop under steady-state block flow releases required under the AMP. ODEQ believes it is reasonable to expect that accumulated organic material within the upper Carmen stream channel will temporarily deplete dissolved oxygen from the water column once block releases are initiated. ODEQ will require EWEB to monitor certain water quality parameters, including DO, in the upper Carmen bypass reach to confirm support for all designated beneficial uses.

Lower Carmen Bypass Reach
EWEB documented evidence of bull trout and planted hatchery spring Chinook salmon spawning in sections of the lower Carmen bypass reach. ODEQ will apply the 11.0 mg/l DO numeric spawning criterion l to this reach. Measurements recorded during seasonal synoptic and/or diel water quality surveys indicate DO meets or exceeds the numeric DO criterion of 11.0 mg/l in the lower Carmen bypass reach upstream of the Carmen powerhouse and upstream of Kink Creek. Under the terms of the AMP, EWEB will adjust releases from Carmen Diversion Reservoir to achieve a target minimum flow of 160 cfs in the lower Carmen bypass reach. ODEQ believes that higher minimum bypass flows will likely facilitate oxygen transfer into the water column through increased aeration and turbulence. ODEQ is reasonably assured that the 11.0 mg/l DO criterion will be met in this reach by maintaining the minimum target flows as provided in AMP Section 4.2.2. ODEQ will require EWEB to monitor DO in this reach to confirm this water quality standard is met.

Smith Bypass Reach
Spawning surveys conducted by EWEB in fall 2004 confirmed at least six spring Chinook salmon redds and several unidentified redds in the lower portion of this reach. Although DO in this reach failed to attain the 11.0 mg/l DO criterion, measurements recorded by EWEB in August and September 2005 demonstrated that DO exceeded 8.0 mg/l within the intergravel zone. As allowed by OAR 340—041-0016(1)(a), ODEQ will apply the 9.0 mg/l DO spawning criterion to the water column in the Smith bypass reach.

Flows in the Smith bypass reach are fed nearly entirely by Bunchgrass Creek with a minor component of groundwater accretion. Under a new operating License, EWEB will be releasing water into this reach in accordance with the schedule presented in AMP Section 4.2.3. ODEQ believes that higher minimum bypass flows will likely facilitate oxygen transfer into the water column through increased aeration and turbulence. For this reason, ODEQ is reasonably assured that providing the minimum flows to this reach in accordance with AMP Section 4.2.3 will maintain support for dissolved oxygen water quality standard. To confirm compliance with the water quality standard, ODEQ will require EWEB to monitor DO in this reach once block releases are implemented.

<u>Tributaries</u>
Sweetwater Creek

A number of bull trout redds were identified in the lower portion of Sweetwater Creek during a spawning survey conducted in Fall 2004. No evidence of spawning activity by other fish species was identified during this survey. Sweetwater Creek discharges to the east side of Trail Bridge Reservoir below the Carmen powerhouse. Fish passage to Sweetwater Creek was restored in 1992 with the replacement of a culvert beneath US Highway 126. However, reservoir elevation fluctuations on Trail Bridge Reservoir can periodically delay fish migration through the culvert. Under a new License, EWEB will maintain the surface elevation of Trail Bridge Reservoir at 2,083 MSL from August 15 through October 31 to facilitate migratory access to Sweetwater Creek during bull trout spawning periods.

Sweetwater Creek supports productive spawning for bull trout, a species listed as threatened by USFWS. ODEQ will apply the 11.0 mg/l numeric DO criterion to this stream in support of documented bull trout spawning. Measurements recorded during diel DO monitoring in August 2004 and 2005 indicate this reach meets or exceeds the applicable criterion during periods when DO may reasonably be expected to be near seasonal low levels. Based on this information, ODEQ determines conditions currently meet the 11.0 mg/l numeric DO criterion. To enhance the bull trout fishery supported by Sweetwater Creek, EWEB shall provide bull trout access to Sweetwater Creek for the term of the new License as required by AMP Section 4.1.5.

Deer Creek

Deer Creek is a wide, Western Cascades drainage which discharges to the McKenzie River at RM 79. A portion of the 11.5-kV distribution line is aligned within the riparian zone along the lower portion of Deer Creek. Under the terms of the AMP, EWEB shall relocate this portion of the transmission line outside the riparian zone within three years of a new License.

Fish population studies performed in 2004 and 2005 identified low numbers of bull trout and coastal cutthroat trout in the lower portions of Deer Creek as well as moderate to high numbers of rainbow trout. No spring Chinook salmon, brook trout, or other fish species were identified during the surveys. EWEB reported no evidence of salmonid spawning in this stream. However, the planting of vegetation as provided in the SA in the VMP following the transmission line realignment may increase LWD inputs and promote gravel recruitment and habitat complexity necessary to support spawning activity in this stream in the future.

Synoptic DO surveys conducted by EWEB indicate water quality in the lower portion of Deer Creek failed to attain the 11.0 mg/l numeric DO criterion during the August and October 2004 events. In September 2005, EWEB measured IGDO and water column DO at five locations. The spatial mean IGDO and water column DO were both determined to be 9.1 mg/l. Because IGDO was at least 8.0 mg/l, ODEQ will apply the 9.0 mg/l water column DO criterion to Deer Creek as provided by OAR 340-041-0016(1)(a). Based on information provided by the Applicant, ODEQ determines conditions in Deer Creek currently meet the applicable numeric DO criterion. To provide for water quality and habitat enhancement, EWEB shall realign the 11.5-kV transmission line corridor outside the riparian corridor and undertake riparian vegetation planting actions as required by proposed License Article 17 of the SA.

<u>McKenzie River</u>

Spawning surveys conducted by EWEB in 2004 identified at least one pair of bull trout spawning in the river margins below Trail Bridge Dam and several redds believed to be of spring Chinook salmon. These observations provide a qualitative assessment of suitable spawning conditions in the full flow reach of the McKenzie River immediately below the Project. Accordingly, ODEQ will apply the 11.0 mg/l numeric DO criterion to this portion of the Project.

Seasonal water quality surveys performed by EWEB in 2004 indicate the 11.0 mg/l numeric DO criterion is met in the McKenzie River below the Project. The DO criterion was also met in the McKenzie River downstream of Ollalie Creek in October 2004. In October 2004, DO was measured at 10.9 mg/l in the McKenzie River just upstream of Deer Creek, and at 10.7 mg/l downstream of McKenzie Bridge.

Monitoring in the McKenzie River below Trail Bridge Dam indicates water quality currently meets the numeric DO criterion. ODEQ is reasonably assured that the dissolved oxygen water quality standard will be met under the terms of a new License. ODEQ will require EWEB to monitor DO below the Project to confirm compliance under the terms of the SA.

6.5.6 ODEQ Findings: Dissolved Oxygen

ODEQ is reasonably assured that operation of the Project under a new FERC License will comply with the dissolved oxygen standard in the following waters:

Reservoirs
ODEQ is reasonably assured applicable DO criteria will be met in Project reservoirs.

Bypass Reaches
Smith Bypass Reach
EWEB demonstrated the spatial mean IGDO is at least 8.0 mg/l during late summer low flow conditions. Per OAR 340-041-0016(1)(a), ODEQ will apply the 9.0 mg/l water column DO criterion to this reach. ODEQ is reasonably assured the applicable spawning DO criteria will be met in the Smith River bypass reach provided EWEB implements the schedule of block releases and maintains minimum instream flows in accordance with Section 4.2.3 of the AMP. ODEQ will require EWEB to monitor DO in this reach as provided in the WQMP to confirm the criterion will be met as described in Section 6.5.5 of this Evaluation and Findings Report.

Upper Carmen Bypass Reach
ODEQ is reasonably assured the applicable spawning DO criteria will be met in the upper Carmen bypass reach provided EWEB implements the schedule of block releases and maintains minimum instream flows in accordance with AMP Section 4.2.1. ODEQ will require EWEB to monitor DO in this reach as provided in the WQMP and as described in Section 6.5.5 of this Evaluation and Findings Report.

Lower Carmen Bypass Reach
ODEQ is reasonably assured the applicable spawning DO criteria will be met in the lower Carmen bypass reach provided EWEB maintains minimum instream flows in accordance with Section 4.2.2 of the AMP. ODEQ will require EWEB monitor DO in this reach as provided in the WQMP and as described in Section 6.5.5 of this Evaluation and Findings Report.

Tributaries
Deer Creek
Based on a spatial mean IGDO of at least, 8.0 mg/l, ODEQ will apply the 9.0 mg/l water column DO criterion to Deer Creek as allowed by OAR 340-041-0016(1)(a). ODEQ is reasonably assured DO in Deer Creek will meet the applicable DO criterion.

McKenzie River

ODEQ is reasonably assured that the dissolved oxygen water quality standard will be met in the McKenzie River downstream of the Project by higher minimum flows and PME measures required under AMP Section 4.2. ODEQ will require EWEB to monitor DO in this reach as provided in the WQMP and as described in Section 6.5.5 of this Evaluation and Findings Report.

Monitoring and Reporting: Dissolved Oxygen

ODEQ is reasonably assured operation of the Project under a new License will comply with the ODEQ dissolved oxygen water quality standard provided the following measures are implemented:

1. Water Quality Management Plan: Within 12 months of FERC License issuance, EWEB shall submit a WQMP to ODEQ which addresses the dissolved oxygen monitoring and reporting requirements presented below. Upon ODEQ approval, EWEB shall submit the WQMP to FERC for approval. Upon FERC approval, EWEB shall implement the WQMP.

2. Dissolved Oxygen Monitoring and Reporting

   a. Bypass Reaches

   Within three months of establishing flow releases required by AMP Section 4.2, EWEB shall monitor DO at monitoring stations located in the lower portion of the upper Carmen bypass reach, lower Carmen bypass reach, and Smith bypass reach in accordance with the WQMP. If monitoring indicates the dissolved oxygen water quality standard is not met, ODEQ may require EWEB to submit a report analyzing the situation and may require additional monitoring and/or adaptive management of the Project to ensure water quality standards are met in these reaches.

   b. McKenzie River

   EWEB shall measure DO in the McKenzie River at USGS Gage 14158850 in accordance with the WQMP. If monitoring indicates the dissolved oxygen water quality standard is not met, ODEQ may require EWEB to submit a report analyzing the situation and may require additional monitoring and/or adaptive management of the Project to ensure water quality standards are met in these reaches.

   c. General Monitoring and Reporting Requirements

   Minimum acceptable data capture is 95 percent, except for circumstances beyond the control of EWEB. Monitoring data shall be submitted to ODEQ within six months of completing required monitoring.

6.6 Nuisance Algae

6.6.1 Water Quality Standard

The standard is set forth in OAR 340-041-0019:

Nuisance Phytoplankton Growth

(1)

(a) The following values and implementation program must be applied to lakes, reservoirs, estuaries and streams, except for ponds and reservoirs less than ten acres in surface area, marshes and saline lakes:

(b) The following average Chlorophyll a values must be used to identify water bodies where phytoplankton may impair the recognized beneficial uses:

(A) Natural lakes that thermally stratify: 0.01 mg/1;

(B) Natural lakes that do not thermally stratify, reservoirs, rivers and estuaries: 0.015 mg/1;

(C) Average Chlorophyll a values may be based on the following methodology (or other methods approved by the Department): A minimum of three samples collected over any three consecutive months at a minimum of one representative location (e.g., above the deepest point of a lake or reservoir or at a point mid-flow of a river) from samples integrated from the surface to a depth equal to twice the secchi depth or the bottom (the lesser of the two depths); analytical and quality assurance methods must be in accordance with the most recent edition of Standard Methods for the Examination of Water and Wastewater.

(2) Upon determination by the Department that the values in section (1) of this rule are exceeded, the Department may:

(a) In accordance with a schedule approved by the Commission, conduct such studies as are necessary to describe present water quality; determine the impacts on beneficial uses; determine the probable causes of the exceedance and beneficial use impact; and develop a proposed control strategy for attaining compliance where technically and economically practicable. Proposed strategies could include standards for additional pollutant parameters, pollutant discharge load limitations, and other such provisions as may be appropriate. Where natural conditions are responsible for exceedance of the values in section (1) of this rule or beneficial uses are not impaired, the values in section (1) of this rule may be modified to an appropriate value for that water body;

(b) Conduct necessary public hearings preliminary to adoption of a control strategy, standards or modified values after obtaining Commission authorization;

(c) Implement the strategy upon adoption by the Commission.

(3) In cases where waters exceed the values in section (1) of this rule and the necessary studies are not completed, the Department may approve new activities (which require Department approval), new or additional (above currently approved permit limits) discharge loadings from point sources provided that it is determined that beneficial uses would not be significantly impaired by the new activity or discharge.

6.6.2 Application of Standard.

Taste, odor, and visual qualities associated with algae can reach nuisance condition proportions. This standard is intended to identify waterbodies, using chlorophyll-a as an indicator, where phytoplankton (floating algae) may impair beneficial uses including domestic water supplies, boating, fishing, and water contact recreation.

Excess algal growth can lead to wide daily variations in dissolved oxygen and pH caused by photosynthetic oxygen production. DO and pH are parameters which are addressed separately in this Evaluation and Findings Report. Where natural conditions are determined responsible for the algal blooms, the existing level of chlorophyll-a is considered to be the upper level of acceptability.

6.6.3 Present Conditions

The Project does not affect any natural lakes. The standard is applicable to Project-affected streams and Project impoundments that are greater than 10 acres in surface area. These impoundments are Carmen-Diversion Reservoir, Smith Reservoir, and Trail Bridge Reservoir. The applicable numeric chlorophyll-a reference level to waters in the vicinity of the Project is 0.015 mg/l.

EWEB measured chlorophyll-*a* at discrete locations within reservoirs, streams, bypass reaches, and area lakes during synoptic water quality surveys performed in May, August, October, and December 2004. Reported Chlorophyll-a values are either below the laboratory method reporting limit (MRL) at all locations or less than one-third of the applicable numeric criterion.

6.6.4 Applicant's Position: Nuisance Algae

EWEB has determined that Project operations are not associated with nuisance phytoplankton growth because:

1. Chlorophyll-a values in Project reservoirs are similar to those in Clear Lake which is upstream of the Project and not subject to significant human disturbance;
2. Chlorophyll-a values in Project reaches are similar to those in the McKenzie and Smith rivers upstream of the Project which are not subject to significant human disturbance;
3. All reported Chlorophyll-*a* values were below ODEQ numeric criteria; and
4. Historical data (1995–2003) indicate levels less than 0.0015 mg/L during April through September and less than 0.0025 mg/L during October through March at sites along the McKenzie River.

6.6.5 ODEQ Evaluation: Nuisance Algae

EWEB measured chlorophyll-*a* at discrete Project locations within reservoirs, streams, bypass reaches, and area lakes during synoptic water quality surveys in May, August, October, and December 2004. EWEB performed Chlorophyll-a sampling in accordance with the river and reservoir sampling methodology drafted and approved by the Aquatics Technical Subgroup, including ODEQ.

EWEB collected samples at nine locations in the McKenzie River from just below Clear Lake downstream to below McKenzie Bridge. Single samples were collected from the Clear Lake epilimnion (August 2004) and McKenzie River downstream of Ollalie Creek (October 2004). EWEB also collected synoptic samples from the upper Smith River, Smith Reservoir epilimnion, and Smith bypass reach. One sample was collected from the Smith Reservoir hypolimnion in May 2004.
Chlorophyll-a levels in all samples were either below laboratory method reporting limits (MRL) or were less than one-third of the numeric criterion of 0.015 mg/l for the nuisance algae water

quality standard. The highest chlorophyll-a value, 0.0048 mg/l, was recorded above the Project downstream of Clear Lake.

In general, Chlorophyll-a levels were highest in waters upstream of the Project and decreased in the downstream direction. Along the McKenzie River, the lowest chlorophyll-a levels in May, August, and October were recorded just above the confluence with Deer Creek. Seasonally, the lowest chlorophyll-a levels in the McKenzie River were reported in May with only two sample results reported above the laboratory method reporting limit (MRL). Chlorophyll-a levels were similar above and below Smith Dam.

6.6.6 ODEQ Findings: Nuisance Algae

EWEB sampled Chlorophyll-a during synoptic reservoir and stream surveys at seasonal intervals throughout the Project area. Data collected during the study confirm concentrations of Chlorophyll-a are significantly below the numeric criterion for this water quality standard. The concentration of Chlorophyll-a generally decreases downstream along the McKenzie River. No discernable change to this trend is observed at sampling locations within the Project boundary which suggests Project operation and developments exert little influence on the growth and propagation of phytoplankton.

Under the SA, EWEB will provide higher flows to bypass reaches which should further reduce the potential for algal growth. ODEQ is reasonably assured that the nuisance phytoplankton numeric criterion will be met under a new License, provided the block releases and minimum instream flows provided in AMP Section 4.2 are implemented.

6.7 Turbidity

6.7.1 Water Quality Standard

The applicable standard is set forth in OAR 340-041-0036:

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.

6.7.2 Application of Standard

Turbidity is an optical property which measures the lack of water clarity caused by the presence of suspended particles. Turbidity causes light to be scattered and absorbed rather than transmitted through water. Turbidity can increase light extinction and reduce photosynthesis and primary production. Reduced visibility caused by turbid waters can also cause behavioral changes such as prey identification, foraging, and social interaction by visually-oriented species such as salmonids (ODEQ 2005).

Turbidity may occur naturally through channel erosion, organic loading, dust deposition, and nutrient influences. Turbidity loading can also come from a variety of anthropogenic point and non-point discharge sources. Oregon applies the numeric turbidity criterion to protect broad classes of beneficial uses including drinking water, safety, aesthetics, recreation, and agricultural and industrial uses from unwanted or potentially harmful degradation.

6.7.3 Present Conditions

Clean Water Act § 303d Listings: Turbidity

Waterbodies in the vicinity of the Project are not identified on the 2004/2006 Integrated Report §303d list for turbidity.

Sampling Locations

EWEB measured turbidity at locations throughout the Project area in conjunction with four seasonal synoptic water quality monitoring events. Seasonal events were conducted in May, August, October, and December 2004 and were intended to capture conditions representative of spring runoff, summer low flow, fall turnover, and winter storm events, respectively.

EWEB monitored turbidity at 11 monitoring locations along the McKenzie River from below Clear Lake to downstream of McKenzie Bridge, at 3 locations along the Smith River including Smith Reservoir, and at 2 locations along Deer Creek.

EWEB also measured turbidity in Carmen Diversion Reservoir in May 2005 during an experimental spill release from Carmen Diversion Dam. No numerical turbidity measurements were recorded downstream during this event.

Current Turbidity Conditions

Measurements recorded during the synoptic water quality surveys confirm generally low turbidity throughout the Project area. With the exception of one December 2004 measurement below McKenzie Bridge (2.2 NTU), turbidity measurements were below 1.0 NTU at all McKenzie River monitoring locations during all four river synoptic events.

No measurements were recorded in the Smith River during the May 2004 synoptic event. Turbidity measurements recorded during August, October, and December 2004 were all below 1.0 NTU.

Turbidity at both Deer Creek locations was below 1.0 NTU during the May, August, and October 2004 monitoring events. Elevated turbidity measurements (8.52 to 9.44 NTU) were recorded at the 2 Deer Creek locations in December 2004. EWEB reported these measurements were recorded during a storm event which affected this drainage.

In May 2005, EWEB released water to the upper Carmen bypass reach to study the hydrologic response of block releases below Carmen Diversion Dam. The spill was initiated by closing the gate to the diversion tunnel which raised the reservoir elevation above the level of the weir crest. EWEB reports that few spill events preceded this test which allowed silt and debris to accumulate. Currents which developed in response to the controlled release mobilized this sediment causing a 5 to 20 NTU turbidity increase for approximately 18 hours. Turbidity decreased to pre-test levels (i.e., generally less than 1.0 NTU) for the duration of the test. No numerical turbidity measurements were recorded downstream of the dam during the test. However, visual observations reportedly identified no turbidity increase below Tamolich Falls or above the Carmen powerhouse in the Carmen bypass reach (EWEB 2010d).

6.7.4 Applicant's Position

EWEB believes that Project operations and maintenance activities proposed under a new License will not result in exceedances of applicable turbidity criteria. This position is evidenced by generally low turbidity throughout the Project area as recorded during synoptic water quality surveys. EWEB notes that elevated turbidity measurements recorded during a storm event in Deer Creek occurred both above and below the transmission line corridor, and suggests that turbidity response is reflective of basin-scale characteristics rather than Project-related influences. While elevated turbidity was observed in Carmen Diversion Reservoir shortly after initiating the May 2005 controlled spill study, turbid conditions decreased to near background levels after 18 hours.

EWEB proposes developing turbidity monitoring protocol in the WQMP to ensure Project operations comply with applicable ODEQ turbidity criteria in the upper Carmen bypass reach.

6.7.5 ODEQ Evaluation: Turbidity

Monitoring conducted by the Applicant demonstrates that normal Project operation does not adversely impact turbidity above background conditions. During a controlled spill event at Carmen Diversion Reservoir, turbidity increased in response to flow diversions over the weir crest, but returned to background levels within about 18 hours. Increased turbidity was also noted in Deer Creek in conjunction with a seasonal storm event. However, measurements were similar above and below the transmission line corridor and suggest turbidity is more closely related to basin-wide characteristics rather than Project effects.

EWEB did not record turbidity measurements at the lower wetted extent of the upper Carmen bypass reach during the controlled release from Carmen Diversion Reservoir in May 2005. However, EWEB reported that visual observations recorded during this test confirmed the absence of turbid conditions. The absence of regular releases to this reach has allowed vegetation growth within the historic McKenzie River streambed. Despite visual observations during the May 2005 release, it is reasonable to expect that scheduled releases to this reach in accordance with Section 4.2.1 of the AMP will mobilize decayed organic matter which may contribute to increased turbidity in the upper Carmen bypass reach. ODEQ will require EWEB to monitor turbidity at the lower wetted extent of this reach to confirm compliance with the turbidity standard.

The ODEQ turbidity standard may allow the applicable turbidity criterion to be exceeded for certain limited-duration activities provided all practicable controls have been employed and ODEQ certifies the activity pursuant to §401 of the CWA. This proposed §401 certification will

not address instream construction activities. Before performing any action requiring in-water work, EWEB must first obtain a CWA §401 water quality certification issued in conjunction with, or pre-authorized for an Army Corps of Engineers CWA §404 permit.

6.7.6 ODEQ Findings: Turbidity

ODEQ is reasonably assured that the operation of the proposed Project will comply with the turbidity standards, provided the following measures are implemented:

Water Quality Management Plan: Within 12 months of FERC License issuance, EWEB shall submit a WQMP to ODEQ which addresses the turbidity monitoring and reporting requirements presented below. Upon ODEQ approval, EWEB shall submit the WQMP to FERC for approval. Upon FERC approval, EWEB shall implement the WQMP.

Turbidity Monitoring and Reporting

a. Upper Carmen Bypass Reach

Within three months of establishing flow releases required by AMP Section 4.2, EWEB shall monitor turbidity at a monitoring station located in the lower portion of the upper Carmen bypass reach in accordance with the WQMP.

b. McKenzie River

EWEB shall measure turbidity in the McKenzie River at the USGS Gage 14158850 in accordance with the WQMP. If monitoring indicates the turbidity water quality standard is not met, ODEQ may require EWEB to submit a report analyzing the situation and may require additional monitoring and/or adaptive management of the Project to ensure water quality standards are met in this reach.

c. General Monitoring and Reporting Requirements

Minimum acceptable data capture is 95 percent, except for circumstances beyond the control of EWEB. Monitoring data shall be submitted to ODEQ within six months of completing required monitoring.

6.8 Total Dissolved Gas

6.8.1 Applicable Water Quality Standard

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

Total Dissolved Gas

(1) Waters will be free from dissolved gases, such as carbon dioxide hydrogen sulfide, or other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation, or other reasonable uses made of such water.

(2) Except when stream flow exceeds the ten-year, seven-day average flood, the concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection may not exceed 110 percent of saturation. However, in hatchery-receiving waters and other waters of less than two feet in depth, the concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection may not exceed 105 percent of saturation.

6.8.2 Application of Water Quality Standard

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

EWEB indicates the internal turbine runners at the Carmen power plant are improperly sized resulting in inefficient operation. Further, the units have undergone extensive wear from years of service resulting in added inefficiencies. Under present operation, EWEB must introduce air through an air admittance valve to reduce internal pressures and prevent cavitation. Sampling data confirm elevated air entrainment in the turbine discharge at certain power generation levels.

At levels above 110 percent saturation, the concentration of dissolved atmospheric gases in water may cause a variety of debilitating or lethal conditions in fish. The Total Dissolved Gas (TDG) standard is designed to prohibit discharges or activities that result in atmospheric gases reaching known harmful concentrations once dissolved in water. The use of air in turbine intakes to avoid cavitation or to increase dissolved oxygen levels can create supersaturation of TDG, a condition that can be avoided if identified.

6.8.3 Present Conditions Based

Clean Water Act § 303d Listings

Waterbodies in the vicinity of the Project are not identified on the 2004/2006 Integrated Report §303d list for TDG.

Sampling Locations

EWEB conducted two studies to measure Project-related TDG effects. EWEB first measured TDG within the Carmen and Trail Bridge powerhouse tailraces and at locations downstream of the powerhouses during the synoptic river surveys performed in May, August, October, and December 2004. TDG and barometric pressure were also recorded to calculate the delta P, percent TDG, and compensation depth.

Based on TDG results recorded during the 2004 synoptic river surveys, EWEB measured diel TDG in the Carmen powerhouse tailrace in May 2005. EWEB recorded TDG at one-minute intervals for 24 hours to investigate TDG response over a range of power generation levels.

Current TDG Conditions

Based on 15 measurements, TDG ranged up to 113.5 percent of saturation in the tailrace of the Carmen powerhouse. Average TDG was 108.5 percent of saturation during this period. Based on 11 measurements recorded 275 feet downstream of the Carmen powerhouse, mean and maximum TDG values were 102.6 percent and 106.1 percent, respectively.

Based on 6 measurements recorded within the tailrace of the Trail Bridge powerhouse, mean and maximum TDG values were 103.2 percent and 109.7 percent of saturation, respectively.

Based on 5 measurements recorded 550 feet downstream of the Trail Bridge powerhouse, mean and maximum TDG values were 103.8 percent and 104.4 percent of saturation, respectively.

EWEB conducted a second TDG survey in May 2005 to investigate the cause and extent of TDG excursions identified during the 2004 synoptic surveys. Plotted as a time-series graph, TDG frequently exceeded the 110 percent saturation criterion during a period which closely tracked the peaking operation of the Carmen plant. Maximum concentrations, which exceeded 113 percent saturation, were reported shortly after startup and continued until mid-afternoon. TDG decreased sharply to less than 101 percent saturation after about 10:00 pm, but rapidly increased to maximum levels again shortly following startup the next morning.

TDG appears closely related to power generation at the Carmen plant. TDG exceeded the 110 percent saturation criterion over generation rates ranging from about 10 MW to 35 MW.

6.8.4 Applicant's Position: TDG

EWEB maintains that operation of the Trial Bridge powerhouse does not cause gas entrainment at concentrations which exceed the ODEQ numeric TDG criterion of 110 percent saturation or otherwise reduce support for beneficial uses below the Project. Flow through the Trail Bridge facility is maintained to the approximate net inflow into the Project. The synoptic river survey was conducted specifically to capture water quality measurements at intervals representative of seasonal conditions. For this reason, EWEB believes measurements collected during the synoptic river survey in 2004 accurately reflect Project related effects which may reasonably be encountered throughout the year.

Diel measurements recorded in the Carmen powerhouse tailrace confirm elevated TDG is attributable to Project operation during low to moderate power generation levels. EWEB proposes to replace both Francis-type turbine runners in the Carmen units and expects reduced TDG impacts as a result of increased turbine efficiency. To confirm this expectation, EWEB proposes to develop a post-construction monitoring program in the WQMP to document Project-related effects under a new License.

6.8.5 ODEQ Evaluation: TDG

Concentrations of TDG in the tailrace below Trail Bridge power plant were below 110 percent saturation during the four synoptic river events conducted in 2004. Flows through this facility reflect the approximate net inflow from all rivers and tributaries upstream of the Project. Because the synoptic surveys were performed during periods representative of seasonal conditions, ODEQ is reasonably assured that the present operation of this facility complies with the TDG numeric criterion.

Within six years of a new License, EWEB shall complete construction of upstream and downstream passage facilities at Trail Bridge Dam in accordance with AMP Section 4.1. Operation of passage facilities will alter the method with which water flows to the full-flow reach below the dam. The influence of operating these facilities on water quality, including TDG, is unknown. For this reason, ODEQ will require EWEB to monitor TDG at representative locations below passage outfalls to measure for Project-related TDG effects associated with operation of these facilities.

Current operation of the Carmen power plant contributes to elevated TDG over a broad range of generation levels. Turbulent discharge from this facility can reach the opposite bank across the narrow, upstream portion of Trail Bridge Reservoir. Fish which traverse the corridor between Trail Bridge Reservoir and the lower Carmen bypass reach may reasonably be expected to encounter TDG concentrations above 110 percent saturation during periods of plant operation. In the FLA, EWEB proposes to replace the runners on both Carmen units in conjunction with general upgrades envisioned for the facility. EWEB anticipates a 2 to 3 percent increase in generation efficiency following planned upgrades (EWEB 2006).

ODEQ believes it is reasonable to expect that modifications which increase operational efficiency will also reduce turbulence which contributes to gas entrainment. Under a new License, EWEB shall replace the runners in both Carmen turbines, or perform equivalent plant modifications or other actions, to reduce the magnitude of gas entrainment below 110 percent saturation in the tailrace below the Carmen powerhouse. ODEQ will require EWEB to monitor TDG over a range of generation levels and operational conditions to confirm that the TDG standard is met following planned upgrades proposed by EWEB.

Concurrent with the upgrade of the Carmen powerhouse, EWEB will install a synchronous bypass valve to redirect flow through the penstock around the turbines in the event of an unplanned power outage. This Project modification is intended to reduce the occurrence of spill events from the Smith Dam emergency spill gate. The bypass valve will discharge to Trail Bridge Reservoir adjacent to the existing Carmen powerhouse. EWEB shall design and operate the discharge outfall of the Carmen bypass valve in a manner which meets water quality criteria, including TDG. ODEQ will require EWEB to monitor TDG during a pre-operational test of this facility.

6.8.6 ODEQ Findings

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

Water Quality Management Plan

Within 12 months of FERC License issuance, EWEB shall submit a WQMP to ODEQ which addresses the TDG monitoring and reporting requirements presented below. Upon ODEQ approval, EWEB shall submit the WQMP to FERC for approval. Upon FERC approval, EWEB shall implement the WQMP.

TDG Monitoring and Reporting

a. Trail Bridge Power Plant

EWEB shall measure TDG below the outfalls of the Trail Bridge fish bypass and fish ladder for a minimum of 72 hours within three months after establishing fish passage. Concurrent with TDG measurements, EWEB shall also record flow and power generation.

b. Carmen Power Plant

EWEB shall measure TDG in the Carmen powerhouse tailrace for a minimum of 72 hours over three complete generation cycles at each Carmen unit within three months of startup following replacement of the turbine runners. Concurrent with TDG measurements, EWEB shall also record flow and power generation. During each test, each unit must be operated over a range of power generation levels and must achieve a maximum of at least 90 percent of the rated

name plate capacity of the operating unit. EWEB shall conduct a portion of each test to measure the influence of the air admission system on TDG.

c. TDG Downstream of Powerhouses
EWEB shall record instantaneous TDG measurements at locations below the powerhouse tailraces during the tests to characterize the downstream extent and dissipation rate of TDG.

d. Bypass Valve
EWEB shall measure TDG below the discharge outfall of the Carmen powerhouse bypass valve during a pre-operational test of the system. Measurements shall be initiated one hour prior to commencing the test and continue for six hours after opening the valve or completing the test, whichever comes first.

e. Block Release Structures: Smith Bypass Reach and Upper Carmen Bypass Reach
Within three months of establishing block releases to the Smith and upper Carmen bypass reaches, EWEB shall measure TDG below each outfall according to the following schedule:

Upper Carmen Bypass
Measure TDG for 72 hours within three months of establishing block releases.

Smith Bypass
Measure TDG and flow for 72 hours:

- Between August 16 and October 31
- Between November 1 and August 15

f. Reporting
EWEB shall submit a report to ODEQ within six months of completing TDG monitoring activities. If monitoring indicates the TDG water quality standard is not met, ODEQ may require EWEB to submit a report analyzing the situation and may require additional monitoring and/or adaptive management of the Project to ensure water quality standards are met in these reaches.

6.9 Temperature

6.9.1 Applicable Standard

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

Temperature

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

(2) Policy. It is the policy of the Commission to protect aquatic ecosystems from adverse warming and cooling caused by anthropogenic activities. The Commission intends to minimize the risk to coldwater aquatic ecosystems from anthropogenic warming, to encourage the restoration and protection of critical aquatic habitat, and to control extremes

in temperature fluctuations due to anthropogenic activities. The Commission recognizes that some of the State's waters will, in their natural condition, not provide optimal thermal conditions at all places and at all times that salmonid use occurs. Therefore, it is especially important to minimize additional warming due to anthropogenic sources. In addition, the Commission acknowledges that control technologies, best management practices and other measures to reduce anthropogenic warming are evolving and that the implementation to meet these criteria will be an iterative process. Finally, the Commission notes that it will reconsider beneficial use designations in the event that man-made obstructions or barriers to anadromous fish passage are removed and may justify a change to the beneficial use for that water body.

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

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

(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.

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

(f) The seven-day-average maximum temperature of a stream identified as having bull trout spawning and juvenile rearing use on subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130B, 151B, 160B, 170B, 180A, 201A, 260A, 310B, and 340B, may not exceed 12.0 degrees Celsius (53.6 degrees Fahrenheit). From August 15 through May 15, in bull trout spawning waters below Clear Creek and Mehlhorn

reservoirs on Upper Clear Creek (Pine Subbasin), below Laurance Lake on the Middle Fork Hood River, and below Carmen reservoir on the Upper McKenzie River, there may be no more than a 0.3 degrees Celsius (0.5 Fahrenheit) increase between the water temperature immediately upstream of the reservoir and the water temperature immediately downstream of the spillway when the ambient seven-day-average maximum stream temperature is 9.0 degrees Celsius (48 degrees Fahrenheit) or greater, and no more than a 1.0 degree Celsius (1.8 degrees Fahrenheit) increase when the seven-day-average stream temperature is less than 9 degrees Celsius.

(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.

6.9.2 Application of Standard

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

Elevated temperatures may also adversely affect other important water quality parameters including dissolved oxygen, and increased algae and fungi productivity.

ODEQ adopts biologically based numeric temperature criteria to support specific life stage and development activities of species which may currently occupy or have historically occupied certain ranges. Native salmonids including bull trout, spring Chinook salmon, rainbow trout (*Oncorhynchus mykiss*), and cutthroat trout (*Oncorhynchus clarki*) are present above, within and below Project-affected streams. Biologically based numeric temperature criteria applicable to the Project are determined by the Fish Use and Spawning Maps presented as Figures 340A and 340B of OAR 340, Division 041. Figure 340A designates the entire Project as suitable habitat for bull trout. The seven-day-average maximum temperature of a stream identified as having bull trout spawning and juvenile rearing use is 12.0 degrees Celsius year round.

The temperature criterion is based on a calculation of the seven-day average maximum (7DMX) temperature. The 7DMX metric is the average of the daily maximum temperatures from seven consecutive days made on a rolling basis.

Definitions applicable to the temperature standard include:

340-04I-0002 Definitions
Definitions applicable to all basins unless context requires otherwise:

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

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

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

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

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

(13) "Core Cold-Water Habitat Use" means waters that are expected to maintain temperatures within the range generally considered optimal for salmon and steelhead rearing, or that are suitable for bull trout migration, foraging, and sub-adult rearing that occurs during the summer. These uses are designated on the following subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130A, 151A, 160A, 170A, 180A, 201A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A.

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

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

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

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

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

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

(56) "Seven-Day Average Maximum Temperature" means a calculation of the average of the daily maximum temperatures from seven consecutive days made on a rolling basis.

(65) "Total Maximum Daily Load (TMDL)" means the sum of the individual waste load allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and background. If receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure. If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs.

6.9.3 Present Conditions

EWEB conducted continuous temperature monitoring activities at numerous locations in the vicinity of the Project from May 2004 through September 2005. Monitoring was performed in accordance with the sampling procedures and objectives described in the Water Quality Final Study Plan (Stillwater Sciences 2004) developed in consultation with the Aquatics Technical Subgroup. Continuous temperature monitoring data were supplemented with measurements collected pursuant to synoptic water quality surveys conducted in May, August, October, and December 2004.

The three primary goals of the temperature monitoring effort were 1) to characterize temperature longitudinally along Project streams; 2) investigate temperature stratification within Project reservoirs; and 3) collect temperature data in support of models which may be used to evaluate temperature in response to alternative management strategies.

To accomplish these goals, EWEB recorded continuous temperature data within Project reservoirs, longitudinally along the mainstem of the McKenzie River between Clear Lake and McKenzie Bridge, in several McKenzie River tributaries, along the Smith River above and below Smith Reservoir, and at two locations in Deer Creek above the confluence with the McKenzie River. In response to potential concerns regarding elevated temperatures in lower Deer Creek, EWEB recorded temperatures in several Deer Creek locations and its tributaries from May through October 2005, to aid in temperature modeling of Deer Creek. Continuous temperature monitoring locations are identified on Figure A-2.

6.9.3.1 Temperature Condition in Project Reservoirs

Carmen-Diversion Reservoir

Temperature monitoring performed during the 2004-2005 study seasons confirmed the applicable temperature criterion was met year round in Carmen-Diversion Reservoir. The 7DMX temperature remained below 10ºC during the entire study and displayed very little seasonal variation.

The water column is well mixed near the spillway and power canal intake where the monitoring was performed (Site 0-3). At this location, the water temperature generally reflects net thermal condition of inflowing streams. At two other locations, near the viewpoint east of the spillway and at the outlet of Ice Cap Springs, thermal stratification and higher seasonal temperature variation were reported. The conditions noted at these locations appear related to shallower water and lower circulation rates.

Smith Reservoir

Smith Reservoir thermally stratifies during summer months with a thermocline developing to a depth of about 23 feet in August. The reservoir undergoes seasonal turnover in the fall and remains well-mixed until late Spring.

Epilimnion measurements were recorded at a depth of about 14 feet near the outlet tower (Site 1-2). 7DMX epilimnion temperature was below the 12ºC criterion during all of 2004 but exceeded the criterion during portions of July, August, and September of 2005, reaching a maximum of 12.8ºC. Measured at a depth of 60 feet, temperature in the Smith Reservoir hypolimnion met the temperature criterion year round.

Trail Bridge Reservoir

Synoptic reservoir surveys indicate Trail Bridge Reservoir develops shallow thermoclines in the summer. The reservoir undergoes turnover in the fall resulting in well-mixed conditions through the winter and into the spring.

Continuous temperature measurements were recorded In Trail Bridge Reservoir at a depth of about 6 feet to characterize seasonal epilimnion temperature response at Site 0-7. Water temperature in the epilimnion exceeded the 12ºC criterion in July and August of 2004 and 2005, reaching a maximum of 13.8ºC. Measured at a depth of 25 feet, water temperature in the hypolimnion met the ODEQ temperature criterion year round.

The highest 7DMX and instantaneous temperatures recorded in Project reservoirs during the 2004 – 2005 study seasons are summarized in Table 11.

Table 11: Maximum 7DMX and Instantaneous Temperatures in Project Reservoirs

Site ID	Location	Highest 7DMX	Highest Instantaneous
0-3	Carmen Diversion Reservoir	9.9	10.3
1-2E	Smith Reservoir Epilimnion	12.8	13.9
1-2H	Smith Reservoir Hypolimnion	11.2	11.2
0-7E	Trail Bridge Reservoir Epilimnion	13.8	15.3
0-7H	Trail Bridge Reservoir Hypolimnion	10.9	11.1

6.9.3.2 Temperature Condition in Project Reaches

McKenzie River

Excluding reservoirs and lakes, EWEB performed continuous temperature monitoring at eight locations along the mainstem of the McKenzie River from below Clear Lake (Site 0-2) above the Project to below McKenzie Bridge (Site 0-12). The ODEQ temperature criterion was met at all monitored locations during the study period except at the McKenzie Bridge monitoring site. At this location, water temperature exceeded the numeric temperature criterion during portions of July and August reaching a maximum of 12.9ºC. McKenzie Bridge is located about 14 miles below the Project. Within this reach, the McKenzie River experiences thermal inputs from ambient conditions and discharge from lower elevation tributaries.

Except at Site 0-12, the highest temperatures along the McKenzie River were recorded above Koosah Falls, above the Project at Site 0-2, which represents outflow from Clear Lake. Although fed by colder groundwater springs, Clear Lake stratifies in the summer resulting in warm seasonal discharge into the upper portion of the McKenzie River. Groundwater accretion from a series of cold water seeps below Tamolich Falls lowers the temperature of surface waters in the upper Carmen bypass reach. Temperatures below the Project are further moderated by inflow from cooler High Cascades streams. Deer Creek, a Western Cascades stream which can reach 20ºC during portions of the summer, joins with the McKenzie River at RM 79. Temperature in the McKenzie River below the confluence with Deer Creek met the temperature standard year round, reaching a 7DMX maximum of 10.3ºC.

Maximum 7DMX and instantaneous temperatures recorded at the eight McKenzie River monitoring sites during the 2004-2005 study season are summarized in Table 12.

Table 12: 7DMX and Instantaneous Temperatures in the McKenzie River

Site ID	Location	Highest 7DMX	Highest Instantaneous
0-2	Above Carmen-Diversion Reservoir and Koosah Falls	11.9	13.6
0-4	Lower Carmen Bypass: Below Tamolich Falls, above Kink Creek	7.1	7.1
0-5	Lower Carmen Bypass: Above Carmen Powerhouse	8.1	8.3
0-8	Below Trail Bridge Powerhouse outlet, incl. spawning channel	10.6	11.1
0-9	Below Ollalie Creek, above Norwegian Creek	8.3	8.4
0-10	Above Deer Creek confluence	9.3	9.6
0-11	Below Deer Creek confluence	10.3	10.6
0-12	Below McKenzie Bridge	12.9	13.5

6.9.3.3 Temperature Condition in McKenzie River Tributaries

Kink Creek

Kink Creek flows into the lower Carmen bypass reach at RM 83.5 roughly midway between the Carmen powerhouse and Tamolich Falls. EWEB measured temperature in Kink Creek near the confluence with the lower Carmen bypass reach at Site 3-1.

Flows in this stream ran dry in July of each year of the study period. The temperature criterion was met during each full month in which flows were present. In July 2004 and 2005, the 7DMX temperature reached 13.4ºC and 13.1ºC, respectively, before flows ceased. Operation of the Project does not influence the magnitude or timing of flows in Kink Creek.

Sweetwater Creek

Sweetwater Creek discharges to the northeast corner of Trail Bridge Reservoir slightly downstream and across from Carmen powerhouse at RM 82.5. Spawning surveys confirm this stream is actively used by bull trout for spawning. EWEB recorded continuous temperature measurements at Site 4-1 located just above the culvert beneath Highway 126. Temperature monitoring demonstrates the biologically-based temperature criterion is met in this stream year round. The 7DMX temperature in Sweetwater Creek is generally low and ranges within a relatively narrow range from 5.1ºC to 7.6ºC. Operation of the Project does not influence the magnitude or timing of flows in Sweetwater Creek.

Anderson Creek

Anderson Creek discharges to the McKenzie River full-flow reach below the Carmen-Smith Spawning Channel at RM 81.0. Monitoring data collected by EWEB confirmed the temperature criterion was met at this location year round. Operation of the Project does not influence the magnitude or timing of flows in Anderson Creek.

Ollalie Creek

Ollalie Creek discharges to the McKenzie River at RM 80.6. Monitoring confirm the temperature criterion was met at this location year round. Operation of the Project does not influence the magnitude or timing of flows in Ollalie Creek.

Maximum 7DMX and instantaneous temperatures recorded in McKenzie River tributaries during the 2004-2005 study season are summarized in Table 13.

Table 13: Maximum 7DMX and Instantaneous Temperatures in Tributaries

Site ID	Location	Highest 7DMX	Highest Instantaneous
3-1	Kink Creek	13.4	13.8
4-1	Sweetwater Creek	7.6	7.7
5-1	Anderson Creek	7.9	8.0
6-1	Ollalie Creek	6.7	6.9

6.9.3.4 Smith River and Tributaries

Excluding Smith Reservoir, EWEB recorded continuous temperature data from thermographs placed in the Smith River upstream of the reservoir (Site 1-1), downstream of the confluence with Bunchgrass Creek (Site 1-3), just above Trail Bridge Reservoir (Site 1-4), and in Bunchgrass Creek just before the confluence with Smith River (Site 2-1).

Temperature at Smith River monitoring sites did not meet the applicable temperature criterion during portions of July, August, and September of 2004 and 2005. Except just below Bunchgrass Creek (Site 1-3) in June 2005, temperature at Smith River monitoring sites also did not meet the temperature criterion in June of 2004 and 2005. The highest temperatures in the Smith River occur in August and range from 18.6ºC above the reservoir to 16.5ºC near the confluence with Trail Bridge Reservoir. High seasonal temperatures in this stream appear to coincide with diminished average monthly base flows which range from 5 to 6 cfs from July to September. From November to June, average monthly base flows in Smith River range from 20 to 29 cfs.

The principal tributary to the Smith River is Bunchgrass Creek which joins the Smith bypass reach just below Smith Dam. 7DMX temperature in Bunchgrass Creek ranged from 13.5ºC to 13.9ºC during July and August 2004 and 2006. Bunchgrass Creek appears to have higher base flow per unit drainage area compared with other Western Cascades streams (Stillwater Sciences 2006d). Flow in Bunchgrass may, therefore, be augmented with groundwater accretion, a position supported by generally lower stream temperatures in this reach compared with locations along the Smith River.
Flow in the Smith bypass reach represents the combined discharge from Bunchgrass Creek, occasional spills from Smith Dam, and groundwater inputs estimated at approximately 1 cfs. Below the confluence with Bunchgrass Creek, the Smith bypass reach gains between from 0.7ºC to 1.7ºC during July, August, and September when the total average monthly flows are at seasonal lows. Under a new License, EWEB shall augment flows in the Smith bypass reach with block releases from Smith Reservoir in accordance with the schedule presented in AMP Section 4.2.3.

Maximum 7DMX and instantaneous temperatures recorded in the Smith River and related tributaries during the 2004-2005 study season are summarized in Table 14.

Table 14: Maximum 7DMX and Instantaneous Temperatures in Smith River and Tributaries

Site ID	Location	Highest 7DMX	Highest Instantaneous
1-1	Smith River upstream of reservoir	18.6	19.2
1-3	Smith River below Bunchgrass Creek	15.5	16.1
1-4	Smith River upstream of Trail Bridge Reservoir	16.5	16.8
2-1	Bunchgrass Creek	13.9	14.4

6.9.3.5 Deer Creek

EWEB currently operates a segment of the 115-kV transmission line within the riparian corridor along the lower 1.0 miles of Deer Creek. EWEB maintains surrounding vegetation at early seral stage to protect power lines and provide access for maintenance. Current vegetation maintenance practices prevent mature tree canopy development which may reduce system potential shading within this reach.

EWEB recorded continuous temperature measurements at locations above and below the transmission line corridor in the lower portion of Deer Creek. Temperatures in Deer Creek are among the highest in the Project area and exceeded the applicable numeric criterion during

portions of June, July, August, and September of 2004 and 2005. The 7DMX temperature reached 20.9ºC downstream of the transmission corridor in August 2004. Monitoring demonstrates that warming occurs within the reach occupied by the EWEB transmission line. During summer months, temperatures averaged nearly 2.0ºC higher below the transmission lines relative to the upstream monitoring site.

Maximum 7DMX and instantaneous temperatures recorded in Deer creek during the 2004-2005 study season are summarized in Table 15.

Table 15: Maximum 7DMX and Instantaneous Temperatures in Deer Creek

Site ID	Location	Highest 7DMX	Highest Instantaneous
8-1	Deer Creek above transmission lines	18.4	18.9
8-2	Deer Creek below transmission lines	20.9	21.3

6.9.4 Applicant's Position

Present Conditions

Reservoirs

The temperature criterion is met year round in Carmen Diversion Reservoir.

Continuous temperature monitoring in the Smith Reservoir epilimnion (Site 1-2E) confirmed brief temperature excursions above 12ºC during August 2005. Similar excursions in 2004 were not identified. The August 2004 thermal profile of instantaneous temperatures indicates the 12ºC temperature criterion is met at a depth of approximately 10 feet. In-situ water temperatures were relatively uniform and met the 12ºC criterion throughout the hypolimnion. EWEB has concluded that the presence of uniform temperature conditions below the numeric criterion throughout the hypolimnion provides support for all designated beneficial uses in Smith Reservoir.

Trail Bridge Reservoir develops a shallow thermocline in summer months resulting in brief excursions above the 12ºC temperature criterion within the epilimnion during portions of July and August. Thermal profiling completed in August 2004 suggests the 12ºC temperature criterion is met during the warmest periods of the year below a depth of about 5 feet. EWEB has concluded that thermal conditions within the reservoir provide support for the most sensitive beneficial uses.

McKenzie River and Tributaries

The applicable temperature criterion is met year round at all monitoring sites in the McKenzie River except for Site 0-12 located below McKenzie Bridge approximately 14 miles downstream of the Project. Except for Deer Creek and Smith River, the applicable temperature criterion is met year round at all monitoring sites located in tributaries to the McKenzie River. Except for Deer Creek and Smith River which are addressed below, EWEB has concluded that temperature monitoring within the McKenzie River and its tributaries demonstrates compliance with applicable numeric temperature criteria and support for all designated beneficial uses.

Smith River
Summertime temperatures in the Smith River above and below the reservoir are driven by reduced flow and high ambient air temperature. In the Smith bypass reach, water temperature is controlled by flow from Bunchgrass Creek with small contributions from groundwater accretion. Flow in the Smith River above the reservoir is unaffected by Project developments or operation. Temperatures in this reach can exceed 18.0ºC in late summer. EWEB conducted temperature modeling to demonstrate the natural thermal condition exceeds the ODEQ numeric criterion applied to this stream.

Deer Creek
Temperatures in Deer Creek are among the highest recorded in the Project area. Stream temperature recorded during the 2004 - 2005 study seasons exceeded the numeric criterion from about mid June into October and reached a maximum of more than 18.0ºC during July and August. EWEB has determined that the stream temperatures recorded in this reach are driven by broad valley width, decreased shade potential caused by forest management practices upstream of the Project, diminished seasonal flows, and high ambient air temperatures. Since water quality conditions, including temperature, upstream of the transmission line corridor are unaffected by Project developments and operations, EWEB has concluded that the findings from temperature monitoring activities demonstrate the natural thermal condition of this stream exceeds the ODEQ numeric criterion. EWEB conducted temperature modeling to estimate natural thermal potential of this stream under pre-Project conditions.

Water Temperature Modeling
EWEB performed a series of temperature modeling exercises to provide assurance that Project operations will meet applicable ODEQ temperature criteria under a new License. Three modeling exercises were performed.

The first effort addressed baseline natural thermal conditions as a possible source contributing to elevated temperatures identified in Deer Creek and the Smith bypass reach. While the findings indicated warming occurs within these Project segments, the results also support that site-specific topographic, hydrologic, and vegetative shade characteristics may prevent certain reaches from attaining applicable numeric criteria under historical, pre-Project development scenarios. Where thermal profiles under natural site-potential conditions exceed numeric criteria, ODEQ rules allow the natural thermal potential of the stream to supersede the biologically-based criteria (OAR 340-041-0028[8]). EWEB conducted temperature modeling in both Deer Creek and the Smith bypass reach to estimate NTP under full site-potential conditions and compared these results with measured results within the respective stream segments.

EWEB also performed two modeling efforts to estimate thermal response to two stream segments under flow regimes under a new License. For the first model, EWEB performed a simple mixing model using flow-weighted contributions from Bunchgrass Creek, scheduled releases from Smith Dam, and groundwater accretion sources along the Smith River to estimate temperature in this reach under the flow schedule prescribed in Section 4.2.3 of the Aquatics Management Plan.

For the last modeling effort, EWEB estimated thermal conditions in the upper Carmen bypass reach resulting from the introduction of year round block releases from Carmen Diversion Dam. Flows required under a new License are expected to permanently extend the fully wetted extent of this reach to a pool located near RM 87 before sinking into the ground. Temperatures were

modeled under two scenarios. First, the model assumed 50 percent of inflow was gradually lost to infiltration over the length of the study reach. The second scenario assumed a more aggressive infiltration rate resulting in a net residual flow of 2 cfs remaining in the channel at the compliance point. The model applied air temperatures estimated at exceedance levels corresponding to both "normal" and "hot" ambient air temperature conditions.

Results from the modeling efforts are discussed below.

Modeled NTP and Flows in Smith Bypass

EWEB modeled temperatures in the Smith River bypass reach corresponding to scheduled releases from Smith Dam required under the Settlement Agreement. The model computed temperatures at two week intervals from July 15 to October 1 based on combined contributions from Bunchgrass Creek, block releases from Smith Dam, and groundwater accretion. EWEB then applied SSTEMP to the mixed inflow temperature to predict the 7DMX temperature at the downstream end of the Smith bypass reach just above Trail Bridge Reservoir (Site 1-4). Results from the modeled Smith bypass flows are summarized in Table 16.

Table 16: Modeled Temperatures in the Smith Bypass Reach

Date	Release from Reservoir (cfs)	Bunchgrass Flow (cfs)	Groundwater Accretion (cfs)	Mixed Temperature (Site 1-3)	7DMX Temperature (Site 1-4)
Jul-15	20.0	5.1	1.0	11.2	12.6
Aug-1	25.0	3.9	1.0	11.5	12.9
Aug-15	35.0	3.6	1.0	11.4	12.5
Sep-1	35.0	3.6	1.0	10.7	11.7
Sep-15	35.0	3.6	1.0	9.8	10.7
Oct-1	35.0	7.0	1.0	9.3	9.9

Temperature modeling based on modeled flows in the Smith bypass indicate temperature at the upstream portion of the Smith bypass reach (Site 1-3) will meet the 12.0ºC criterion year round. Based on warming predicted by SSTEMP modeling, the downstream portion of the reach just above Trail Bridge Reservoir will not meet the 12.0ºC numeric criterion from about July 15 through the end of August. During this period, SSTEMP predicted the highest 7DMX temperature at the lower end of the Smith River will be 12.9ºC.

EWEB modeled NTP in the Smith River to determine conditions in this stream without the presence of Smith Dam. The stream was divided into two segments. Segment 1 consists of the upper Smith River from the confluence with Bunchgrass Creek (Site 1-3, RM 2.0) upstream above Smith Reservoir (Site 1-1, RM 5.0). Segment 2 consists of the present-day Smith bypass reach from the confluence with Bunchgrass Creek downstream to just above Trail Bridge Reservoir (Site 1-4. RM 0.0).

Modeled 7DMX temperatures for upstream and downstream segments of the Smith bypass reach are presented in Table 17.

Table 17: Modeled NTP in Smith Bypass Reach

Date / Location	Below Bunchgrass Creek (Site 1-3)	Above Trail Bridge Reservoir (Site1-4)
May-15	7.8	7.4
Jun-15	11.7	9.6
Jul-15	15.1	14.0
Aug-1	15.3	15.1
Aug-15	15.6	15.4
Sep-1	13.9	13.5
Sep-15	13.0	13.0
Oct-1	10.2	10.3

The SSTEMP model predicted that historic temperatures in the Smith bypass reach were generally similar to current thermal conditions with slightly warmer pre-Project temperatures at the upstream location (Site 1-3) due to the influx of warmer Smith River water and slightly cooler temperatures at the lower end (Site 1-4). The cooler modeled downstream temperatures are likely the result of higher pre-Project flows which offset the warming potential experienced under the current bypass flow regime. Under historic conditions, SSTEMP predicted thermal conditions above the biologically-based 12ºC numeric criterion from mid-July through mid-September. During each modeled period, historic temperatures in this reach exceeded the temperatures predicted under flows required under the terms of the Settlement Agreement.

Modeled NTP in Deer Creek

EWEB used two modeling tools to estimate NTP in Deer Creek under pre-development conditions. In the first scenario, EWEB used SSTEMP to model stream temperature in the reach adjacent to the current transmission line corridor. SSTEMP modeled mean and maximum stream temperatures in response to a range of riparian shade scenarios. System potential shade was based on a maximum tree height and crown diameter of 209 feet and 66 feet, respectively. Table 18 compares the maximum temperatures modeled using SSTEMP assuming a current tree height of 7.2 meters and a maximum assumed tree height of 63.8 meters. Maximum observed temperatures recorded on the corresponding dates during the 2005 study season are included for reference.

Table 18: Maximum Observed and Modeled Temperatures in Deer Creek

	August 1	August 15	September 1	October 1
Observed (2005)	17.6	18.3	17.5	11.9
SSTEMP: Current conditions	19.0	18.5	17.5	11.9
SSTEMP: Maximum Shade	17.1	16.6	15.7	10.9

SSTEMP modeling indicates stream temperatures do not fall below the 12ºC criterion from the beginning of August through mid-September. Further, restoring tree height and canopy diameter to reflect maximum shade potential provided a net maximum modeled temperature decrease of less than 2.0ºC. The findings of the SSTEMP modeling suggest that shade implementation along the transmission corridor in Deer Creek by itself is insufficient to achieve applicable numeric temperature criteria downstream of the transmission lines.

EWEB conducted a second modeling exercise to explore the effects of applying shade implementation on a broader, basin-scale. Using BasinTemp©, EWEB modeled temperatures in the Deer Creek basin under assumed historical vegetation conditions. The modeling effort

was calibrated using temperature data collected in 2005 from five additional Deer Creek locations above the transmission line corridor and four upstream tributaries to Deer Creek. Table 19 presents the modeled 7DMX temperatures above and below the transmission lines at Sites 8-1 and 8-2, respectively.

Table 19: Modeled NTP and Observed 7DMX Temperatures in Deer Creek

		August 1	August 15	September 1	October 1
Deer Creek: Upstream (8-1)	Modeled	17.4	17.5	15.8	12.8
	Observed	17.0	16.8	15.0	11.2
Deer Creek: Downstream (8-2)	Modeled	19.1	18.9	17.6	12.8
	Observed	18.7	18.4	17.0	12.8

Modeled stream temperatures at both upstream and downstream locations in Deer Creek exceeded the numeric criterion for the entire eight-week modeling period. At the beginning of the model simulation period on August 1, the modeled 7DMX temperature downstream of the transmission line exceeds the numeric criterion by more than 7.0ºC. BasinTemp© modeling closely reflected observed 7DMX temperatures at Site 8-2 at the downstream portion of Deer Creek which suggests temperature impacts in this basin may be less sensitive to increased shade potential. EWEB suggests that the observed and modeled temperatures may be related to basin characteristics such as broad valley width which contribute to decreased topographic shading rather than localized land use practices.

Modeled Flows in Upper Carmen Bypass

EWEB conducted temperature modeling exercises to predict the downstream thermal response to scheduled releases from Carmen Diversion Dam required under a new License. Flows are not currently regularly released from this dam. Under a new License, EWEB will release a minimum of 30 cfs into the upper bypass reach year round. During a field visit, EWEB and ODEQ personnel identified a basalt feature which bisects the river channel near RM 87.0. This feature is expected to represent the furthest downstream extent of continuously connected aquatic habitat in the upper Carmen bypass reach. This location was selected as a downstream compliance monitoring site.

Flows in the upper Carmen gradually sink into the highly porous volcanic bedrock. Studies conducted in May 2005 indicate block releases of 50 cfs sink entirely into the ground shortly beyond the downstream monitoring site at RM 87.0 (Stillwater Sciences 2006d). The sinking rate along the channel prior to that point is unknown.

EWEB used SSTEMP to model stream temperature at the lower end of the upper Carmen bypass reach under two stream loss scenarios. First, EWEB assumed a “fixed loss” of 15 cfs along the length of the bypass reach. In the second scenario, a more aggressive regime was adopted in which all flows above 2 cfs sunk belowground by the proposed downstream compliance point.

Results from temperature modeling of upper Carmen bypass reach flows are presented in Table 20.

Table 20: Modeled 7DMX Temperatures in Upper Carmen Bypass Reach

	June	July	August	September
Carmen Diversion Reservoir: Observed Monthly Mean				
Input: Site 1-3	7.6	8.5	8.5	7.3
Modeled 7DMX Temperature at Upper Carmen Bypass Reach Compliance Point (RM 87.0)				
RM 87.0: Scenario #1	8.5	9.5	9.4	7.9
RM 87.0: Scenario #2	9.0	10.2	9.9	8.4

Notes: Modeled values based on 10-percent probability of ambient air temperature exceedance.
Scenario #1: Fixed flow loss of 15 cfs over length of bypass reach
Scenario #2: Worst-case loss of all but 2 cfs of block release

SSTEMP modeling predicts that temperatures at the downstream end of the bypass reach will remain below the applicable 12.0ºC temperature criterion under both fixed-loss and worst-case sinking model scenarios. Since no temperature monitoring data were collected to calibrate the model under the presumed flow regime, no validation of model accuracy was performed. EWEB proposes developing a monitoring protocol for temperature in the reach once flows are implemented to verify compliance with applicable water quality criterion.

6.9.5 ODEQ Evaluation

The mainstem McKenzie River and all its tributaries upstream of the confluence with the South Fork McKenzie are designated bull trout spawning and rearing habitat. The biologically based numeric temperature criterion to protect this use is 12.0ºC, unless superseded by NTP. ODEQ has placed Deer Creek, a tributary to the McKenzie River and located within the Project area, on the CWA Section 303(d) list of water quality limited water bodies for the parameter of temperature.

Portions of the Project area support populations of federally listed fish species including bull trout (*Salvelinus confluentus)* and Spring Chinook salmon (*Oncorhynchus tshawytscha*) which rely on certain habitat requirements, including the presence of cold water, during critical life stage development.

Current operation of the Project alters the natural hydrograph which can have a potential adverse affect on certain water quality parameters, including temperature. Under the terms of the AMP, EWEB will perform certain PMEs including the release of additional flows in Project reaches to enhance aquatic habitat and water quality. The Project as proposed would continue to exert a thermal impact on streams. However, modeling efforts suggest the temperature standard will be met throughout the Project at all times of the year providing EWEB performs the required PME measures and implements the Conditions described in this Evaluation and Findings Report.

ODEQ offers the following evaluation of specific Project water bodies.

<u>Project Reservoirs</u>
Carmen Diversion Reservoir
The temperature criterion is met year round in Carmen Diversion Reservoir.

Smith Reservoir
ODEQ applies the 12ºC temperature criterion to Smith Reservoir year round based on fish use distribution maps which indicate this water body is potentially within the historic range used by bull trout for spawning and juvenile rearing.

Smith Reservoir stratifies during portions of the summer during which the 12.0ºC criterion may occasionally be exceeded in the epilimnion. Summertime temperatures meet the 12ºC temperature criterion throughout the hypolimnion beginning below a depth of about 10 feet. ODEQ believes an abundance of suitable habitat exists below this depth which meets the applicable temperature criterion and demonstrates support for the most sensitive designated beneficial uses.

Smith Reservoir sustains a healthy, year-round fishery dominated by rainbow trout of hatchery origin with significant numbers also of cutthroat and non-native brook trout.

Summertime surveys identified rainbow and cutthroat trout concentrated in upper warmer zones suggesting fish favor these intervals during this portion of the year. These behavioral patterns suggest the shallow reservoir provides favorable habitat which is absent of thermal conditions or other environmental stressors which may cause fish to seek cooler thermal refuge. ODEQ has established a temperature criterion of 18.0ºC for salmonid rearing and migration and 13.0ºC for salmonid spawning. These criteria are met year round at all depths within Smith Reservoir. ODEQ believes that temperature monitoring demonstrates support for all designated beneficial uses in Smith Reservoir.

Trail Bridge Reservoir
Surveys conducted in Trail Bridge Reservoir in 2005 confirm the presence of bull trout, cutthroat trout, native and hatchery rainbow trout, non-native brook trout, mountain whitefish, and juvenile Chinook salmon (Stillwater Sciences 2006a). ODEQ applies the 12ºC temperature criterion to Trail Bridge Reservoir based on the potential for bull trout spawning and juvenile rearing.

Trail Bridge Reservoir develops a shallow thermocline in summer months resulting in brief excursions above the 12ºC temperature criterion within the epilimnion during portions of July and August. The 7DMX temperature in the epilimnion decreases sharply in late August reaching the 12ºC criterion by early September. Thermal profiling completed in August 2004 suggests the 12ºC temperature criterion is met during the warmest periods of the year below a depth of about 5 feet. Below this zone, the temperature criterion is met year round and provides an abundance of habitat suitable to all designated beneficial uses.

Under a new License, EWEB will maintain the elevation of Trail Bridge Reservoir at 2,083 feet MSL from August 15 through October 31 to facilitate bull trout access through the fish passage culvert to Sweetwater Creek. Monitoring data indicate that during the early part of this period temperature in the upper portion of the reservoir may exceed the numeric criterion. Elevated temperatures may delay movement during key migratory periods. However, PIT tagged bull trout were detected migrating successfully through the culvert in August and September 2004 and 2005 when temperatures were near seasonal maxima (Stillwater Sciences 2006e). ODEQ believes that turbulent mixing below the culvert outfall may locally interrupt the shallow thermocline or otherwise provide thermal cues which reduce delay and avoidance at this point.

ODEQ believes the documented distribution of bull trout throughout Trail Bridge Reservoir demonstrates water temperature supports all designated beneficial uses.

McKenzie River and Tributaries

McKenzie River

The temperature criterion is met year round at all monitoring sites on the McKenzie River within the Project area. Temperature increases longitudinally below the Project due to tributary discharge and ambient warming resulting in short-duration temperature excursions below McKenzie Bridge approximately 14 miles downstream of the Project.

Tributaries

The temperature criterion is met year round in Sweetwater Creek, Anderson Creek, and Ollalie Creek. The temperature criterion is also met year round in Kink Creek, except during the month preceding the seasonal cessation of flows.

Smith River

Temperature in the Smith River is driven by reduced summertime flows and warm ambient air temperatures. NTP exceeds the numeric criterion in this reach, and, therefore, supersedes the applicable numeric criterion. Under a new License, EWEB shall provide year round block releases to the Smith bypass reach to provide habitat for designated uses.

Modeled NTP and Smith bypass reach temperatures are summarized in Table 21. Temperature modeling suggests that temperatures in the Smith bypass reach following implementation of Settlement Agreement flows will range between 0.4ºC and 2.9ºC below NTP. ODEQ believes the water temperature resulting from these block releases will be below applicable NTP and, therefore, will be in support of all designated beneficial uses. ODEQ will require compliance monitoring to confirm temperature response from scheduled block releases will comply with modeled NTP.

Table 21: Modeled NTP in Smith Bypass Reach

Date / Location	Modeled Temperature Above Trail Bridge Reservoir (Site 1-4)	NTP Above Trail Bridge Reservoir (Site1-4)	Difference
May-15	NM	7.4	
Jun-15	NM	9.6	
Jul-15	12.6	14.0	-1.4
Aug-1	12.9	15.1	-2.2
Aug-15	12.5	15.4	-2.9
Sep-1	11.7	13.5	-1.8
Sep-15	10.7	13.0	-2.3
Oct-1	9.9	10.3	-0.4

Note: Modeled temperature assumes minimum block releases per AMP Section 4.3.2.
NM means Not Modeled for this period.
All units in degrees Celsius.

Deer Creek

Temperature in Deer Creek is driven by reduced summertime flows, warm ambient air temperatures, and vegetation management practices which reduce the shade potential in the vicinity of the transmission line corridor. Basin-scale modeling confirms slightly lower stream temperatures under full system potential shade, although modeled temperatures still do not meet the numeric criterion of 12ºC until mid-October. Modeled NTP at the lower end of Deer

Creek is presented in Table 22. Under system potential shade, modeled NTP exceeds the numeric criterion in this reach, and, therefore, supersedes applicable numeric criteria.

EWEB will relocate the transmission line towers out of the riparian corridor and plant vegetation in this reach in accordance with the VMP to achieve system potential shade in the Project area. EWEB will meet the NTP criterion following relocation of the transmission line and planting of vegetation in this corridor to provide system potential shade for this portion of the Project.

Table 22: Modeled NTP in Deer Creek

	August 1	August 15	September 1	October 1
Deer Creek: Upstream	17.4	17.5	15.8	12.8
Deer Creek: Downstream	19.1	18.9	17.6	12.8

Upper Carmen Bypass Reach

EWEB modeled estimated thermal conditions near the wetted downstream extent of the upper Carmen bypass reach following introduction of the block releases required under the terms of the Settlement Agreement. Since regular releases do not currently occur, data were unavailable to calibrate the model. However, under input parameters intended to represent "worst-case" conditions, EWEB estimates the 7DMX temperature near RM 87.0 will not exceed the numeric criterion of 12.0ºC. ODEQ believes the flows prescribed under the Settlement Agreement will meet the numeric temperature criterion near the downstream wetted extent of the upper Carmen bypass reach once flows to this reach are established. To confirm this expectation, ODEQ will require follow-up compliance monitoring. In the event the temperature numeric criterion is exceeded, ODEQ may require EWEB to submit a report analyzing the situation and may require additional monitoring and/or development of adaptive management strategies which may be implemented to maintain compliance with the temperature water quality standard.

6.9.6 ODEQ Finding

ODEQ is reasonably assured that operation of the Project under a new FERC License will not contribute to violations of the temperature standard, provided that the following measures are implemented:

1. Water Quality Management Plan: Within 12 months of FERC License issuance, EWEB shall submit a WQMP to ODEQ which addresses the temperature monitoring and reporting requirements presented below. Upon ODEQ approval, EWEB shall submit the WQMP to FERC for approval. Upon FERC approval, EWEB shall implement the WQMP.

2. Temperature Monitoring and Reporting
   a. Upper Carmen Bypass Reach
   Within three months of establishing block releases from Carmen Diversion Dam as required by AMP Section 4.2.1, EWEB shall measure temperature near the upper and lower portions of the upper Carmen bypass reach in accordance with the WQMP. EWEB shall also measure flow releases from Carmen Diversion Dam. If monitoring indicates the biologically based numeric temperature criterion of 12.0ºC is not met, ODEQ may require EWEB to submit a report analyzing the situation or may require additional monitoring and/or adaptive management.

b. Smith River Bypass Reach
Within three months of establishing block releases from Smith Dam as required by AMP Section 4.2.3, EWEB shall measure temperature near the upper and lower portions of the Smith River bypass reach in accordance with the WQMP. EWEB shall also measure flow releases from Smith Dam. If temperature monitoring indicates modeled NTP criteria are not met at this location, ODEQ may require EWEB to submit a report analyzing the situation or may require additional monitoring and/or adaptive management. If monitoring demonstrates NTP is met under the schedule of prescribed block releases, ODEQ will require implementation of the Settlement Agreement flows as a condition of compliance with the ODEQ temperature standard in this reach.

c. Deer Creek
EWEB shall measure temperature at monitoring points located above and below the transmission line in the lower portion of Deer Creek in accordance with the WQMP. EWEB shall relocate the Deer Creek valley segment of the 115-kV transmission line out of the Deer Creek riparian area within three years of a new FERC License as required by proposed License Article 22. Following this relocation, EWEB shall revegetate the riparian area in a manner which will promote shade potential in this reach.

d. McKenzie River
EWEB shall measure temperature and flow in the McKenzie River at the USGS Gage 14158850 in accordance with the WQMP. If monitoring indicates the numeric temperature criterion of 12.0ºC is not met, ODEQ may require EWEB to submit a report analyzing the situation or may require additional monitoring and/or adaptive management of the Project to ensure water quality standards are met.

e. General Monitoring and Reporting Requirements
Minimum acceptable data capture is 95 percent, except for circumstances beyond the control of EWEB. Monitoring shall be performed in accordance with the procedures and data quality objectives described in a QAPP approved by ODEQ. Monitoring data shall be submitted to ODEQ within six months of completing required monitoring.

3. Adaptive Management
If water quality monitoring demonstrates that Project operations contribute to exceedances of the applicable temperature standard, EWEB shall prepare a plan in consultation with ODEQ which proposes measures to reduce Project-related thermal loading. The plan may consider measures to alter the timing and/or magnitude of releases to minimize temperature increases in affected reaches. EWEB must submit the plan within six months of identifying temperature exceedances. Upon ODEQ approval, EWEB shall submit the plan to FERC for approval. Upon FERC approval, EWEB shall implement the plan.

6.10 Toxic Substances

6.10.1 Applicable Standard

The applicable standard is set forth in 340-041-0033:

(1) Toxic substances may not be introduced above natural background levels in the waters of the state in amounts, concentrations, or combinations that may be harmful, may chemically change to harmful forms in the environment, or may accumulate in sediments or bioaccumulate in aquatic life or wildlife to levels that adversely affect public health, safety, or welfare; aquatic life; wildlife; or other designated beneficial uses;

(2) Levels of toxic substances in waters of the state may not exceed the applicable criteria listed in Tables 20, 33A, and 33B. Tables 33A and 33B, adopted on May 20, 2004, update Table 20 as described in this section.

(a) Each value for criteria in Table 20 is effective until the corresponding value in Tables 33A or 33B becomes effective.

(A) Each value in Table 33A is effective on February 15, 2005 unless EPA has disapproved the value before that date. If a value is subsequently disapproved, any corresponding value in Table 20 becomes effective immediately. Values that are the same in Tables 20 and 33A remain in effect.

(B) Each value in Table 33B is effective upon EPA approval.

(b) The department will note the effective date for each value in Tables 20, 33A, and 33B as described in this section.

(3) To establish permit or other regulatory limits for toxic substances for which criteria are not included in Tables 20, 33A, or 33B, the department may use the guidance values in Table 33, public health advisories, and other published scientific literature. The department may also require or conduct bioassessment studies to monitor the toxicity to aquatic life of complex effluents, other suspected discharges, or chemical substances without numeric criteria.

6.10.2 Application of Standard

This standard provides protection for humans, wildlife, and aquatic life from adverse effects resulting from the presence of toxic substances above natural levels, either alone or in combination with other chemicals or substances. Where needed, ODEQ can consider additional studies reported in the scientific literature to review applicability of numeric criterion, or to set guidance values.

6.10.3 Present Conditions

The Toxic Substances water quality standard prohibits the introduction of toxic material into waters of the state in amounts or combinations which may be harmful to aquatic life, human health, or other designated beneficial uses. ODEQ has established numeric criteria for toxic substances in Tables 20, 33a, and 33b of OAR 340-041-0033.

Sampling Locations and Frequency

EWEB conducted synoptic reservoir and river surveys in May, August, October, and December 2004 to provide temporal water quality data corresponding to characteristic seasonal periods. River samples were collected at eight locations along the McKenzie River from just below Clear Lake (Site 0-2) to below McKenzie Bridge (Site 0-12), and above and below Smith Reservoir on Smith River (Sites 1-1 and 1-4, respectively). Samples were also collected from Smith Reservoir (Site 1-2), Trail Bridge Reservoir (Site 0-7), and Carmen Diversion Reservoir (Site 0-3). EWEB also sampled the epilimnion and hypolimnion within Clear Lake in August 2004.

Inorganics

Measured levels of inorganic minerals (sodium, potassium, chloride, magnesium, calcium, and alkalinity) were generally very low throughout Project reservoirs and reaches and were generally below applicable ODEQ numeric criteria. The lowest concentrations of calcium, magnesium, alkalinity, and hardness were recorded in the Smith River above the reservoir. Flow in the Smith bypass reach is dominated by inflow from Bunchgrass Creek. Concentrations of inorganics in this reach were comparable with concentrations identified in the McKenzie River. Overall, the low concentrations of inorganic minerals result in low hardness values which average about 12 mg/l throughout the Project area.

Trace Metals

EWEB measured concentrations of the following trace metals in Project reservoirs and reaches: antimony; arsenic; beryllium; cadmium; chromium; copper; lead; mercury; nickel; selenium; silver; thallium; and zinc. EWEB compared the results with chronic and acute criteria for the protection of aquatic life, chronic criteria for the protection of human health based on fish and water ingestion and fish consumption, and maximum contaminant levels (MCLs) in drinking water for the protection of human health.

Criteria for the protection of aquatic life for cadmium, copper, lead, nickel, silver, and zinc are strongly dependent on hardness. ODEQ establishes numeric criteria based on an assumed hardness of 100 mg/l. Monitoring of calcium and magnesium in Project waters indicates the hardness ranges from 7 mg/l to 19 mg/l with a mean concentration of about 12 mg/l. EWEB developed hardness-dependent freshwater dissolved metals criteria to evaluate trace metal toxicity based on locally measured hardness and alkalinity. Adjusting for low hardness significantly reduced the numeric toxicity criteria for many trace metals.

The following trace metals were not detected in any sample above laboratory method detection limits (MDLs) or were detected at levels below the laboratory method reporting limit (MRL): Antimony; Arsenic; Beryllium; Cadmium; Copper; Selenium; Thallium.

The following trace metals were detected in one or more sample at concentrations exceeding the laboratory MRL, but at concentrations below applicable toxicity criteria: Chromium; Mercury; Nickel.

Samples collected in May 2004 were analyzed using EPA Method 200.7 which resulted in MDLs above the most stringent numeric criteria for the following metals: antimony; arsenic; beryllium; lead; nickel; and thallium. EPA Method 200.8 was used during subsequent events to achieve MDLs below the most stringent numeric criteria for all target analytes except arsenic and beryllium. Using revised analytical methods, the lowest practicable MDLs still exceeded the most stringent numeric criteria for beryllium (6.8 ng/l, continuous chronic criteria (CCC) for the protection of aquatic life) and arsenic (2.2 ng/l, CCC for the protection of human health based on water and fish consumption). However, the MDLs for these trace metals were sufficiently low to confirm the absence of these substances at concentrations exceeding all other applicable screening criteria, including chronic criteria for the protection of human health and aquatic life.

Concentrations of lead and silver exceeded their respective hardness-adjusted criteria on the following occasions:

- Clear Lake epilimnion (Site 0-1E), August 2004. Total lead detected at 0.33 mg/l, above the ODEQ hardness-adjusted criteria of 0.21 mg/l based on a hardness of 12 mg/l as $CaCO_3$.

- Carmen Diversion Reservoir (Site 0-3), December 2004. Total silver detected at 0.194 mg/l, above the ODEQ hardness-adjusted criteria of 0.09 mg/l based on a hardness of 13 mg/l as $CaCO_3$.

- Trail Bridge Reservoir hypolimnion (Site 0-7), August 2004. Total lead detected at 0.32 mg/l, above the ODEQ hardness-adjusted criteria of 0.21 mg/l based on a hardness of 13 mg/l as $CaCO_3$.

In summary, Project operations do not result in direct discharge of toxic materials to waters of the State. The findings of the investigation confirm a general absence of trace metals within the Project area at concentrations above applicable numeric criteria. The presences of lead in waters above and within the Project area suggest that the presence of this metal is related to the parent geology and not a result of operations. Silver was detected in one sample (Site 0-3: Carmen-Diversion Reservoir, December 2004), but was not detected above laboratory MRLs at any other location.

Use of the most appropriate laboratory methods could not confirm the absence of arsenic or beryllium at concentrations above the most stringent numeric criteria. However, since the Project does not use or discharge these metals, it is reasonable to conclude that the potential presence of these metals is in support of all designated beneficial uses.

Nutrients
EWEB monitored nutrient levels in Project reservoirs and reaches during the four synoptic survey events conducted in 2004. The following nutrient parameters were monitored: Total Kjeldahl Nitrogen (TKN); Ammonia; Nitrate plus Nitrite; Orthophosphate; and Total Phosphorus.

Nutrient levels in Project reservoirs were generally below their respective laboratory MRLs or were below comparable regional reference levels (EPA 2000). Total Phosphorus was measured in Smith Reservoir (Site 1-2) at an order of magnitude above the regional reference value, but within the range of measured values for the region. Similarly, TKN, orthophosphate, and total phosphorus were detected in Trail Bridge Reservoir (Site 0-7) at levels above regional reference values, but within the range of measured values for the Cascades ecoregion.

Nutrient levels in the McKenzie River were generally either below laboratory MRLs or below regional reference values. Seasonally, nutrient levels were highest in October with TKN concentrations approaching or exceeding regional values. The increase in nitrogen may be due to the introduction of organic material following seasonal rain events. Total phosphorus and orthophosphate increased downstream in the Smith River with a corresponding decrease in TKN. Overall, nutrient levels in the Smith River were low and within the range of regional values.

6.10.4 Applicant's Position

EWEB maintains that Project operations do not discharge toxic substances to waters of the State. This position is supported by sampling data collected during synoptic surveys throughout

the Project area which demonstrate general compliance with applicable numeric criteria. Two exceptions to this position were noted. Total silver was detected in Carmen Diversion Reservoir at 0.194 mg/l, which exceeds the hardness-corrected criterion of 0.09 mg/l. Total lead was detected in Trail Bridge Reservoir at 0.32 mg/l, which exceeds the hardness-corrected criterion of 0.21 mg/l. Since neither of these trace metals is a component of Project operations, and since total lead was identified upstream of the Project at a concentration similar to that in Trail Bridge Reservoir, EWEB maintains the concentrations of trace metals observed throughout the Project area reflect the attainment of natural conditions based on the composition of the regional parent geology. EWEB has concluded that the findings from the synoptic surveys support the position that Project operations and developments do not violate the toxic substance water quality standard.

6.10.5 ODEQ Evaluation

No Project-affected waters are listed on the ODEQ 303(d) list for PCBs, herbicides, or other toxic substances.

Water Column
The Carmen-Smith Hydroelectric Project does not discharge trace metals to waters of the State.

Water in the upper McKenzie basin is naturally low in magnesium, calcium, and other inorganics resulting in low water hardness which increases the toxicities of certain trace metals. Despite more stringent hardness-corrected toxicity criteria, only two samples of trace metals (silver in Carmen Diversion Reservoir, lead in Trail Bridge Reservoir) were identified in Project waters at concentrations exceeding the most stringent criteria. Since the Project does not discharge these or other trace metals, ODEQ believes that observed levels of trace metals reflect the attainment of natural conditions which are reflective of native mineralogy in the basin.

Nutrient loading is low throughout the Project as evidenced by low levels of phosphorus and mostly non-detectable levels of nitrate. Biological productivity is low throughout the Project.

PCBs
EWEB indicates it does not use PCBs in power generation or transmission line facilities. EWEB has either determined the equipment is non-PCB equipment or believes the equipment is non-PCB equipment because of its age or date of installation. If a leak were to occur from any Project equipment, the leak would be addressed by state and federal reporting and clean-up requirements that offer adequate protection to the environment and beneficial uses.

Other Hazardous Materials
EWEB uses petroleum products and hazardous materials in everyday operation and maintenance. Plans and procedures to use, store, label, inventory, transport clean-up, and dispose of hazardous materials are addressed in a Spill Prevention Control and Countermeasure Plan (SPCC). The SPCC specifies that employees who may reasonably be expected to encounter spills receive training on implementation of the plans.

6.10.6 ODEQ Findings

The Department is reasonably assured that the Toxic Substances water quality standard will be met for the Project under a new FERC License.

6.11 Antidegradation

Water quality standards have three main elements; the beneficial uses that are protected by the standard, numeric and narrative criteria which support these uses and an antidegradation policy that governs how and when existing water quality may be lowered. When 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.

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

The policy must provide that where existing quality exceeds that necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, the existing quality shall be maintained and protected unless the state determines that lowering the quality without impairing existing uses is appropriate.

The policy must also provide that where high quality waters constitute an outstanding National resource, such as waters of national parks, state parks, wildlife refuges, and waters of exceptional recreational or ecological significance, the existing high quality water shall be maintained and protected.

6.11.1 Water Quality Standard

The applicable standard is set forth in 340-041-0004:

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.

6.11.2 Application of Standard

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

In applying the Antidegradation Policy to this §401 Application, the operating conditions of the hydroelectric Project under a new License are evaluated to determine whether there is reasonable assurance that no degradation of existing water quality will occur unless the identified degradation complies with the Antidegradation Policy.

These rules require that existing high quality waters (i.e., where water quality is higher than levels necessary to protect fish, shellfish, wildlife, and recreation) shall be maintained and protected unless the EQC chooses to allow lowered water quality for justifiable reasons, or unless the Director allows lower water quality on a short-term basis to respond to emergencies or otherwise protect public health and welfare. These rules further require the ODEQ to minimize degradation of high quality waters and protect the recognized beneficial uses of such waters by requiring the highest and best practicable control of all waste discharges and activities. These rules, in conjunction with other provisions of the water quality standards contained in OAR 340-041, are intended to assure that water quality is not changed so as to impair recognized beneficial uses of the water.

The Department has traditionally interpreted the antidegradation policy to allow approval of new discharges or activities that may have some theoretical or detectable impact on high quality waters provided that:

1. Adverse impact on water quality will not be significant,
2. Any change in water quality will not adversely affect recognized beneficial uses, and
3. Highest and best practicable treatment and control of waste discharges and activities are employed to minimize any adverse effects on water quality.

Generally, compliance with the water quality standards in OAR 340-041 would be considered sufficient to assure that beneficial uses will be protected. However, if a standard has not been adopted for a pollutant, or if new information indicates that an existing standard does not adequately support a given beneficial use, ODEQ is required to revise the water quality standard to protect the recognized beneficial use. OAR 340-041-0340(1) Table 340A identifies the beneficial uses to be protected in the waters of the Willamette Basin.

6.11.3 Present Conditions

Existing water quality conditions are described in this Evaluation and Findings Report, and the §401 Application.

6.11.4 Applicant's Position

EWEB recognizes that operation of the Project causes changes in water quality and quantity which may potentially reduce support for some recognized beneficial uses at certain locations and times. Current operation of the Project results in occasional excursions of the TDG water quality criterion within the Carmen power plant tailrace at certain power generation levels. EWEB also recognizes that infrequent spills at Carmen Diversion Dam may temporarily cause increased turbidity and sediment loading within the upper Carmen bypass reach. Modifications to Project developments and operations are addressed in the FLA and as PMEs set forth in the Aquatics Management Plan to the Settlement Agreement. EWEB has concluded that implementation of the FLA as supplemented by the SA including the PMEs will ensure compliance with the ODEQ water quality standards and consistency with the antidegradation policy.

6.11.5 ODEQ Evaluation

Proposed water quality measures discussed in this *Evaluation and Findings Report* address known and potential water quality impacts and adverse effects on beneficial uses. Through implementation of these measures, we expect a positive response in water quality as a result of reducing Project-related impacts and implementing PMEs intended to increase protection of beneficial uses.

ODEQ policy requires an antidegradation review when considering any water quality action such as a new NPDES point source discharge permit or water quality certification. The findings presented in this document represent an in-depth evaluation of individual water quality parameters which we believe may reasonably be affected by Project developments and operation under a new License. ODEQ is reasonably assured that water quality standards will be met under a new License which includes operational changes proposed by EWEB, PMEs in the SA, and ODEQ conditions placed on Project operations as presented in this Evaluation and Findings Report. Under the proposed operational conditions, ODEQ is further assured that the Project will not reduce existing water quality in a manner which violates the antidegradation policy.

EWEB shall meet applicable water quality standards under a new operating License. To ensure that operation of the Carmen-Smith Hydroelectric Project will comply with these standards, EWEB must monitor water quality and, in consultation with ODEQ, adaptively manage future operations as warranted in a manner which ensures continued compliance with water quality standards and other applicable requirements of state law.

This antidegradation evaluation is limited to potential water quality impacts resulting from operations under a new FERC License for the Carmen-Smith Hydroelectric Project. Subsequent antidegradation reviews may be required to process separate water quality actions such as §401 water quality certificates issued in conjunction with §404 of the CWA for in-water construction and/or maintenance projects.

6.11.6 ODEQ Findings

The Department is reasonably assured that the Antidegradation standard will be met for operation of the Project under a new FERC License provided EWEB protects water quality through implementation of the Settlement Agreement PME measures and Certification Conditions by using Best Management Practices, emergency response plans, and obtaining applicable NPDES permits.

6.12 Three Basin Rule

The intent of the Three Basin Rule (OAR-340-041-0350) is to preserve or improve the existing quality water for the Clackamas River, the North Santiam River and the McKenzie River. Municipal water supplies, recreation, and preservation of aquatic life are specifically protected from new or increased waste discharges, except as provided by this rule. New activities allowed by this rule are considered if they contribute no or insignificant pollution inputs to these waters.

6.12.1 Water Quality Standard

Portions of the Three Basin Rule language that may apply to this §401 Application are included below. The rule can be found in its entirety at OAR 340-41-0350.

340-041-0350
The Three Basin Rule: Clackamas, McKenzie (above RM 15) & the North Santiam

(1) In order to preserve or improve the existing high quality water for municipal water supplies, recreation, and preservation of aquatic life, new or increased waste discharges must be prohibited, except as provided by this rule, to the waters of:
(a) The Clackamas River Subbasin;
(b) The McKenzie River Subbasin above the Hayden Bridge (river mile 15);
(c) The North Santiam River Subbasin.
(6) The Director or a designee may issue the following General Permits or Certifications subject to the conditions of the Permit or Certification: …
(g) Federal Clean Water Act Section 401 water quality certifications.

6.12.2 Application of Standard

The Three Basin Rule is intended to preserve existing high quality water in three subbasins, including the McKenzie above RM 15, for municipal water supplies, recreation, and aquatic life. The intent of the rule is to protect beneficial uses by preventing additional waste discharges except as specifically authorized by this rule.

6.12.3 Present Conditions

Existing water quality conditions are described in this *Evaluation and Findings Report*, and the §401 Application.

6.12.4 Applicant's Position

EWEB has offered no position on the Three Basin Rule.

6.12.5 DEQ Evaluation

The Three Basin Rule seeks to preserve water quality in three specific Oregon river basins which are used for municipal water production. The Three Basin Rule was developed specifically to address pollutant loads from point source discharges but also applies to nonpoint source facilities and hydroelectric projects. Under this rule, new and/or increased sources are prohibited in these basins unless the contributions will not reduce existing water quality. Although the Carmen-Smith Hydroelectric Project is an existing facility, review of the Three Basin Rule is appropriate given the scope of changes to the operation under a new FERC License.

EWEB operates the Hayden Bridge municipal water intake at McKenzie River RM 11 which is the sole source of drinking water to more than 200,000 residents in the Eugene metropolitan area. To ensure protection of this resource, EWEB developed a Drinking Water Protection Plan in August 2000 (EWEB 2000) which includes a risk assessment of potential threats to water quality in the watershed. Since that time, EWEB has developed and implemented plans to reduce potential impacts to water quality from non-point sources including agriculture, forest management, construction, and on-site septic systems. EWEB's Watershed Baseline Monitoring Program was expanded in 2005 to monitor water quality on a basin scale and includes bimonthly sampling events at 13 locations. A summary report of monitoring efforts is expected in October 2010. Preliminary reports indicate a few water quality parameters may exceed the most stringent screening levels during storm events, but overall baseline water quality at McKenzie River monitoring sites meets or exceeds all applicable screening criteria. (EWEB 2010c)

EWEB monitors water quality at the Hayden Bridge intake in accordance with EPA requirements pertaining to the operation of Public Water Systems (PWS) and the Safe Drinking Water Act (SDWA) of 1974. Recent annual water quality reports published by EWEB confirm levels of all regulated contaminants are below all state and federal drinking water health standards (EWEB 2009a).

EWEB is in the unique position of operating a municipal water supply system serving a major metropolitan area below two hydroelectric projects which it also owns and operates. Monitoring conducted by EWEB to ensure protection of municipal water supply operations is also useful for evaluating water quality downstream of its hydroelectric operations. Available information indicates no degradation of water quality below the Carmen Smith Hydroelectric Project attributable to Project operations.

6.12.6 DEQ Findings

ODEQ is reasonably assured that water quality standards, including the Three Basin Rule, will be met for operations of the Project under a new FERC License which includes implementation of the PMEs set forth in the SA, changes to Project operation proposed by EWEB, and conditions proposed in this Evaluation & Findings Report.

7.0 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, stormwater, and sewage discharges.

Section 303 of the Act relates to Water Quality Standards and Implementation Plans. The federal Environmental Protection Agency (EPA) has adopted regulations to implement Section 303 of the Act. The EQC has adopted water quality standards consistent with the requirements of Section 303 and the applicable EPA rules. The EQC standards are codified in 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.

Existing NPDES Permits

EWEB holds one individual NPDES wastewater discharge permit (NPDES Permit No. 101329) for the discharge of non-contact cooling water (NCCW) and sump dewatering discharge at the Carmen-Smith Hydroelectric Project. The permit authorizes similar activities at both the Carmen and Trail Bridge power plants. The permit expired on May 31, 2009. EWEB filed a renewal application with ODEQ in November 2008. ODEQ has administratively extended the permit until renewal of the subsequent permit is complete. The target renewal date is 2014. No other activities at the Project result in point-source discharges which require coverage under the NPDES program.

The permit authorizes EWEB to discharge wastewater generated as a result of two industrial activities. First, the permit allows the discharge of NCCW produced to cool the turbines at the Carmen and Trail Bridge powerhouses. Water is withdrawn from the river, circulated through an internal heat exchanger, and discharged back to the river. The theoretical increase in river temperature is 0.03°C which is below the human use allowance and less than can practicably be detected.

The permit also authorizes EWEB to return water accumulated in the sumps beneath the turbines directly to the river. The water which accumulates in the sumps originates from incidental leaks in the penstocks.

In accordance with the permit, EWEB will monitor the NCCW effluent monthly for flow and temperature, and the sump discharge monthly for flow, temperature, and pH. Discharge monitoring reports (DMRs) filed by EWEB indicate discharge performed in accordance with

NPDES Permit No. 101329 has been in compliance with applicable discharge monitoring criteria since the Permit was initially issued in 1995.

Required NPDES Permits

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

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

8.0 EVALUATION OF OTHER APPROPRIATE REQUIREMENTS OF STATE LAW

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

8.1 Department of State Lands

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

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

8.2 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 496.012** Wildlife Policy

This statute establishes ODFW's primary directive to prevent serious depletion of any indigenous species and to maintain all species of fish and wildlife at optimum levels.

- **ORS 496.435** Policy to Restore Native Stocks

Restore native stocks of salmon and trout to historic levels of abundance.

- **ORS 509.580 - 509.645** ODFW's Fish Passage Law

Provide upstream and downstream passage at all artificial obstructions in Oregon waters where migratory native fish are currently or have historically been present.

- **OAR 635-007-0502 through 0509** Native Fish Conservation Policy

- **OAR 635-500-0100-0120**Trout Management

Maintain the genetic diversity and integrity of wild trout stocks; and protect, restore and enhance trout habitat.

- **OAR 635-500-0266 through 0509** McKenzie Subbasin Fish Management Policies and Objectives

- **OAR 635-500-1661** McKenzie River Basin Fish Management Plan for Chinook

- **OAR 635-415-0000-0030** Fish and Wildlife Habitat Mitigation Policy

In October 2008, pursuant to ORS 509.585 and OAR 635-412-0025(1), 9(b), 10(b)(A), the Oregon Fish and Wildlife Commission agreed to waive the requirement of fish passage created by the artificial obstruction caused by Smith Dam. The Commission agreed to the waiver because it determined PME measures in the SA to be implemented by EWEB represented a net benefit to native migratory fish relative to providing passage at Smith Dam. The waiver obligates EWEB to implement certain PME measures which EWEB and ODFW understand will collectively enhance spawning, rearing, and foraging habitat and yield a net benefit to existing stocks of native migratory fish in these areas. Many of the PME measures recognized by the Commission for the Fish Passage Waiver are also reflected as PMEs in the Aquatics Management Plan of the Settlement Agreement which is supported by EWEB, ODFW, and Parties to the Settlement Agreement, including ODEQ. Specifically, ODEQ believes the PME measures directly support the objectives of ODEQ's Biocriteria water quality standard.

8.3 Department of Land Conservation and Development

ORS Chapter 197 contains provisions of state law requiring the development and acknowledgement of comprehensive land use plans. This chapter also requires state agency actions to be consistent with acknowledged local land use plans and implementing ordinances. EWEB's §401 Application contains affirmative statements of land use compatibility from Linn and Lane Counties. No §401 certification condition is necessary in relation to ORS Chapter 197.

The Oregon Department of Land Conservation and Development (DLCD) is responsible for implementing comprehensive plans and ensuring consistency with statewide planning goals. In correspondence dated November 4, 2009, DLCD determined the Project is located outside Oregon's Coastal Zone and, therefore, will not result in "reasonably foreseeable coastal effects" as defined in the Oregon Coastal Management Plan (OCMP). For this reason, DLCD determined the Project need not demonstrate consistency with the OCMP. No §401 certification condition is necessary in relation to consistency with the OCMP.

8.4 Department of Environmental Quality

Onsite Septic Systems

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

EWEB maintains six on-site septic systems which serve four homes, a Project office, and the Carmen power plant. As allowed by OAR 340-071-0120(1), ODEQ has authorized Linn County to implement permitting and inspection of onsite systems which do not require a WPCF permit from ODEQ. Four of the six onsite systems predate 1974 and thus are administratively approved until either the system fails or is upgraded. Two of the systems were installed after 1974 and are subject to inspections by Linn County. EWEB anticipates the need for additional sanitary facilities to accommodate additional staff housing under a new License. EWEB will work directly with Linn County during planning, installation, and inspection of these systems, as applicable.

Hazardous Materials

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

NPDES Permits

Oregon rule (OAR 340-045-0015) requires facilities that discharge to water to secure National Pollution Discharge Elimination System permits for discharges of pollutants to surface water. As discussed in Section 7.0, EWEB holds NPDES Permit No. 101329 which authorizes the discharge of non-contact cooling water used to cool the turbines and water which accumulates

in a sump as a result of penstock leakage. This permit authorizes similar activities at both the Trail Bridge and Carmen power houses.

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

8.5 Oregon Water Resources Department

ORS 543A.025 establishes the minimum requirements under which the Oregon Water Resources Department (OWRD) may issue a water right for the continued operation of an existing hydroelectric project. OWRD must render a finding that the reauthorization will not impair or be detrimental to the public interest.

EWEB holds five water rights for storage and four water rights for non-consumptive hydropower generation for its Carmen-Smith Hydroelectric Project. Under ORS 537.410(2), ORS 540.610(2)(a), and ORS 540.610(4), EWEB's water rights are perpetual and not subject to cancellation. Because the water rights held by EWEB are perpetual, the water rights are not subject to the reauthorization criteria set forth in ORS 543A.025.

9.0 PUBLIC COMMENT

ODEQ conducted a public comment period from October 22, 2010, through 5:00 pm November 30, 2010. ODEQ held a meeting and public hearing on November 9, 2010.

ODEQ received comments on the proposed conditional certification, and supporting documentation contained in the Evaluation Report and Findings Record. Comments were received from:

- ODFW: Salem, Oregon. Received November 19, 2010.
- EWEB: Eugene, Oregon. Received November 30, 2010.
- Ada Tolliver: Leaburg, Oregon. Received November 30, 2010.

Comments pertaining to specific water quality standards are addressed in appropriate sub-sections of Section 7. General comments received within the public comment period are discussed below. Changes incorporated into the Evaluation and Findings Document and/or the certification are identified. Comments received by ODEQ are presented as Attachment B.

Comment No. 1 (ODFW): ODFW suggested edits to Section 6.3.5 of the Evaluation and Findings Report to contrast the relative benefit of providing fish passage at Smith Dam with certain PMEs offered as an alternative to passage. The suggested edits further clarify the nature of the fish passage waiver agreement between EWEB and ODFW.

ODEQ Response No. 1: ODEQ accepted the suggested edits.

Comment No. 2 (ODFW): ODFW requested clarification in Section 6.8.2 of the Evaluation and Findings Report regarding the mechanical causes of TDG in the tailrace below the Carmen

power house. The comment seeks further explanation why ODEQ believes EWEB's proposal to rebuild the Carmen power house will alleviate this water quality condition.

ODEQ Response No. 2: The original draft of Section 6.8.2 discussed the general causes of air entrainment at hydroelectric facilities. In response to this comment, ODEQ edited this section to address the specific characteristics of the Carmen power house which ODEQ believes directly contribute to elevated TDG under certain power generation ranges. Specifically, ODEQ believes that ageing, improperly-sized turbine runners contribute to operational inefficiencies which require air admission to reduce potential cavitation. Air entrainment results from the operation of the air admittance valve which can cause elevated TDG.

Comment No. 3 (ODFW): ODFW suggested edits to the Evaluation and Findings Report which clarify the citation of rules and statutes related to natural resource management policies and objectives administered by ODFW.

ODEQ Response No. 3: ODEQ accepted the suggested edits.

Comment No. 4 (ODFW): ODFW wishes to clarify a statement by ODEQ in Section 8.2 of the Evaluation and Findings Report which suggested that all mitigation requirements of the fish passage waiver agreement between ODFW and EWEB were reflected in PMEs identified in the Aquatics Management Plan of the Settlement Agreement. In fact, several culvert replacement projects are elements of the fish passage waiver agreement which are not PME components of the Aquatics Management Plan.
ODEQ Response No. 4: ODEQ adjusted the text in Section 8.2 to reflect the distinction identified in the comment.

Comment No. 5 (EWEB): EWEB identified references in the §401 Conditions which appear inconsistent with similar references contained in the SA and the Evaluation & Findings Document. EWEB provided an edited "red-line" version of the §401 Conditions with suggested changes to better achieve consistency between the related documents.

ODEQ Response No. 5: ODEQ reviewed and accepted many of the suggested edits which EWEB offered which improve consistency between the related documents.

Comment No. 6 (EWEB): EWEB believes the §401 Conditions contain a degree of prescriptive detail which may limit the flexibility of the water quality working group from developing a WQMP which best characterizes water quality conditions under a new License. EWEB believes a collaborative process which relies on input from the water quality working group is the preferred means to tailor a monitoring program to specific reaches at the Carmen-Smith hydro project. Since ODEQ is represented on the working group and has approval authority of the final WQMP, EWEB requests ODEQ defer much of the detail currently in the §401 Conditions to the development of WQMP.

ODEQ Response No. 6: ODEQ developed the §401 Conditions to address the minimum data requirements deemed necessary to evaluate water quality under the operational requirements of a new FERC license. To guide the monitoring process, ODEQ included many details regarding data collection methodology. While ODEQ anticipates the WQMP will ultimately reflect these provisions, ODEQ also recognizes that conditions placed on sampling methodology necessarily restrict the means by which the overall objectives of the §401 water

quality certification are achieved. For this reason, ODEQ has modified certain portions of the §401 Conditions in a manner which enables the Water Quality Working Group to provide input based on collective decision making. While ODEQ welcomes the opportunity to develop certain provisions of the WQMP in this manner, ODEQ will use its participation on the working group and its approval authority of the WQMP to ensure monitoring efforts fully capture the requirements of the §401 water quality certification.

Comment No. 6 (EWEB): EWEB seeks consistency in the use of the words “shall” and “must.”

ODEQ Response No. 6: ODEQ accepts edits to reflect these changes.

Comment No. 7 (EWEB): The §401 Conditions require EWEB to initiate water quality monitoring in the upper Carmen bypass reach within three years of license issuance. Since the SA does not require releases to upper Carmen before the sixth year of license issuance and since EWEB does not provide regular releases to this reach, the location of the proposed downstream compliance point will likely be dry much of the time until regular block releases to this reach are established.

ODEQ Response No. 7: ODEQ has adjusted the conditions in the §401 water quality certification to be based on the timing of block releases to the upper Carmen bypass reach.

Comment No. 8 (EWEB): Condition 12 of the certification requires EWEB to pay project-specific fees to ODEQ for costs of overseeing implementation of the §401 water quality certification. Costs are specified through the first eleven years of the new license and provide for ODEQ participation on the Fisheries Working Group and the Water Quality Working Group as well as for oversight of water quality monitoring. EWEB maintains that fees for these activities should be reduced or eliminated for two reasons:

a) ORS 543.080(5)(f) disallows assessment of a project-specific fee for routine compliance monitoring or activities with non-adaptive management provisions; and

b) EWEB states that since ODEQ has no direct expertise in managing fisheries issues, ODEQ should not charge fees for participation on the Fisheries Working Group.

ODEQ Response 8(a): Condition 12 stipulates project-specific fees in years 7 through 11 following license issuance to oversee water quality monitoring. EWEB correctly states that fees for routine monitoring with non-adaptive management provisions may not be recovered under ORS 543.080(5)(f). However, ODEQ maintains these fees are reasonable and necessary to provide oversight during implementation of water quality-related PMEs and are, therefore, directly supported by ORS 543.080(4). Further, the actions addressed by these fees contain numerous provisions which contemplate the need to implement alternate strategies to achieve the intended outcome of resource protection. Specifically:

- Condition 1j requires the WQMP to include a provision for adaptive management in the event water quality criteria are not attained.
- Condition 6c contains an adaptive management provision which requires EWEB to develop a plan to reduce thermal loading in the event water quality monitoring determines applicable numeric temperature criteria are exceeded.
- Condition 8c contains an adaptive management provision which requires EWEB to develop an operation plan in the event water quality monitoring determines the TDG criterion is exceeded.

Collectively, the above referenced conditions provide for adjustments to future project operation based, in part, on the outcome of water quality monitoring and, therefore, constitute provisions of adaptive management. ODEQ maintains these fees are reasonable and necessary to provide oversight in those activities which affect water quality and for which ODEQ has statutory authority to oversee and enforce.

ODEQ Response 8(b): Condition 12 stipulates project-specific fees during the first six years of license issuance to compensate ODEQ, in part, for participation on the Fisheries Working Group. The SA designates ODEQ representation on the Fisheries Working Group which is principally responsible for overseeing implementation of the Aquatics Management Plan. While ODEQ recognizes that ODFW is the agency with statutory authority for implementing state law regarding fisheries issues, the Aquatics Management Plan nonetheless includes numerous measures which directly influence water quality and which require ODEQ consultation prior to implementation. Further, certain PMEs, including fish passage and instream flows, are reflected as §401 conditions. Because of similarities which exist between certain PMEs in the Aquatics Management Plan and conditions in the water quality certification, ODEQ believes an adjustment to the project-specific fees is warranted which reflects efficiencies gained through the involvement with the two working groups. Accordingly, ODEQ has adjusted the project-specific fees presented on Condition 12 to reflect these efficiencies.

Comment No. 9 (Tolliver): Commenter believes that wireless transmissions from the telecommunications system currently used by EWEB produce harmful effects on water quality. Since the installation of additional gages required by the SA will increase the use wireless devices, ODEQ should use this opportunity to explore the effects of electromagnetic emissions.

ODEQ Response No 9: The Commenter did not identify how wireless transmissions affect water quality or which water quality parameters are adversely affected. Literature referenced by the Commenter did not specifically identify a causal relationship between electromagnetic transmissions and reduced water quality. Further, ODEQ believes that episodes during which certain water quality parameters fail to meet applicable criteria may be readily explained by physical actions or environmental stressors. For example, excessive TDG in tailrace waters is related to the entrainment of air in turbine discharge; and, stream temperature is influenced by factors which include reduced flow, ambient temperature, and shade. Since ODEQ does not regulate the installation or operation of wireless devices, and since ODEQ does not associate the use of electromagnetic transmissions with reduced water quality, ODEQ will not require EWEB to explore the effects which these activities may or may not have on water quality.

Comment No. 10 (Tolliver): Commenter notes that the frequency of algal blooms appears to be increasing and suggests that Clear Lake, the headwaters of the McKenzie River, is at risk.

ODEQ Response No. 10: ODEQ agrees that the number of reported blue-green algal blooms has increased in recent years and that harmful algal blooms represent a potential risk to the health of humans, animals, and the environment. However, since 2004 when Oregon Department of Human Services (DHS) began posting health advisories in response to harmful algal blooms, no such advisories have been issued for Clear Lake. The conditions which contribute to harmful algal blooms are not fully understood, but may include nutrient imbalances, trophic disruption, thermal stratification, or other biological, chemical, or physical factors which favor the proliferation of cyanobacteria. Clear Lake is located upstream of all physical

developments associated with the Carmen-Smith Hydroelectric Project and is, therefore, not influenced by Project operations. For this reason, ODEQ cannot require EWEB to modify operations in a manner which alters Project effects on Clear Lake.

10.0 CONCLUSIONS AND RECOMMENDATION FOR CERTIFICATION

ODEQ has evaluated EWEB's application for a §401 water quality certification and related 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, provided EWEB implements the § 401 conditions proposed 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 Carmen Smith Hydroelectric Project, FERC Project No. 2242, consistent with the findings of this document.

11.0 REFERENCES

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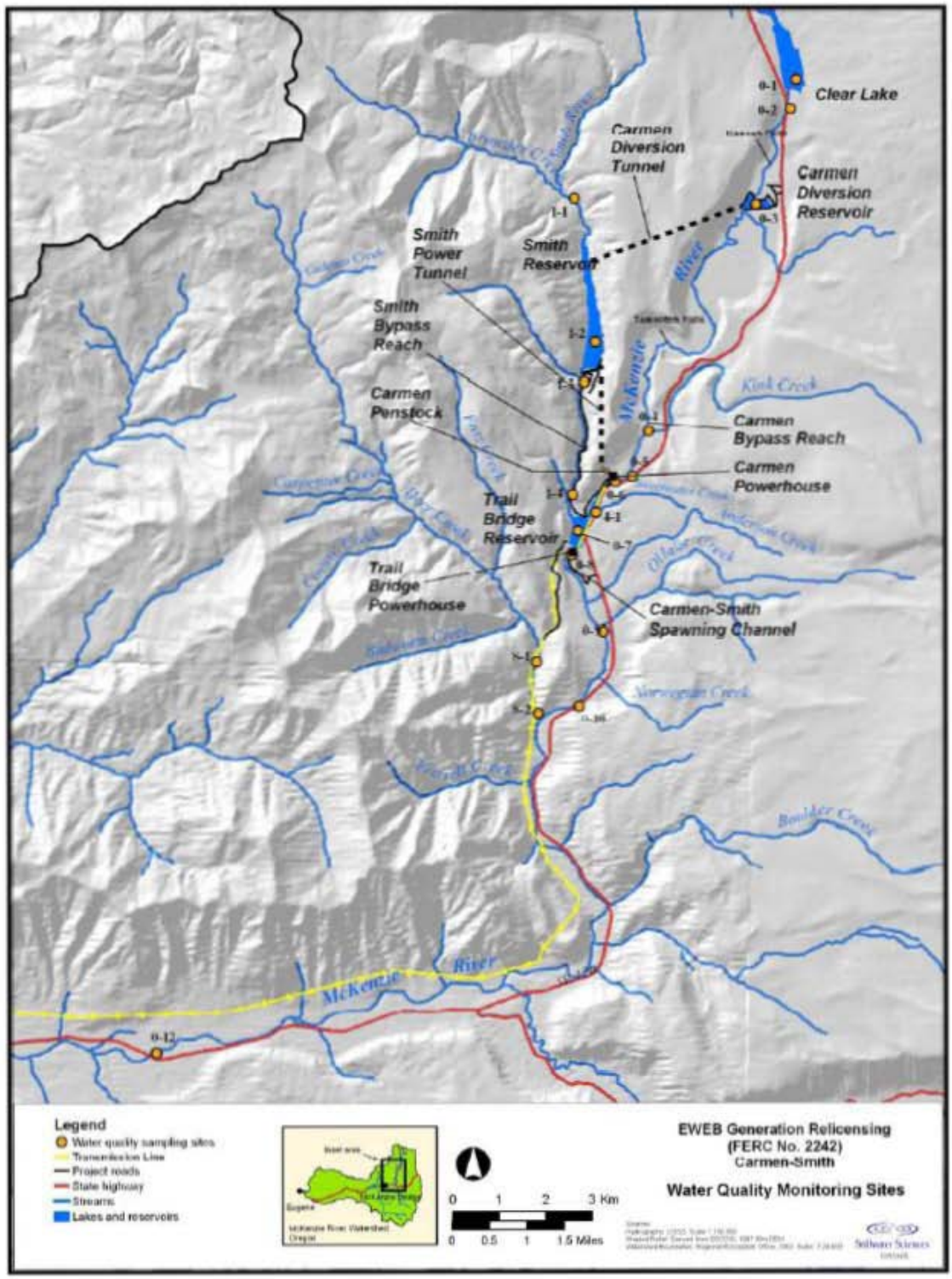
ATTACHMENT A

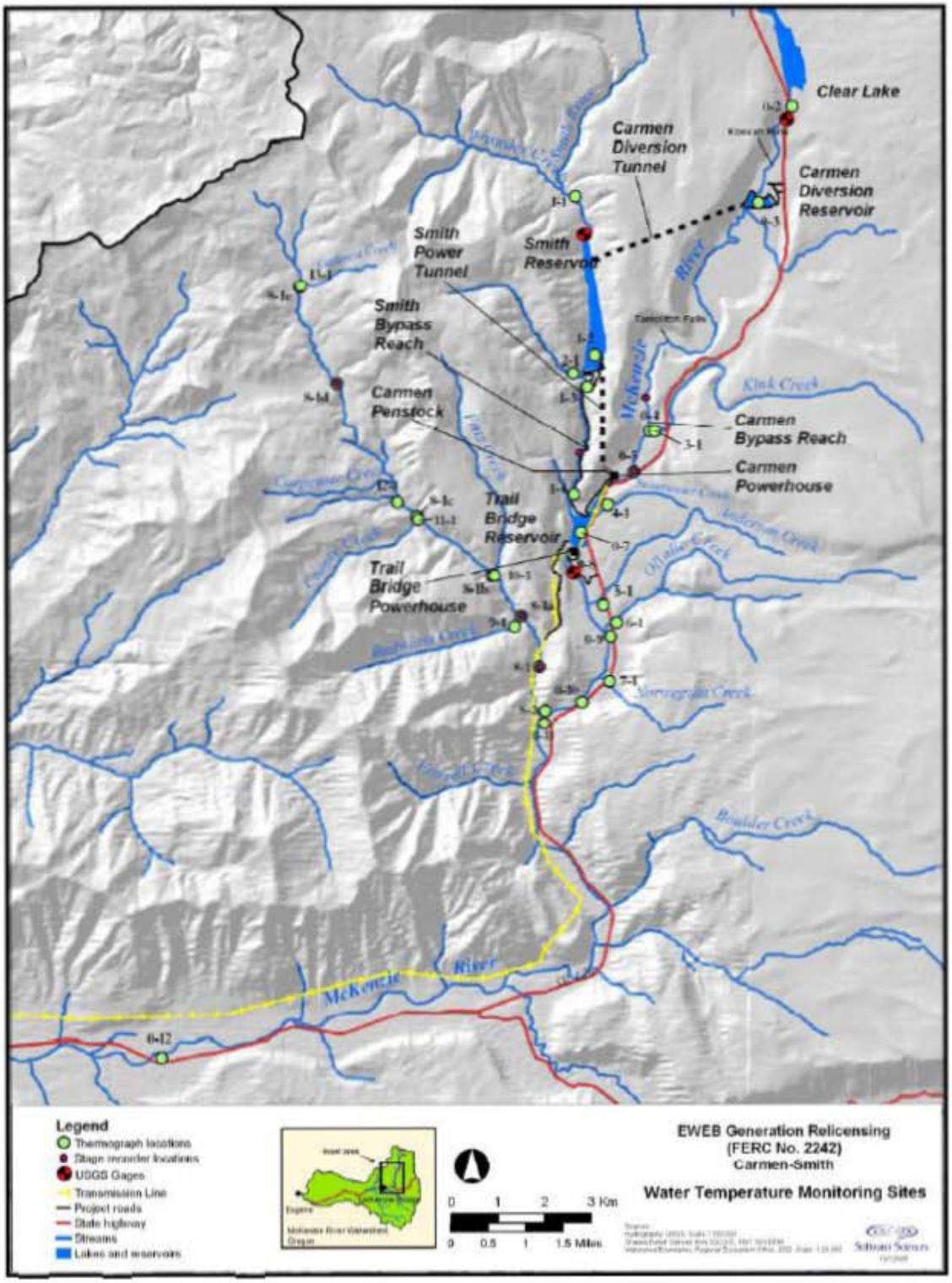
WATER QUALITY MONITORING LOCATIONS

Figure A-1: Water Quality Monitoring Sites



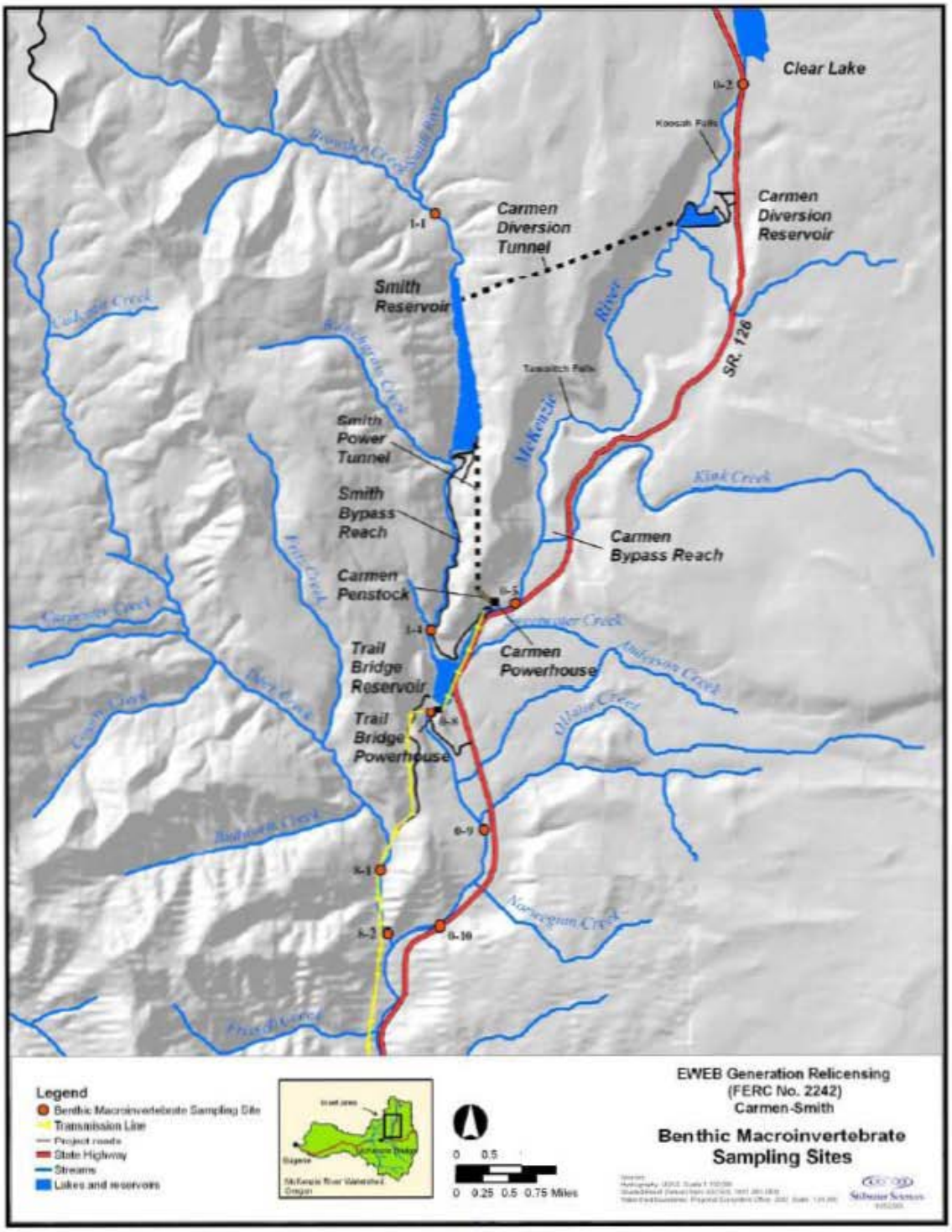
Source: Eugene Water & Electric Board. Used by permission.

Figure A-2: Water Temperature Monitoring Sites



Source: Eugene Water & Electric Board. Used by permission.

Figure A-3: Benthic Macroinvertebrate Monitoring Sites



Source: Eugene Water & Electric Board. Used by permission.

Table A-1: Key to Water Quality Sampling Activity and Site Locations

Site ID	River Mile	Description	Sampling Activity			
			WQ	WT	SR	BMI
		McKenzie River Sites				
0-1	89.5	Clear Lake	X[1,2]			
0-2	89.2	Downstream of Clear Lake	X[3,1]	X		X
0-3	87.5	Carmen Diversion Reservoir	X[1,2]	X		
0-4	83.6	Above Kink Creek	X[4]	X	X	
0-5	83.0	Above Carmen Powerhouse	X[2,3,]	X		X
0-6	82.8	Carmen Powerhouse Tailrace	X[2,5]			
0-7	82.0	Trail Bridge Reservoir	X[1,2]	X		
0-8	81.5	Below Trail Bridge Reservoir	X[3,4,]	X	X	X
0-9	80.5	Below Olallie Creek		X		X
0-10	79.5	Above Deer Creek	X[2]	X		X
0-11	79.0	Below Deer Creek		X		
0-12	68.1	Below McKenzie Bridge	X[2]	X		
		Smith River Sites				
1-1	5.0	Upstream of Smith Reservoir	X[3]	X	X	X
1-2	3.0	Smith Reservoir	X[1,2]	X		
1-3	2.0	Below Bunchgrass Creek		X	X[6,7]	
1-4	0.0	Above Trail Bridge Reservoir	X[3,4]	X		X
2-1	2.0	Bunchgrass Creek		X		
		Tributaries, other than Deer Creek				
3-1	83.5	Kink Creek, above McKenzie		X		
4-1	82.5	Sweetwater, above McKenzie		X		
5-1	81.0	Anderson, above McKenzie		X		
		Deer Creek Sites				
8-1e	6.8	Deer Creek, below Cadenza Creek		X[6]		
8-1d	5.6	Deer Creek, above bridge crossing		X[6]	X[6,7]	
8-1c	3.5	Deer Creek, above County Creek		X[6]	X[6]	
8-1b	2.2	Deer Creek, above Fritz Creek		X[6]		
8-1a	1.4	Deer Creek, above Budworm Creek		X[6]		
8-1	0.8	Deer Creek, above transmission lines	X[8]	X	X	X
8-2	0.5	Deer Creek, below transmission lines	X[8]	X		X
9-1	1.4	Budworm Creek, above Deer Creek		X[6]		
10-1	2.2	Fritz Creek, above Deer creek		X[6]		
11-1	3.5	County Creek, above Deer Creek		X[6]		
12-1	5.6	Carpenter Creek, above Deer Creek		X[6]		
13-1	6.8	Cadenza Creek, above Deer Creek		X[6]		

Abbreviations

WQ = Water Quality monitoring sites
WT = Water Temperature monitoring sites
SR = Stage Recorder sites
BMI = Benthic Macroinvertebrate monitoring sites

Notes to Table A-1

[1] Bacteria measurements were limited to these locations. The July/August 2004 diel sampling event was conducted at these sites and in the spawning channel (Site 0-8). Smith River sites were re-sampled in Summer 2005 due to equipment failure during 2004 surveys.

[2] Trace metals measurements were limited to these locations.

[3] The July/August 2004 diel sampling event was conducted at these sites and in the spawning channel (Site 0-8). Smith River sites were re-sampled in Summer 2005 due to equipment failure during 2004 surveys.

[4] In August 2004, inter-gravel dissolved oxygen (IGDO) sampling was conducted in these reaches and the spawning channel (Site 0-8). Smith River sites were re-sampled in August, September, and October 2005 due to measurements of low IGDO during 2004 surveys.

[5] Total dissolved gas (TDG) measurements were limited to these locations. TDG sampling was repeated at Site 0-6 during 2005.

[6] In May 2005, additional thermographs and stage recorders were installed to support temperature modeling of the Smith Bypass Reach and Deer Creek. Only *in-situ* water quality parameters (e.g., temperature, DO, pH, conductivity) were monitored in Deer Creek.

[7] Temperature and relative humidity monitors were installed in May 2005 to support temperature modeling of the Smith Bypass Reach and Deer Creek.

[8] Only *in-situ* water quality parameters (e.g., temperature, DO, pH, conductivity) were monitored in Deer Creek.

Table A-2: Water Quality (WQ) Parameters Measured During Synoptic Surveys

Parameter Class	Parameter
In-situ water quality	• Temperature • Dissolved oxygen (DO), inter-gravel DO (IGDO)[1] • Total dissolved gas (TDG)[2] • Conductivity (total dissolved solids) • pH • Turbidity and Secchi depth[3]
Water chemistry	• Inorganics (HCO_3, CO^3, $CaCO_3$, Na, Cl, B, Mg, Ca, K, SO_4) • Trace metals (As, Be, Cd, Cr, Cu, Pb, Hg, Ni, Sb, Se, Ag, Tl, Zn)4 • Organic carbon (TOC) • Nutrients (NH_4^+, TKN, $NO_3^- + NO_2^-$, $PO4^{3-}$, TP)
Biological	• Algae (chlorophyll-*a*) • Bacteria (*Escherichia coli [E. coli]*)[5]

[1] IGDO was measured at a subset of river synoptic survey locations, as indicated in Table A-1.

[2] TDG was measured at power plant discharges only, as indicated in Table A-1.

[3] Turbidity was measured at all synoptic survey locations; Secchi depth was measured in reservoir locations.

[4] Trace metals were measured at a subset of reservoir and river synoptic survey locations, as indicated in Table A-1.

[5] Bacteria and algae were measured at reservoir locations only, as indicated in Table A-1.

ATTACHMENT B

PUBLIC COMMENTS

Oregon
Theodore R. Kulongoski, Governor

Department of Fish and Wildlife
Fish Division
Hydropower Program
3406 Cherry Avenue, NE
Salem, OR 97303
(503) 947-6201
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November 19, 2010

Via Electronic Mail

Chris Stine
Oregon Department of Environmental Quality
Water Quality Western Region
165 East Seventh Ave.
Ste.100
Eugene, OR 97401

Subject: Proposed Water Quality Certification for the Carmen Smith Hydroelectric Project (FERC 2242)

Dear Chris,

With this letter the Oregon Department of Fish and Wildlife (ODFW) is offering comments for the Oregon Department of Environmental Quality's proposed Section 401 water quality certification for the Carmen Smith Hydroelectric Project. ODFW's comments are focused on the Evaluation and Findings Report.

Section 6.3.5 ODEQ Evaluation, Fish Passage, Smith Dam pages 41 and 42
ODFW suggests the following edits:

"The application proposed to balance the loss of historical habitat range resulting from Smith Dam with negotiated alternatives to passage intended to provide a net benefit to species in the Project area *compared to providing fish passage at the dam*. ODFW concluded that the proposed measures will yield a net benefit to migratory species present in the Project area *compared to providing fish passage*. ODFW anticipates the measures, which increase habitat complexity and provide greater spawning area, will greatly increase spring Chinook smolt production. In October 2008, the Oregon Fish and Wildlife Commission *entered into a fish passage waiver agreement with EWEB* [approved EWEB's application]."

Section 6.8.2 Application of Water Quality Standard (TDG) page 61 and 62
This section describes a general cause of supersaturation at hydropower dams, and suggests that when water is spilled over the face of a dam it entrains air as it plunges into the plunge pool at the base of the dam. In the case of the Carmen powerhouse tailrace, water is not spilling over the face of the dam, but is discharged from the turbine and plunges into the tailrace. The report does not describe the project-specific cause of air entrainment and supersaturation at the Carmen powerhouse. For example, it is not stated whether the air is entrained as the turbine flow plunges into the tailrace, or whether air is entrained in the penstock or some other location. Because the actual

cause of the supersaturation is not described in the report; it is not clear why replacing the turbine runners is expected to reduce TDG impacts. ODFW recommends that the report include a description of the project-specific causes of supersaturation, and why it is reasonable to expect that replacing the turbine runners will reduce TDG to acceptable levels.

Section 8.2, page 96, Appropriate Requirements of State Law specific to ODFW
We recommend adding the following statute and rules:

ORS 496.012 Wildlife Policy. This statute establishes ODFW's primary directive to prevent serious depletion of any indigenous species and to maintain all species of fish and wildlife at optimum levels.

OAR 635-500-0266 through 0276 McKenzie Subbasin Fish Management Policies and Objectives.

OAR 635-500-1661 McKenzie River Basin Fish Management Plan for Spring Chinook.

OAR 635-007-0502 through 0509 Native Fish Conservation Policy

We recommend deleting the following OAR's because they have been replaced by the Native Fish Conservation Policy OAR's:

OAR 635-007-0510 General Fish Management Goals

OAR 635-007-0521-0524 Natural Production Policy

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

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

The last paragraph of section 8.2 suggests that all the mitigation requirements of the waiver agreement are wholly contained in the Aquatics Management Plan (AMP) of the Settlement Agreement; however, a requirement of the waiver agreement to replace two culverts along the transmission line between towers 109 and 110 was not included in the settlement agreement or the AMP, but is nonetheless an important aquatic measure.

Thank you for the opportunity to comment. Please contact me at 503-947-6090 or Ken.Homolka@state.or.us if you have any questions about these comments.

Sincerely,

Ken Homolka
Hydropower Program Leader

C (email): Jeff Ziller- ODFW
Dave Harris- ODFW

November 30, 2010

Christopher Stine, PE
Environmental Engineer
Oregon Department of Environmental Quality
165 East Seventh Avenue, Suite 100
Eugene, OR 97401

Subject: Clean Water Act § 401 Certification Conditions for the Eugene Water & Electric Board Carmen-Smith Hydroelectric Project (FERC No. 2242) McKenzie Subbasin, Linn and Lane Counties, Oregon

Dear Mr. Stine:

The Eugene Water & Electric Board (EWEB) submits the following comments to the Oregon Department of Environmental Quality (ODEQ) on the proposed water quality certification for the Carmen Smith Hydroelectric Project (Carmen-Smith). EWEB's comments pertain to the proposed conditions in DEQ's draft document entitled "*Clean Water Act § 401 Certification Conditions for the Eugene Water & Electric Board Carmen-Smith Hydroelectric Project (FERC No. 2242) McKenzie Subbasin, Linn and Lane Counties, Oregon"* (§ 401 Conditions).

EWEB's comments include general comments on the proposed §401 Conditions including a detailed discussion why the proposed project-specific fee structure is not appropriate. EWEB is also providing specific comments on the § 401 Conditions, as well as a red-line version of the draft § 401 Conditions with suggested modifications designed to ensure better consistency between the § 401 Conditions, the ODEQ Evaluation and Findings Report, and the Settlement Agreement (SA) for the Relicensing of Carmen-Smith (to which EWEB and ODEQ are parties).

General comments on the proposed § 401 Conditions:

a) EWEB notes that the text in the § 401 Conditions appears to be inconsistent at times with either the SA, the Evaluation and Findings Report, or both. The editorial red-line suggested revisions in the attached Word file reflect EWEB's desire to achieve better consistency between the § 401 Conditions, the Evaluation and Findings Report, and the SA.

b) The § 401 Conditions appear to include many details which, in EWEB's opinion, are better left to the Water Quality Management Plan (WQMP) to be developed by EWEB, in conjunction with and approval by ODEQ, after FERC issues the new license. These details include specifics as to the frequency, duration, location and timing of required water quality monitoring. EWEB requests that ODEQ reduce the level of detail contained in the § 401 Conditions to allow for the development of specific monitoring means, methods and frequency in the WQMP that will best fit Carmen-Smith following FERC issuance of the new license. ODEQ has approval authority over the WQMP and the deliberate and detailed development of the WQMP document will capture all the required monitoring specifics through an iterative, collaborative process.

c) The words "shall" and "must" are interspersed throughout the document. The document has been revised in the attached red line for consistency by substituting "shall" for "must".

d) In Section 4, paragraph a(1), and throughout the remainder of the document, ODEQ requires that EWEB monitor DO or other parameters in the Upper Carmen Bypass Reach within three years of license issuance. EWEB does not currently release water to this reach and the SA does not provide for EWEB to release water to this reach until six years after license issuance (although "interim" flow may be released when reasonably practicable). Therefore, between years three and six, there may be little or no water in this particular reach to monitor.

e) The following general comments pertain to the project-specific fees in proposed Condition 12 of the § 401 Conditions.

ODEQ Fees

Proposed Condition 12 provides that in accordance with ORS 543.080, EWEB "shall pay project-specific fees" to ODEQ "for costs of overseeing implementation of this Certification." The proposed fees EWEB is to pay to ODEQ are provided in proposed Condition 12.a and range from $26,000 for years one through three to $21,000 for years four through six to $9,000 for years seven through eleven. ODEQ has indicated informally that these proposed project-specific fees are based on a representative of ODEQ participating on the Water Quality Management Work Group for Carmen-Smith and on the Fisheries Work Group and are divided equally for those two participations.

Oregon law in ORS 543.080(5)(f) provides that a project-specific fee may not be assessed for "[r]outine monitoring of compliance with nonadaptive management provisions of. . . a Federal Energy Regulatory Commission license." Thus, for Carmen-Smith water quality management issues, ODEQ cannot charge project-specific fees for routine monitoring of compliance and should only charge project-specific fees, for example, for oversight of adaptive management provisions. Thus, the half of the Department's fees for water quality management issues should be reduced significantly to remove the costs for routine monitoring of nonadaptive management provisions.

The remaining half of the ODEQ fees for participation on the Fisheries Work Group should not be charged as a project-specific fee. Respectfully, ODEQ has no particular expertise on fisheries-related issues. The State of Oregon will be represented on the Fisheries Work Group by a representative of the Oregon Department of Fish and Wildlife (ODFW). ODFW is the Oregon state agency charged by statute with responsibility for fisheries issues. ODEQ should certainly be able to participate on the Fisheries Work Group if it desires but should not charge project-specific fees to EWEB regarding fisheries issues that are not its statutory responsibility but rather the statutory responsibility of ODFW.

ODFW Fees

Proposed Condition 12 also provides that in accordance with ORS 543.080, EWEB "shall pay project-specific fees" to ODFW "for costs of overseeing implementation of this Certification." Proposed Condition 12.b provides that EWEB is to pay ODFW $22,052 annually for 15 years. ODFW has indicated that these proposed payments are for participation by an ODFW employee on the Fisheries Work Group for the next 15 years and by another ODFW employee on the Wildlife Management Plan Work Group and perhaps the Vegetation Management Plan Work Group every other month for the next 15 years.

At the threshold, the requirement in proposed Condition 12 that EWEB make payment to ODFW "for costs of overseeing implementation of this Certification" is incorrect. The Certification assigns no role for ODFW. In addition, ORS 543.080(3) and (8) and ORS 543.092(3) make clear that the ODEQ Certification can impose project-specific fees only related to implementation of the Certification and that, if the imposition of project-specific fees for ODFW were to occur, it was intended to occur only through an order of the Water Resources Director. As a result, ODEQ cannot include project-specific fees for ODFW in the Certification.

ODFW is a signatory party to the SA for relicensing of Carmen-Smith. In signing the SA, ODFW agreed that it would collect fees as provided in the SA. For example, in Section 1.3 of the SA, ODFW represented that it believed that "the measures in this Agreement including Exhibits A through G satisfy the federal and state requirements of the Parties within the jurisdiction of FERC for the relicensing, continued construction, operation and maintenance of Carmen-Smith with respect to the protection, mitigation, and enhancement of natural resources, water quality, recreation, and cultural and historical resources to be affected by Carmen-Smith" and that it believed that its "statutory and other legal obligations and authorities are, or can be, met through implementation of this Agreement and development of any recommendations, conditions, prescriptions, determinations and certifications consistent with this Agreement that are submitted to FERC for inclusion in the New License."

The SA does not provide for, and ODFW did not negotiate for, payment of project-specific fees of $22,052 annually for 15 years. ODFW did negotiate for, and the SA does provide for, EWEB to pay certain funds to ODFW. In Section 4.3.1.2 of Exhibit B (Aquatics Management Plan) of the SA, EWEB agreed to "provide to ODFW 50% of the annual funds necessary to implement the brook trout control plan," with the annual funds for ODFW based on ODFW's costs for personnel, supplies and services, travel and indirect rates. In the SA, EWEB agreed to make this payment for a minimum of 10 years and a maximum of 14 years from issuance of the new license. The ODEQ Certification must remain consistent with the SA and not include the proposed annual amount of $22,000 for project-specific fees for ODFW.

ORS 543.080(5)(b) also provides that a project-specific fee may not be assessed for "[w]ork that is paid for by the annual hydroelectric fee." EWEB pays approximately $76,000 annually as a hydroelectric fee. Once the Federal Energy Regulatory Commission issues a new license for Carmen-Smith, approximately $49,000 of the amount EWEB pays will be paid to ODFW. ODFW has indicated that those funds will pay for Ken Homolka and Dave Harris of ODFW. In Attachment A to Exhibit B (Aquatics Management Plan) of the SA, Ken Homolka is listed as the ODFW lead for the Fisheries Work Group, and Dave Harris and Jeff Ziller are listed as the alternates. In Attachment A to Exhibit D (Wildlife Management Plan) of the SA, Dave Harris is listed as the ODFW lead for the Wildlife Management Plan Work Group, and Brian Wolfer is listed as the alternate. In Attachment A to Exhibit E (Vegetation Management Plan) of the SA, Ken Homolka is listed as the ODFW lead for the Vegetation Management

Plan Work Group, and Dave Harris and Jeff Ziller are listed as alternates. Thus, the persons listed as leads in all cases will already be paid for by EWEB annual hydroelectric fees and cannot be the basis for project-specific fees.

Finally, ORS 543.080(5)(f) provides that a project-specific fee may not be assessed for "[r]outine monitoring of compliance with nonadaptive management provisions of . . . a Federal Energy Regulatory Commission license." The Wildlife Management Plan and Vegetation Management Plan contain only nonadaptive management provisions and, thus, provide no basis for imposing project specific fees. The Aquatics Management Plan contains some adaptive management provisions as well as nonadaptive management provisions.

In summary, the Certification should not contain a provision requiring EWEB to pay any project-specific fees for ODFW because: (1) ODFW will be incurring no costs of overseeing implementation of the Certification, (2) there is no statutory authority for ODEQ to include ODFW project-specific fees in the Certification, (3) ODFW did not negotiate for, and the SA does not provide for, EWEB to pay ODFW the proposed project-specific fees, (4) the persons listed as leads for the three work groups are already paid for by EWEB's payments of annual hydroelectric fees, and (5) the Wildlife Management Plan and Vegetation Management Plan include only routine monitoring of compliance with nonadaptive management provisions of the license and the Aquatics Management Plan also includes some nonadaptive management provisions.

Specific comments on the proposed § 401 Conditions:

1. Section 2, paragraph b. Please change the word "implemented" in the second sentence to "required." EWEB may implement water releases prior to being required to do so under the terms of the SA. However, the USGS gauges necessary to determine the flows requested by ODEQ will not be installed until scheduled by the SA. Therefore, there may be several years where EWEB will be releasing water without an accurate way to provide the flow data requested by ODEQ.

2. Section 3, paragraph b. As identified previously in meetings of the Fisheries Work Group, EWEB has determined that the spill reduction measures outlined in Attachment C to the Aquatics Management Plan (AMP) will not protect the Smith Bypass Reach as originally envisioned during SA negotiations. EWEB intends to provide the Fisheries Work Group with a revised flow chart in the near future. Please revise the language in this paragraph as shown in the attached red-line to

reflect that Attachment C to the AMP may be revised or replaced (as approved by all parties to the SA).

3. Section 3, paragraph g. Please delete this paragraph. It is not a requirement of the Oregon Emergency Response System that notification be given for natural erosive events. Carmen-Smith operates exclusively on US Department of Agriculture National Forest System lands except for the lower portion of the transmission line. EWEB does not monitor or control other activities on the National Forest System lands including road building, logging, recreation, or other activities or events that may cause erosive events.

4. Section 3, paragraph h. The Transmission Line Management Plan does not contain best management practices addressing sediment and turbidity reduction for the relocation of the transmission line out of Deer Creek. Section 4.6.1 of the Vegetation Management Plan contains language that requires a plan and schedule for Deer Creek that would fit the purpose and need identified in this paragraph.

5. Section 5, paragraph a (1). There is a remnant reference to DO monitoring in the third sentence.

6. Section 7, paragraph a. This section requires turbidity monitoring by EWEB within three years of license issuance in areas that may be affected by construction. Construction monitoring of turbidity will, in all likelihood, be required by the ODEQ 1200-CA construction permit and/or the 401 certification(s) issued for the federal section 404 permit(s). The data collection called for in this section within the proposed three years of license issuance will not be particularly representative (or useful) as baseline data for Carmen-Smith operation and should be adjusted to start within six years of license issuance to reflect Carmen-Smith operation, as shown in the attached red-line.

7. Section 8, paragraph a (1). Exceedances of the applicable water quality standards for TDG at hydroelectric projects are often related to the admittance of air to water under high head (or pressure). The results obtained by EWEB during relicensing studies are not unlike the results from other hydroelectric facilities. TDG levels at the Carmen Powerhouse exceeded 110% saturation some of the time, typically during start up and when operating the unit inefficiently. EWEB did not observe any TDG issues or any TDG readings approaching 110% anywhere else at Carmen-Smith.

There is no data to suggest that TDG levels would be elevated at the fish bypass pipe exit or at the fish ladder entrance due to the complete mixing with atmospheric air throughout the passage from the trail Bridge Reservoir to the McKenzie River. There is also no reason to believe that TDG below the Trail Bridge powerhouse would deviate from what was measured during relicensing studies, which was well below 110% saturation because the Trail Bridge plant only has 60 feet of head and a Kaplin turbine. EWEB requests that ODEQ delete paragraph (1) from Section 8 paragraph a.

EWEB appreciates the opportunity to comment on the draft water quality certification proposed by ODEQ for the Carmen-Smith Hydroelectric Project. EWEB looks forward to working with ODEQ on the development of the Water Quality Management Plan to ensure that the operation of Carmen-Smith is fully protective of water quality.

Please do not hesitate to contact me should you wish to discuss any of EWEB's comments. I can be reached at 541-685-7609.

Sincerely,

Jared G. Rubin, Ph.D.
Environmental Specialist
Eugene Water & Electric Board

cc: Michael McCann, EWEB
Don Haagensen, Cable Huston Benedict Haagensen & Lloyd LLP
EWEB Library

From:
Ada June Tolliver
90996 Angels Flight Rd
Leaburg, Oregon 97489
541-896-3429

To:
State of Oregon Department of Environmental Quality
Water Quality Western Region
Attn: Chris Stine
165 E 7th Ave
Suite 100
Eugene, Oregon 97401

RE:
Application for Certification Pursuant to Section 401 of the Federal Clean Water Act
Submitted by Eugene Water & Electric Board for the **Carmen-Smith Hydroelectric Project**
(FERC No. 2242)

November 30, 2010

Dear Mr. Stine;

Thank you for your time to speak with me this morning about my questions and concerns regarding EWEB's application and the DEQ requirements.

I understand that my concerns about the biological effects of radio frequency emissions on the environment are a matter of scientific controversy.

I am writing today to comment that I believe the telecommunications system currently being used by Eugene Water and Electric Board (EWEB) has and is continuing to produce a harmful effect upon the McKenzie River watershed environment, ecology and the quality of our water.

For almost 4 years I have been struggling to understand why what I could see on a daily basis occurring was not being investigated by any environmental agency. It all began as an annoying sound that I began noticing produced a startle response in the wildlife on the lake and in my household pets. Something unnatural and disturbing to the environment was occurring. And my research began….

I have learned more than I ever wanted to know about EWEB, the FCC, FERC, the BPA power trading process, radio communication systems and the huge amount of scientific data that shows non thermal biological effects of electromagnetic frequency emissions.
I have tracked EWEBs' FCC application after application and their failure to build out an upgraded communication system. Trying to find out what radio frequency they are using to communicate all the data required of them is a lesson in frustration. Perhaps the DEQ will have better luck in working with the EWEB implementation team to find out what frequency the USGS gauges activated in 2007 and 2008 are using to communicate the RTU data.

As I read through the requirements for EWEB FERC relicensing and the 401 certification I was struck by how much data was required to be submitted. Nowhere was there any consideration or standards as to how that information was to be collected and transmitted. This is a very different world than it was 50 years ago before the proliferation of radio frequency usage. After speaking with you and confirming that new reaches of the watershed were to be monitored using new remote terminal units (RTU) gauging stations I

was struck by the realization that this could present the opportunity for the DEQ to explore the effects of electromagnetic emissions in an environmental setting that was previously unexposed.

The research need is there to determine the cause of the algae blooms, growth in moss production and the declining health of our forest canopy. EWEB is already working with an OSU forestry class to study their forest along the Leaburg canal. The University of Oregon has an excellent environmental studies department that could be approached as a partner. The National Institute of Health has called for further studies in the biological effect of electromagnetic emissions. The USFWS has called for research on the effect of EMF on birds. This could provide many a researchers dream and is perhaps a situation where grant money could be obtained for the study.

Stillwater Sciences has provided a “before” benchmark to compare the current ecology of the river. Please don’t let the “after” become any worse and investigate what is going on with EWEBs’ communication system to cause such destruction. Look to the changes in programming and infrastructure that was implemented in the spring of 2007. Challenge the FCC. This is Oregon’s river. Please protect and save it.

You do not need to be a scientist or biologist to see that the McKenzie River is in real environmental trouble. Just take a drive on Highway 126 East and look at the health of our forest canopy and the trees being devoured by oak moss. The birds, the animals, the fish, insect hatches and the bees are all gone or disappearing. Algae blooms are occurring in unprecedented numbers and in places never before affected. Clear Lake the source of the McKenzie is in trouble. We are going to be faced with a “Silent Spring” that Rachel Carson could have never imagined in one of Oregon’s most beautiful rivers.

Thank you.
Ada June Tolliver

Attachments:

The Tragedy of the Commons by Cindy Sage
The BioInitiative Report
Identification of Research Needs Relating to Potential Biological or Adverse Health Effects of Wireless Communication
Bees, Birds and Mankind