

Exhibit B

For

Carmen-Smith Hydroelectric Project
(FERC No. 2242)

November 2016 Amended and Restated Aquatics
Management Plan

Submitted by:

Eugene Water & Electric Board



November 2016 Amended and Restated Aquatics Management Plan

Prepared for
Eugene Water & Electric Board
Eugene, Oregon

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List of Attachments

- Attachment A. Fisheries Work Group Representatives.
- Attachment B. Section 8.12 of the Carmen-Smith Settlement Agreement.
- Attachment C. Operational Guidelines for Smith Reservoir and Bypass Reach.
- Attachment D. OAR 635-412-0035 (Oregon Fish Passage Criteria).

1 INTRODUCTION

This Aquatics Management Plan (AMP) identifies and describes the process to be used for addressing fisheries and other aquatics resource issues at the Eugene Water & Electric Board (EWEB) Carmen-Smith Hydroelectric Project (Project) on the upper McKenzie River in Linn and Lane Counties, Oregon, during the term of the New License issued by the Federal Energy Regulatory Commission (FERC) for the Project (FERC No. 2242). The process and actions identified in this AMP have been developed as part of and included within the November 2016 Amended and Restated (Settlement Agreement).

The AMP represents the culmination of the fisheries and other aquatics resources planning efforts conducted as part of the relicensing process for the Project. The resource planning efforts for the Project began in 2003 with the release of the Initial Consultation Package for the Project (EWEB 2003). EWEB formed an interested parties' group to guide fisheries and other aquatic resource issues including collaborative design of any needed studies and drafting of the reports of the study results. The group and additional parties continued to be active in the relicensing of the Project, leading to the development of this AMP as part of the Settlement Agreement, and their participation is expected to continue through the implementation of the parts of the New License concerning fisheries and other aquatic resources.

The actions identified for implementation by EWEB in this AMP, are included in the Settlement Agreement and also in the Proposed License Articles included in the Settlement Agreement. The actions were identified and developed by EWEB in consultation with the settlement parties and are based in part on the results of certain collaboratively developed studies: the *Fish Population, Distribution, and Abundance* study (Stillwater Sciences 2006a); the *Aquatic Habitats and Instream Flows* study (Stillwater Sciences 2006b); the *Flow Fluctuations and Stranding* study (Stillwater Sciences 2006c); the *Habitat Restoration Potential in Smith Bypass Reach* study (Stillwater Sciences 2008a); the *Lower Carmen Bypass Reach Habitat* study (Stillwater Sciences 2008b); the *Effects of Stream Flow on Habitat in the Upper Carmen Bypass Reach* study (Stillwater Sciences 2008c); the *Water Quality* study (Stillwater Sciences 2006d); the *Hydrologic Regimes* study (Stillwater Sciences 2006e), the *Large Woody Debris Dynamics* study (Stillwater Sciences 2006f), the *Sediment Budget* study (Stillwater Sciences 2006g), and the *Fluvial Geomorphic Processes and Channel Morphology* study (Stillwater Sciences 2006h) conducted for the relicensing of the Project.

1.1 Areas Covered by the AMP

1.1.1 Reservoirs

- Carmen Diversion
- Smith
- Trail Bridge

1.1.2 Reaches

- Upper Carmen Bypass of the McKenzie River
- Lower Carmen Bypass of the McKenzie River

- Smith Bypass of the Smith River
- Carmen-Smith Spawning Channel off the McKenzie River, below Trail Bridge
- Mainstem McKenzie River below Trail Bridge Dam to Deer Creek

1.2 Related Resource Management Plans

Other resource management plans developed for the relicensing of the Project that reference or address fisheries and other aquatic resource-related management issues include the management plans for Vegetation; Transmission Line (to be developed following New License issuance); Recreation and Aesthetics; and Roads, Waste Areas, and Staging Areas.

2 PLANNING AND COORDINATION

The Parties agree to coordinate and to cooperate in implementation of this AMP including the provisions of Sections 2.2.2. Such coordination and cooperation will be assisted by creation of a permanent work group, the Fisheries Work Group (“FWG”). EWEB shall convene the FWG in accordance with Section 2.2.2 to discuss and to coordinate fisheries management activities in this AMP.

2.1 Roles and Responsibilities

The FWG will function throughout the period of time the New License is in effect. The FWG will include representatives from any interested Party including but not limited to EWEB, the United States Fish and Wildlife Service (“USFWS”), the National Marine Fisheries Service (“NMFS”), the United States Department of Agriculture Forest Service (“USDA Forest Service”), the Oregon Department of Fish and Wildlife (“ODFW”), and the Oregon Department of Environmental Quality (“ODEQ”). Each Party participating on the FWG will designate at least one representative and an alternate to serve on the FWG. The initial representatives and alternates are listed in Attachment A to this AMP. Changes to the initial representatives or alternates listed in Attachment A will be made in accordance with the provisions of Section 8.12 (copy attached in Attachment B) of the Settlement Agreement.

EWEB is responsible for implementing this AMP. The USDA Forest Service has approval authority over activities involving National Forest System (“NFS”) lands, including measures in the McKenzie Wild and Scenic River corridor, not otherwise authorized by the New License. USFWS has regulatory authority over fishways and certain species listed under the Endangered Species Act of 1973 (“ESA”) and critical habitat designated under the ESA. NMFS has regulatory authority over fishways and certain species listed under the ESA and critical habitat designated under the ESA. ODFW has certain regulatory authority over fisheries under Oregon law.

2.1.1 In consultation with the FWG members when appropriate, EWEB shall:

- Prepare all study, design, operating or implementation plans or reports necessary to implement this AMP, consistent with Standard Construction Scheduling¹.
- Fund implementation of this AMP.
- Conduct any necessary environmental analyses and obtain any required authorizations to implement this AMP from federal, state and local governments.

¹ “Standard Construction Scheduling” means that EWEB will establish contractual construction schedule deadlines that are reasonably attainable by working normal 40-hour weeks. EWEB will require construction contractors to perform their work within normal working hours (Mondays through Fridays between the hours of 7 a.m. and 5 p.m.). EWEB will not require contractors to work overtime, extra shifts, or on national holidays as a baseline schedule assumption. EWEB will consider authorizing special work hour adjustment requests from a contractor on a case by case basis as necessary to accommodate fire season constraints, wildlife related restrictions, equipment/material delivery delays, or similar circumstances. EWEB’s construction contract will include liquidated damage or other appropriate penalties for late completion of work if the causes are within the contractor’s control as well as the right to require the use of overtime or additional work shifts if EWEB desires to accelerate the contractor’s work.

- Implement and maintain all actions required under this AMP, using Standard Construction Scheduling.
- Monitor actions implemented under this AMP to evaluate compliance with this AMP including performance standards.
- Implement contingency actions when actions implemented under this AMP do not achieve compliance with this AMP including performance standards.
- Make required reports to the FWG members and FERC and other governmental entities, as appropriate.
- Make necessary updates or amendments to this AMP after consultation with the other Parties and receipt of any necessary approvals, as provided in Section 2.2 of this AMP.
- Assign a representative knowledgeable in fisheries resources to coordinate implementation of this AMP.

2.1.2 USDA Forest Service will:

- Review and approve, as appropriate, any documents, including study, design, operating and implementation plans identified herein as requiring USDA Forest Service action.
- Issue required permits and authorizations for AMP actions on NFS lands, which include activities within the McKenzie Wild and Scenic River corridor not otherwise included in the New License, consistent with 36 CFR 251 and other applicable laws.
- Provide FWG members with periodic updates to lists of special-status fish species on NFS lands.
- Advise EWEB regarding any restrictions placed on habitats or activities due to listing of threatened and endangered species, critical habitat designations, and Biological Opinions related to NFS lands.
- Provide input to the FWG members on activities under this AMP that may affect fisheries and other aquatic resources within USDA Forest Service regulatory authority.
- Provide technical expertise on design, construction, and maintenance standards related to implementation of the parts of this AMP involving NFS lands.
- Assign a representative knowledgeable in fisheries resources to the FWG.
- Will approve reasonable, appropriately justified requests for modifications to schedules and deadlines, provided that such modifications will not have material and substantial adverse effects on aquatic species

2.1.3 USFWS will:

- Review and approve, as appropriate, any documents, including study, design, operating and implementation plans identified herein as requiring USFWS action.
- Provide FWG members periodic updates to lists of threatened and endangered species and critical habitat under the ESA and species proposed for listing in the area of the Project.
- Provide input to the FWG members on activities under this AMP that may affect fish and other aquatic resources within USFWS regulatory authority.
- Notify EWEB about any changes in fisheries use patterns that are observed that may

influence any actions to be implemented under this AMP.

- Assign a representative knowledgeable in fisheries to the FWG.
- Approve reasonable, appropriately justified requests for modifications to schedules and deadlines, provided that such modifications will not have material and substantial adverse effects on aquatic species.

2.1.4 NMFS will:

- Review and approve, as appropriate, any documents, including study, design, operating and implementation plans identified herein as requiring NMFS action.
- Provide FWG members periodic updates to lists of threatened and endangered species and critical habitat under the ESA and species proposed for listing in the area of the Project.
- Provide input to the FWG members on activities under this AMP that may affect fish and other aquatic resources within NMFS regulatory authority.
- Notify EWEB about any changes in fisheries use patterns that are observed that may influence any actions to be implemented under this AMP.
- Assign a representative knowledgeable in fisheries to the FWG.
- Review applications for ESA Section 4(d) approval to take ESA-listed Chinook salmon for research activities called for in this AMP. Provided sufficient numbers of fish are available for research purposes and the study design meets NMFS' standard conditions for conducting research with ESA-listed fish, issue 4(d) take approval notices to EWEB or researchers working on EWEB's behalf.
- Approve reasonable, appropriately justified requests for modifications to schedules and deadlines, provided that such modifications will not have material and substantial adverse effects on aquatic species.

2.1.5 ODFW will:

- Review and approve, as appropriate, any documents, including study, design, operating and implementation plans identified herein as requiring ODFW action.
- Provide input to the FWG members on activities under this AMP that may affect resources within ODFW regulatory authority.
- Notify EWEB about any changes in fisheries use patterns that are observed that may influence any actions to be implemented under this AMP.
- Advise the FWG of cutthroat release schedules including size and numbers of fish released.
- Assign a representative knowledgeable in fisheries to the FWG.
- Approve reasonable, appropriately justified requests for modifications to schedules and deadlines, provided that such modifications will not have material and substantial adverse effects on aquatic species.

2.1.6 ODEQ will:

- Review and approve, as appropriate, any documents, including study, design, operating and implementation plans identified herein as requiring ODEQ action.
- Provide input to the FWG members on activities under this AMP that may affect resources within ODEQ regulatory authority.
- Notify EWEB about any changes in water quality that are observed that may influence any actions to be implemented under this AMP.
- Assign a representative knowledgeable in water quality to the FWG.

2.2 Implementation, Coordination, and Approval**2.2.1 Implementation**

EWEB shall implement and maintain the actions in this AMP according to the timelines in this AMP.

2.2.2 Coordination and approval

EWEB will:

- Coordinate, consult with, and convene meetings of the FWG.
- Convene a meeting of the FWG at least annually. There may be times when a more frequent or less frequent schedule for convening meetings than annually will be necessary. Meetings will be scheduled less frequently than annually only with the consensus of the FWG. For purposes of this AMP, consensus means that any decision must be acceptable to, or not opposed by, all representatives of the members of the FWG.
- Make best efforts to prepare and distribute to the FWG members an agenda and all meeting materials at least fourteen days before each meeting.
- Prepare draft notes of each meeting including a list of attendees and meeting handouts, agreements, or decisions made in the meeting and actions to be taken, provide the notes to the FWG members for review and comment within a reasonable period of time, and provide to the FWG members final notes that include the comments.
- Provide at least 30 days' written notice before each meeting unless unexpected circumstances require input from the FWG members on shorter notice.

For annual meetings, EWEB shall convene the FWG within the first quarter of each calendar year, unless EWEB determines it is appropriate to convene the annual meeting in a different quarter based on activities implemented under the New License. For any annual meeting, EWEB shall summarize the actions implemented under this AMP for the previous calendar year and shall provide the summary to the FWG members either in writing or by posting on EWEB's website. In the summary, EWEB shall also summarize the actions EWEB plans to implement under this AMP for the current calendar year.

2.2.2.1 Consultation process

EWEB shall, where this AMP requires consultation with the FWG before EWEB files with FERC any study, operating or implementation plan, report, or facility design: (i) where specified in this AMP, consult with the FWG during the development of the draft study, operating or implementation plan, report or facility design, (ii) provide the FWG members with a copy of the draft study, operating or implementation plan, report, or facility design and all data supporting that draft study, operating or implementation plan, report, or facility design, and (iii) allow a minimum of 30 days (which EWEB may reasonably extend upon request of a member of the FWG if needed to facilitate consultation) for the FWG members to comment and to make recommendations, unless a different time period is established under the New License or this AMP or is directed by FERC.

During the consultation period, EWEB shall convene at least one meeting of the FWG to discuss the draft study, operating or implementation plan, report, or facility design and reach consensus and if consensus cannot be reached proceed as described below. EWEB shall provide to the FWG members a final version of the study, operating or implementation plan, report, or facility design at the time that EWEB provides the final version of the document for approval pursuant to Section 2.2.2.2 below.

If a member of the FWG does not respond to a request for consultation within 30 days, or as such period may have been extended, that member is not considered for purposes of obtaining consensus. If no members of the FWG respond to the request for consultation within 30 days, or as such period may have been extended, EWEB may file the study, operating or implementation plan, report, or facility design with FERC.

When consultation is required under this AMP and consensus is not reached by the FWG prior to the date EWEB is required to make a submission to FERC, EWEB shall make the submission to FERC according to the schedule provided in this AMP or the New License, or as directed by FERC, and shall describe to FERC how EWEB's submission accommodates any comments and recommendations of the FWG members. If EWEB's submission does not adopt a recommendation, the submission will include EWEB's reasons based on Project-specific information. EWEB shall provide FERC with a copy of any comments and recommendations provided by the FWG members during the consultation. Any FWG member may seek to resolve the consultation disagreement in accordance with the dispute resolution process in Section 7 of the Settlement Agreement. The FWG members may submit their own comments to FERC. If applicable, once the dispute resolution process is completed, EWEB shall file the study, operating or implementation plan, report or facility design with FERC.

2.2.2.2 Agency approval process

Where this AMP or the New License requires consultation with the FWG and approval by one or more Governmental Parties, EWEB's submission of a study, operating or implementation plan, report, or facility design to the FWG members will also constitute submission for approval to such Governmental Party, if a member of the FWG. When approval of a Governmental Party is required, EWEB shall provide to the Governmental Party a final version of the study, operating or implementation plan, report, or facility design on which approval is sought. Unless a different time period is established in the New License or in this AMP or is directed by FERC, EWEB shall, where approval by a Governmental Party is required, allow a minimum of 30 days for the Governmental Party to provide its approval before EWEB files any study, operating or

implementation plan, report, or facility design with FERC. If consensus is achieved by the FWG pursuant to Section 2.2.2.1, such approval shall be deemed to have been obtained. Each Governmental Party who is a member of the FWG with approval authority will document its approval in writing to EWEB, which approval or approvals EWEB shall include in any filing with FERC. Unless otherwise required by the New License or this AMP or directed by FERC, EWEB shall, if requested by any Governmental Party with approval authority, grant a 30-day extension for the completion of consultation. Any Governmental Party or Parties will endeavor to make approval decisions during consultation whenever possible.

If a Governmental Party does not respond to a request for approval within 30 days, or as such period may have been extended, the obligation for obtaining approval from that Governmental Party will be deemed to have been satisfied for purposes of meeting the requirements of the New License and this Settlement Agreement. If no Governmental Parties with approval authority respond to the request for approval within 30 days, or as such period may have been extended, EWEB may file the study, operating or implementation plan, report or facility design with FERC.

When approval of a Governmental Party is required under this AMP and approval has not been provided, EWEB or the Governmental Party may seek to resolve the lack of approval in accordance with the dispute resolution process in Section 7 of the Settlement Agreement. If the dispute has not been resolved after the dispute resolution process outlined in Sections 7.1, 7.1.1, and 7.1.2 of the Settlement Agreement or approval has not been provided prior to the date that EWEB is required to make a submission to FERC, EWEB shall make the submission to FERC according to the schedule provided in this AMP or the New License, or as directed by FERC, and shall describe to FERC why approval was not provided. In such instance, the Governmental Party whose approval was required may submit its own explanation as to why approval was not provided. EWEB or the Governmental Party may seek to resolve the lack of approval in accordance with the dispute resolution process in Section 7 of the Settlement Agreement. If applicable, once the dispute resolution process is completed, EWEB shall file the study, operating or implementation plan, report, or facility design with FERC. If resolution was not achieved through dispute resolution, then the Governmental Party may submit its own explanation as to why resolution was not achieved.

2.2.2.3 Expedited consultation and agency approval process

When consultation under Section 2.2.2.1 above or Governmental Party approval under Section 2.2.2.2 above is required and the time provided for consultation in Section 2.2.2.1 or approval in Section 2.2.2.2 is not reasonably available because EWEB must implement an action under the New License within a shorter period of time due to extraordinary circumstances beyond EWEB's reasonable control, EWEB shall provide notice to the Work Group and Governmental Party, as applicable, that: (a) an expedited consultation and approval process will occur within the time available, (b) the location, date, and time for the process, (c) the subject for the process, and (d) why EWEB must take action within the shorter period of time. EWEB shall complete as much of the consultation and approval process as can occur in the time reasonably available before EWEB must implement the action. If consultation is not completed or an approval is not obtained within the time available, EWEB may implement the action to the extent allowed by law, but the Parties may still require that the consultation process in Section 2.2.2.1 above and the approval process in Section 2.2.2.2 above, as applicable, be completed after EWEB has implemented the action.

2.2.2.4 Consultation and Approval Process for Measures in the McKenzie Wild and Scenic River Corridor

Where this AMP requires consultation with the FWG and approval or authorization by the USDA Forest Service for measures that will be undertaken in the McKenzie Wild and Scenic River corridor that FERC does not require in the New License, EWEB shall follow the consultation requirements described in Section 2.2.2.1 and the agency approval process described in 2.2.2.2.

Before initiating any habitat or ground-disturbing measures in the McKenzie Wild and Scenic River corridor located on NFS lands, EWEB shall obtain from the USDA Forest Service and file with the Commission any appropriate authorization for the occupancy and use of NFS lands for measures not otherwise included in the New License.

2.3 Periodic Plan Review and Revision

EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall periodically review this AMP to determine if revisions are needed. The first such review will occur no earlier than 10 years after New License issuance unless otherwise agreed to by consensus of the FWG in consultation with the FWG. Subsequent reviews will occur every 5 to 10 years after that time unless otherwise agreed to by consensus of the FWG in consultation with the FWG to determine if and what specific revisions are needed. EWEB shall summarize any needed revisions at a meeting of the FWG, and 30 days prior to that meeting, distribute draft revisions to the FWG for review. Based on discussion at the FWG meeting, EWEB shall develop a revised draft AMP for review within 90 days after the meeting. EWEB shall provide all members of the FWG an opportunity to review and to comment on, and to reach consensus on the revised draft AMP in accordance with the procedures in Section 2.2.2.1 of this AMP. Any FWG member may seek to resolve a lack of consensus in accordance with the dispute resolution process in Section 7 of the Settlement Agreement. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall then prepare a final revised AMP. If a required approval is not obtained, any FWG member may seek to resolve the lack of approval in accordance with the dispute resolution process in Section 7 of the Settlement Agreement.

In submitting the final revised AMP to FERC, EWEB shall also submit documentation of all FWG and agency consultation, agency approvals, copies of comments and recommendations on the draft and revised AMP, and specific descriptions of how the comments and recommendations were accommodated by the final revised AMP. If EWEB does not adopt a recommendation, the filing will include EWEB's reasons, based on project specific information.

Revisions to the AMP will not be required to be implemented until EWEB is notified by the Commission that the revisions to the AMP are approved. Upon Commission approval, EWEB shall implement the revised AMP, including any changes required by the Commission.

EWEB may make minor (non-substantial) changes to this AMP consistent with the provisions of Articles 2 and 3 of the New License, provided, however, that EWEB provides a minimum of 30 days advance notice of the minor changes to the FWG (unless circumstances beyond the reasonable control of EWEB requires shorter advance notice) and no member of the FWG contends that the proposed changes are not minor. If any member of the FWG objects that the proposed changes are not minor, EWEB shall proceed through the consultation process in Section

2.2.2.1 above for the proposed changes. If EWEB elects, the objection by the member of the FWG that the proposed changes are not minor may also be considered during the consultation process.

3 PLAN OBJECTIVES

The objectives of this AMP are to:

- 1) Protect, maintain, and enhance aquatic resources associated with the Project in a manner consistent with Project operations, public safety needs, and aquatic resource interests.
- 2) Describe the aquatic resource actions to be implemented by EWEB under the Settlement Agreement.
- 3) Define the roles and responsibilities of EWEB in planning, implementing, maintaining, assessing, and funding aquatic resource actions during the term of the New License including but not limited to:
 - a) Providing upstream and downstream fish passage at Trail Bridge Dam.
 - b) Providing increased opportunities for Chinook salmon spawning in Smith Bypass Reach and lower Carmen Bypass Reach.
 - c) Providing additional flows in Smith Bypass Reach, upper Carmen Bypass Reach, and lower Carmen Bypass Reach.
 - d) Reducing the potential for Project-induced spill in Smith Bypass Reach.
 - e) Reducing the potential for Chinook salmon and bull trout stranding in Trail Bridge Reservoir.
 - f) Maintaining the Carmen-Smith Spawning Channel.
 - g) Supporting cutthroat trout in Carmen Diversion Reservoir and supporting cutthroat trout and limiting brook trout in upper Carmen Bypass Reach.
 - h) Providing training to its employees and contractors for implementation of this AMP.
- 4) Define the roles and responsibilities of the FWG and agencies with approval authority in implementing this AMP.
- 5) Define the processes and procedures for ongoing management of aquatic resources associated with the Project.

4 ELEMENTS

4.1 Fish Passage

4.1.1 Passage standards

EWEB shall design, construct, operate and maintain all Trail Bridge Dam facilities for the purpose of supporting safe, timely, and effective passage without serious injury or mortality to migrating salmonids and other native fish species as described in Sections 4.1.1.1 and 4.1.1.2 below.

EWEB shall also operate the Carmen Powerhouse for the purpose of supporting safe, timely, and effective passage without serious injury or mortality to migrating salmonids and other native fish species as described in Section 4.1.1.3 below.

4.1.1.1 Standards for upstream passage at Trail Bridge Dam

As provided in Section 4.1.2, EWEB shall design, construct, operate and maintain the Trail Bridge Dam trap and haul facility for upstream fish passage, subject to the standards in Table 4-1 below estimated as total adult mortalities/total adults migrating through facility on an annual basis.

Table 4-1. Numeric Standard for upstream passage of adult Chinook salmon and adult bull trout, following construction of the Trail Bridge Trap and Haul facility (Section 4.1.2)

Species	Standard
Chinook	<1% adult mortality per year, including delay induced mortality
Bull trout	No more than 2 adult fish per year or 1% (whichever is higher) mortality; 5% injury per year

4.1.1.2 Standards for downstream passage Trail Bridge Dam

As provided in Section 4.1.3, EWEB shall modify, operate, and maintain Trail Bridge Dam facilities for downstream fish passage, subject to the standards for downstream fish passage in Table 4-2 below, regardless of passage route (i.e., spillway, attraction water supply intake, or other).

Table 4-2. Numeric Standard for downstream passage for Chinook salmon and bull trout, following construction of the Trail Bridge Trap and Haul facility (Section 4.1.3).

Species	Affected Life Stages	Standard
Chinook	fry and juveniles	2% mortality, 5% injury, per year
	Adult	No more than 2 fish per year or 2% mortality (whichever is higher); 5% injury, per year
Bull trout	fry and juveniles and subadults	2% mortality, 5% injury, per year
	Adult	No more than 2 fish per year or 2% mortality (whichever is higher); 5% injury, per year

4.1.1.3 Standards for upstream passage at Carmen Powerhouse

Standard for mortality and injury: Mortality and injury standards are considered to be exceeded if monitoring surveys document Carmen Power Plant facilities and operations result in three or more adult fish (any combination of bull trout or Chinook salmon) observed dead or seriously injured in a calendar year.

4.1.2 Upstream passage facilities at Trail Bridge Dam

As provided by this Section 4.1.2, EWEB shall design, construct, operate, and maintain a trap and haul facility at Trail Bridge Dam consistent with EWEB’s Technical Memorandum dated June 28, 2016² and any subsequent revisions thereto and according to the criteria document entitled *Anadromous Salmonid Passage Facility Design*³ and this Section 4.1.2 for the purpose of supporting safe, timely, and effective upstream passage of fish and to achieve upstream fish passage standards described in Section 4.1.1.1. EWEB shall design the trap and haul facility in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service.

EWEB shall include in the design of the trap and haul facilities:

- a) Entrance pool specifications,
 - o 6-inch step entrance,
 - o An attraction water supply (AWS) sufficient to provide a variable 12-24-inch step entrance, and will provide appropriate tailrace hydraulics;
- b) 9-inch step at V-trap,
- c) V-trap,
- d) Trap pool size 10 ft. x 10 ft.,
- e) Hopper size 4 ft. x 4 ft.,

² EWEB Technical Memorandum to NMFS: Trail Bridge Trap and Haul Design Criteria Summary, with appendices (June 28, 2016)

³ Developed by National Marine Fisheries Service, Northwest Region (NMFS 2011) or current version thereof at the time of design.

- f) Real-time underwater video monitoring within the trap or other reliable method to identify species and numbers of fish entering the trap,
 - g) Water to water transfer of fish from hopper to transport truck,
 - h) Identification and improvement/development (if needed) of release location(s),
 - i) A lamprey ramp or other passage system for Pacific lamprey that (1) integrates with the trap & haul (2) which could be installed at a future date if necessary and (3) will exclude lamprey from the trap pool. The lamprey ramp or other passage system would be provided when deemed appropriate by EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service.
- 1) EWEB shall operate and maintain the trap entrance water elevation differentials as follows:

Period of time	Trap flows/differentials
July–October	Salmon entrance: 18-24 inch differential, Trout entrance: 6-inch differential.
November–June	Salmon entrance: 12 inch differential, Trout entrance: 6-inch differential.

- 2) Within 6 months after New License issuance, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission a design and schedule for construction of the Trail Bridge Dam trap and haul facilities. Subject to Commission approval, within 3 years after the later of New License issuance or final resolution of any Appeal relating to this Section 4.1.2, EWEB shall complete construction of the Trail Bridge Dam trap and haul facilities.
- 3) No later than 6 months prior to planned completion of the trap and haul facilities, EWEB shall prepare in consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service, and file with the Commission a Preliminary Operations and Maintenance Plan for Trap and Haul (POMPTH) to provide an initial guide for the operation of the trap and haul facilities.
- 4) EWEB shall base the POMPTH on the Anadromous Salmonid Passage Facility Design⁴. The POMPTH shall describe:
- a. Timing (days of the week) of operation:
 - i. 5 days/wk November – August 15,
 - ii. 7 days/wk August 16 – October.
 - b. Remote video operation and guidelines for documenting fish observations,
 - c. Frequency of hauling fish shall be 0 – 2 times/day of operation as determined from video fish counts,
 - d. Fish handling guidelines,
 - e. Location of fish release,
 - f. Shut down/start up procedures,

⁴ developed by National Marine Fisheries Service, Northwest Region (NMFS 2011) or current version thereof at the time of design.

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- g. Guidelines for use of exclusion bars during transfer operations,
 - h. Guidelines for icing shutdown.
- 5) Within 6 months of the Commission approval of the report documenting results of the Upstream Passage Observation and Evaluation Plan (UPOEP) provided in Section 4.1.6.1 below, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service, prepare and file with the Commission a Revised Operations and Maintenance Plan for Trap and Haul (ROMPTH) for the Trail Bridge trap and haul facility. Upon Commission approval, EWEB shall implement the ROMPTH.
- a) Five years after commissioning of the trap and haul facilities, EWEB may, in consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service, file an amendment to the ROMPTH with the commission to modify frequency and/or timing of trap operations, if warranted.
- 6) Within 6 months after New License issuance and acceptance, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission a plan and schedule for the demolition of the existing tailrace barrier below Trail Bridge Dam. Subject to Commission approval, within 3 years after the later of New License issuance or final resolution of any Appeal relating to this Section 4.1.2. EWEB shall complete demolition of the existing tailrace barrier below Trail Bridge Dam, providing fish access to the trap and haul facility for upstream fish passage.

4.1.3 Downstream passage facilities at Trail Bridge Dam

4.1.3.1 Trail Bridge spillway

EWEB shall design, construct, operate, and maintain the Trail Bridge Dam spillway, gate and hoist system, and AWS for the purpose of supporting year-round safe, timely, and effective downstream passage of fish and according to the criteria document entitled *Anadromous Salmonid Passage Facility Design*⁵ and as provided by this Section 4.1.3.1, to achieve downstream fish passage standards described in Section 4.1.1.2. EWEB shall design the spillway, gate and hoist system, and AWS in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service.

- 1) Within 6 months after New License issuance, EWEB shall in consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service, prepare and file with the Commission a plan, schedule, and design for construction of modifications to the spillway, gate and hoist system and for ceasing operation of the Trail Bridge powerplant for the purposes of power generation. Subject to Commission approval, within 3 years after the later of New License issuance or final resolution of any Appeal relating to this Section 4.1.2., EWEB shall complete modifications to the spillway, gate and hoist system. Upon completion of the upstream and downstream fish passage facilities, EWEB shall cease operation of the power plant, as described below in 4.1.3.2.

⁵ Developed by National Marine Fisheries Service, Northwest Region (NMFS 2011) or current version thereof at the time of design.

- 2) EWEB shall include (but not be limited to) in the design of the spillway, and gate and hoist system facilities the following:
 - a. Modification of the spillway gate to allow a 12-inch minimum opening to accommodate adult bull trout and adult Chinook passage,
 - b. Modifications of the “flip bucket” and other features to promote laminar flow and reduce turbulence;
 - c. Modifications to eliminate, to the extent possible the need to salvage adult fish from the flip bucket;
 - d. Installation of a hoist mechanism to allow fine control of gate openings and spillway flows to meet ramping criteria; and
 - e. Modification to tailrace configuration, if needed to ensure safe landing and discharge conditions for fish as they exit the spillway.
- 3) No later than 6 months prior to planned completion of modifications to the Trail Bridge Dam spillway, and gate and hoist system, EWEB shall in consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service, prepare and file with the Commission a Preliminary Operations and Maintenance Plan for Spillway (POMPS) for the modified spillway, and gate hoist system and Trail Bridge Powerhouse. Upon Commission approval, EWEB shall implement the POMPS.
- 4) Within 12 months after completion of the evaluation described in the Downstream Passage Evaluation Program (DPEP) provided in Section 4.1.7 below, EWEB shall in consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service, prepare and file with the Commission, a Revised Operations and Maintenance Plan for Spillway (ROMPS). Upon Commission approval, EWEB shall implement the ROMPS.

4.1.3.2 Trail Bridge Power Plant/turbine shutdown

Upon completion of the upstream and downstream fish passage facilities, EWEB shall cease operation of the Trail Bridge turbine and power plant for the purposes of power generation⁶ to meet downstream passage standards and to avoid entrainment and to facilitate downstream passage, and will only operate the power plant equipment for safety, limited maintenance, and emergency purposes. In addition, to ensure flow can be passed by the Trail Bridge Dam during construction of passage facilities, EWEB may operate the Trail Bridge power plant until completion of upstream and downstream passage facilities at Trail Bridge Dam described in Sections 4.1.2 and 4.1.3. The Parties’ goal is to have fish passage facilities completed within 3 years from issuance of the New License.

During the term of the New License, EWEB shall, for dam safety, maintenance, and emergency purposes, maintain the Trail Bridge power plant in safe working order. Continued reliable performance of the Trail Bridge intake, penstock, generating unit, and energy dissipation valve is necessary to serve the following purposes:

- a) Low-level outlet for Trail Bridge Reservoir,

⁶ The cessation of power generation at the Trail Bridge Plant is not intended to preclude the possibility of EWEB proposing to use a microturbine for energy dissipation in the attraction water supply (AWS) system for the trap and haul facility.

- b) Redundancy to the spillway, gate and hoist in case of failure, and
 - c) Additional flow capacity for safe passage of the probable maximum flood (PMF).
- 1) EWEB shall operate the Trail Bridge power plant as provided in Table 4-3 below. If weather, flows, and operational conditions allow, EWEB may achieve multiple Test Period Purposes in a single period of operation. EWEB shall notify the FWG as soon as practical should operation of the Trail Bridge power plant and turbine be required for emergency events or if operations deviate from the table below.

Table 4-3. Trail Bridge Turbine Exercise Program.

Test Period Purpose	Time Period	Duration	Spillway Flows
Full capacity operation to allow testing, instrument calibration checks, trend observation and high flow training activities.	Between mid-December and late February.	Once for up to seven consecutive days	All flows in excess of 1,800 cfs (maximum flow through plant)
Critical systems testing using a standard test plan to demonstrate functionality of systems serving the generating unit and bypass valve.	April through June	One time for a 48-hour period.	All flow in excess of 650 cfs (minimum flow for generation)
Spillway inspections, spillway gate system reliability testing, instrument calibration checks, and trend observations.	July	Once for up to seven consecutive days	None
Critical systems testing using a standard test plan to demonstrate functionality of systems serving the generating unit and bypass valve.	November or December	Once for up to seven consecutive days	All flow in excess of 650 cfs (minimum flow for generation)
Emergency operations, including but not limited to Trail Bridge spillway equipment failure, and spillway and gate repairs.	As required	As required.	As the situation allows.

- 2) To minimize fish entrainment, EWEB will limit operation of the Trail Bridge power plant turbine to the following situations:
- a. during the Trail Bridge spillway maintenance and construction periods after consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service;
 - b. to minimize use of the existing energy dissipation valve; and
 - c. as may be necessary to meet FERC requirements after prompt notification to the Fish Agencies.

4.1.4 Upstream passage at Sweetwater Creek

Except as otherwise provided in the Construction Management Plan implemented under Article 31, EWEB shall maintain a minimum elevation of 2,083 feet in Trail Bridge Reservoir from 15 August through 31 October for the term of the New License, which is intended to aid upstream passage of bull trout into Sweetwater Creek by providing a minimum depth of one foot of water in the entrance to the Sweetwater Creek culvert.

4.1.5 Upstream passage at the Carmen-Smith Spawning Channel

EWEB shall design, construct, operate and maintain upstream fish passage with steps no higher than 6 inches at the Carmen-Smith Spawning Channel entrance, as well as a facility for upstream passage out of the channel at the spawning channel water control structure, consistent with *AMP-90% Design Submittal Volume 3*, dated December 2012 by CH2MHill and the *Anadromous Salmonid Passage Facility Design*⁷ and as provided by this Section 4.1.5, for the purpose of supporting safe, timely and effective upstream passage of fish at the spawning channel. EWEB shall design the upstream passage spawning channel modifications in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service.

- 1) Within 1 year after New License issuance, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission, a plan and schedule for design and construction of the spawning channel fish passage facilities. Subject to Commission approval, within four years after New License issuance, EWEB shall complete construction of the spawning channel fish passage facilities.
- 2) Within 12 months after EWEB's completion of the evaluation described in the Upstream Passage Evaluation Program (UPEP) provided in Section 4.1.6, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission a Spawning Channel Operations and Maintenance Plan (SCOMP) to provide for operation of the spawning channel fish passage facilities. EWEB shall base the SCOMP on the *Anadromous Salmonid Passage Facility Design*⁸, and the results of EWEB's implementation of the Upstream Passage Observation and Evaluation Plan (UPOEP) described in Section 4.1.6 below. Upon Commission approval, EWEB shall implement the SCOMP.

4.1.6 Upstream Passage Evaluation Program (UPEP)

The Upstream Passage Evaluation Program (UPEP) consists of 3 distinct plans to be implemented consecutively and that are designed to build upon one another in succession to provide monitoring of upstream fish migration through the Project for the duration of the New License. The three stages of the Program are as follows:

- 1) Upstream Passage Observation and Evaluation Plan (UPOEP):
 - a. an initial observation component that begins upon commencement of operation of the trap and haul facility provided for in Section 4.1.2 and
 - b. a formal evaluation of the performance of Project facilities against the passage standard provided in Section 4.1.1.1;
- 2) Upstream Passage Adaptive Management Plan (UPAMP) which is to be implemented for the Trail Bridge trap and haul facility only if the results of the UPOEP indicate non-compliance with the Passage Standard provided in Section 4.1.1.1;
- 3) Upstream Passage Ongoing Monitoring Plan (UPOMP).

⁷ Developed by National Marine Fisheries Service, Northwest Region (NMFS 2011) or current version thereof at the time of design.

⁸ developed by National Marine Fisheries Service, Northwest Region (NMFS 2011) or current version thereof at the time of design.

4.1.6.1 Upstream Passage Observation and Evaluation Plan (UPOEP)

UPOEP schedule and reporting

Six months prior to planned completion of the Trail Bridge Dam trap and haul facilities, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission, the Upstream Passage Observation and Evaluation Plan (UPOEP) to conduct hydraulic and biological monitoring at the Project.

The UPOEP shall include an implementation schedule. The UPOEP will provide that EWEB may make minor modifications to the plan and schedule in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service.

EWEB shall implement the initial observation component of the UPOEP after Commission approval and after EWEB's completion of the construction of the Trail Bridge Dam trap and haul facilities, as detailed below. Data collected during the initial observation component of the UPOEP will be used by EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service, to determine if sufficient numbers of naturally-produced adult Chinook salmon are returning to spawn above Trail Bridge Dam to proceed with implementation of the formal evaluation component of the UPOEP.

Within 6 months after EWEB's completion of the implementation of the UPOEP, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare a report documenting the results of the evaluation and the data collected. EWEB shall file the report with the Commission along with comments by members of the FWG and describing how EWEB addressed or responded to the comments.

If EWEB's implementation of the UPOEP verifies that the Project facilities function as designed, where applicable, and injury and mortality at the Project facilities are within the passage standards provided in Sections 4.1.1.1 above, then no further hydraulic or biological evaluation by EWEB is required, except as provided in the Upstream Passage Ongoing Monitoring Plan (UPOMP).

UPOEP elements

In general, as provided in this Section 4.1.6.1, the UPOEP plan will provide for 1) counting and recording the status of fish ascending the fish passage facilities, 2) the capture, tagging, and release of fish at a site downstream of the Carmen-Smith Spawning Channel entrance, 3) evaluating delay, injury, and mortality, to upstream migrating spring Chinook salmon and bull trout passing through the Project, and 4) the opportunistic capture and tagging of native migratory trout⁹ for inclusion in migration tracking through the Project. EWEB shall focus the studies on wild stocks of spring Chinook salmon and bull trout, however it is understood that actions taken for spring Chinook salmon and bull trout may also benefit native migratory trout.

As described for specific facilities and locations below, the UPOEP shall contain the following elements:

- 1) The initial observation component of the UPOEP shall include the following:

⁹ Native migratory trout means cutthroat and rainbow trout

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- a. EWEB shall begin observation surveys one week after the first spring Chinook salmon is observed by video monitoring to enter the Trail Bridge Dam trap and haul facility during the first upstream migration season after completion of construction of the facility. Observation surveys shall be conducted bi-weekly through 15 October until EWEB in consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service determine that sufficient numbers of naturally produced adult Chinook salmon are returning to spawn above Trail Bridge Dam.
 - b. EWEB shall record and enumerate spring Chinook salmon and bull trout in the Trail Bridge tailrace and trap and haul facility, in part, to determine, in consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service, that sufficient numbers of naturally-produced adult Chinook salmon are returning to spawn above Trail Bridge Dam to proceed with implementation of the formal evaluation component of the UPOEP,
 - c. During the initial observation component, if EWEB identifies any major issues with fish attraction, passage into the trap, or with initial haul operations, EWEB shall, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, make modifications to facilities and/or operations as appropriate to address the issue.
- 2) The formal evaluation component of the UPOEP shall include the following:
- a. Native migratory trout studies: EWEB shall collect and PIT tag, or use other appropriate technology for, native migratory trout (which may migrate year-round) and document movement throughout the Project to evaluate connectivity between populations upstream and downstream of Trail Bridge Dam and utilization of passage facilities.
 - b. Institute a system for anglers to report observations of injury or mortality to salmonids and to return tags from study fish.
 - c. A plan and schedule based on the predicted seasonal pattern of passage timing by Chinook salmon and bull trout at Trail Bridge Dam and, where appropriate, will include plan elements to corroborate predicted migration timing with observations of actual timing. EWEB shall include in the plan measures to evaluate migration delay at Project facilities through direct observation, tag detections, recordings, or other appropriate technology.
 - d. Methods for recording the migration rate of individual Chinook salmon and bull trout adults past each passage facility and through the Project area using radio telemetry, spawning surveys, video fish monitoring, PIT tags and/or other appropriate technology to evaluate the extent to which upstream migrant Chinook salmon and bull trout successfully reach spawning areas in the lower Carmen Bypass reach, the Smith Bypass reach, or Sweetwater Creek and to track native migratory trout.
 - e. Evaluation of all observed Chinook salmon and bull trout injury, delay and mortalities in an attempt to determine if the cause is from a Project facility.

EWEB shall also record and photograph all observed external serious injuries to Chinook salmon and bull trout.

Trail Bridge trap and haul biological evaluation

For evaluation of the Trail Bridge trap and haul facility, the UPOEP may include, but not be limited to 1) radio telemetry, 2) snorkel surveys, 3) PIT tag detections, 4) remote underwater cameras and/or 5) observations from the power plant and trap decks. The intent of the evaluation is to record schooling and aggregation behavior in the Trail Bridge tailrace and the condition, including injuries, of all fish entering the facility or other appropriate technology, for adult Chinook salmon and bull trout. Observations will occur at time of first handling, and during time of release. “Injury and mortality” in this context is, defined as any adult fish observed with substantial injuries or deceased within the facility, or during transfer, transport, or release from transport vehicles, or dying prematurely (as a pre-spawning mortality) within 24 hours after release from transport vehicles, unless it is evident that the fish was substantially injured or impaired upon first entering the trapping facility.

Carmen Power Plant biological evaluation

- 1) For the biological evaluation of the Carmen Power Plant, the UPOEP may include but not be limited to, SCUBA, radio telemetry, snorkel surveys, PIT tag detections, and/or observations from the power plant deck, to evaluate the extent to which spring Chinook salmon are delayed by Carmen Power Plant facilities, and to evaluate the extent to which bull trout and spring Chinook salmon are seriously injured or killed as a result of the Carmen Power Plant discharge. EWEB shall include in the study measures designed to search for and assess serious injuries and mortalities of Chinook salmon, bull trout and native migratory trout observed at Carmen Power Plant.
- 2) EWEB, in consultation with and subject to the approval of Fish Agencies and USDA Forest Service, shall conduct an evaluation as part of the UPOEP, which will be used to construct, if needed, an adaptive approach for fish passage at the Carmen Power Plant tailrace by monitoring fish after spring Chinook salmon and bull trout are hauled from the Trail Bridge Dam trap and haul facilities and released in Trail Bridge Reservoir above Trail Bridge Dam, to determine if there is significant delay, substantial mortality, or serious injury to Chinook salmon and bull trout (see Passage Standards, 4.1.1.3) associated with upstream passage past the Carmen Power Plant tailrace as a result of its facilities or operations. The criteria for determining significant delay, substantial mortality and serious injury are:
 - a) Standard for significant delay of spring Chinook salmon: The operation of the Carmen Power Plant will not delay “staged and spawn-ready” spring Chinook salmon from migrating to spawning habitat in the tributaries of Trail Bridge Reservoir by more than 48 hours as provided below. Potential delay at the Carmen Power Plant will be evaluated as follows, unless modified by EWEB in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service:
 - i) Boundaries of the Carmen Power Plant tailrace will be delineated prior to the study.

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- ii) An agreed-to number of adult spring Chinook will be tracked with radio tags (or other appropriate technology) prior to entry into Trail Bridge Reservoir.
 - iii) Movement of tracked fish will be monitored from the location of tagging to the Carmen Power Plant tailrace, and to the approximate location of spawning (i.e., determine if migration occurs into Smith or lower Carmen bypass reach). It is anticipated that movement will be monitored daily from stationary or mobile receivers (depending on selected technology).
 - iv) “Control” and “test” operations will be established for 24 days (“experimental period”) between 25 August and 17 September, which based on past data is the period of greatest anticipated movement of Chinook salmon in the lower Carmen Bypass Reach.
 - 1’) Control operations will be defined as Carmen Power Plant off for the duration of the control period. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall designate three control periods, each consisting of a continuous period of at least four days during the experimental period.
 - 2’) Test operations will be defined as Carmen Power Plant “normal operations” within a 24-hour period. Normal operations are typically defined as 12 hours with the Power Plant on, and 12 hours with the Power Plant off. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall also designate three test periods of normal operation, each consisting of at least four continuous days during the experimental period.
 - v) Control and test periods will alternate during the experimental period, such that four days of control operations will be followed by four days of test operations. Analysis will consist of comparing the patterns of movement of tracked fish during control and test periods. The main response variable will be a comparison of the number of hours tracked Chinook salmon spend in the vicinity of the Carmen Power Plant tailrace as delineated in i) above between the two periods. If tracked Chinook salmon in the vicinity of the Carmen Power Plant tailrace spend on average longer than 48 hours more during the test period than fish spend during the control period, it will be interpreted that they were significantly delayed by Carmen Power Plant operations. Overall patterns of movement observed will also be considered in this interpretation.

Provided study objectives are not compromised, additional considerations for the evaluation plan to take into account:

- 1’) Timing of control and test operations relative to times of peak power prices,
- 2’) Water routing and management during control operations.

This assessment is scheduled to occur for two years (spawning seasons) but could be extended or shortened based on the first year's results by EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service.

- 3) If, based on the results of EWEB's implementation of the UPOEP, the standard for significant delay or the standard for substantial mortality and serious injury is exceeded, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission a list of appropriate modifications or additions to Project facilities or operations designed to address identified substantial delay, significant mortality or serious injury. Upon Commission approval, EWEB shall implement the modifications or additions to Project facilities or operations.

Sweetwater Creek Culvert biological evaluation

For the biological evaluation of the Sweetwater Creek Culvert, the UPOEP may include but not be limited to radio telemetry, PIT tags, video and/or spawning surveys, to evaluate the effectiveness of modifications to Trail Bridge Reservoir operations (Section 4.1.4 above) to aid bull trout entry into Sweetwater Creek.

Carmen Smith Spawning Channel biological evaluation

For the biological evaluation of the Carmen Smith Spawning Channel entrance and exit, the UPOEP may include but not be limited to radio telemetry, PIT tags, video and/or spawning surveys to determine if Project facilities are causing delay of Chinook salmon and bull trout migration.

4.1.6.2 Upstream Passage Adaptive Management Plan (UPAMP)

- 1) The formal evaluation component of the UPOEP will provide for an initial two-year study as described above. If the results of the UPOEP as described in the completion report submitted to the Commission indicate the trap and haul facility induced mortality rate of adult Chinook salmon or bull trout exceeds the fish passage standards of Section 4.1.1, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission a plan and schedule, called the UPAMP, to address causes of injury or mortality. Upon Commission approval, EWEB shall implement the UPAMP to modify the trap and haul facilities. The design modifications will address the causes in the most expeditious way practicable. Examples of possible modifications include, but are not limited to:
 - a. Modifications to the entrance(s),
 - b. Modifications to AWS flow volume and/or discharge pattern,
 - c. Modifications to the distribution and/or pattern of flow,
 - d. Changes to placement or additional video equipment,
 - e. Changes to transport frequency or timing,
 - f. Modifications to hopper and/or transport vehicles, and
 - g. Revised release methods and/or site.

- 2) Upon completion of the modifications, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, implement a modified version of the UPOEP to evaluate that the modifications have achieved the Passage Standard. The cycle of evaluation and modification will repeat for no more than 10 upstream migration seasons.
- 3) At the end of 10 upstream migration seasons of evaluation and modifications, if facility induced mortality rates of adult Chinook salmon or bull trout continue to exceed the fish passage standards provided in Section 4.1.1.1, EWEB shall in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission a plan and schedule for the design and construction of a volitional fish ladder or other agreed upon remedy including Project decommissioning. Within 12 months after Commission approval, EWEB shall, in consultation with and subject to the approval of Fish Agencies and USDA Forest Service, complete design of a volitional fish ladder, decommissioning, or other approved remedy, and shall begin construction (or deconstruction) as soon as possible after completion and approval of design. If a volitional fish ladder or other remedy is constructed, EWEB shall operate and maintain the facility throughout the term of the New License. In the interim, EWEB will continue to operate the trap and haul facility or other approved fish passage measures. If construction of the volitional ladder or other remedy interferes with operation of fish passage, then EWEB will implement other temporary means of passage.

4.1.6.3 Upstream Passage Ongoing Monitoring Plan (UPOMP)

Within 6 months of the Commission approval of the report documenting the UPOEP results, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission, the Upstream Passage Ongoing Monitoring Plan (UPOMP) to describe EWEB's ongoing upstream passage monitoring efforts at the Project. Upon Commission approval, EWEB shall implement the UPOMP.

The UPOMP will describe how EWEB shall monitor Project fish passage facilities, and report its findings to the FWG on an annual basis. EWEB shall prepare the annual report in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. The monitoring report is anticipated to include summaries of video monitoring and visual observations, as well as documentation of the number of each species, dates fish were observed in the trap, numbers of fish transported and released upstream, and condition of all observed fish. The report will also include summaries of all analyses, if any, conducted on successful fish passage, delay, injury, and mortality in relation to upstream fish passage facility operations, project operations (e.g. shut downs), and environmental conditions (e.g., instream flow).

If, in the course of annual monitoring of operations of the Trail Bridge trap and haul facilities, mortality or serious injury as described in Section 4.1.1.1 is observed, EWEB will notify the FWG and in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, develop a plan to implement corrective measures similar to the UPAMP as described above.

After 10 annual UPOMP reports, EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, may consider changing the reporting interval to less frequently than annually.

4.1.7 Downstream fish passage evaluation plan (DPEP)

4.1.7.1 DPEP schedule and reporting

No later than 6 months prior to EWEB's planned completion of modifications to the spillway, gate and hoist system as provided in Section 4.1.3, EWEB shall in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission a Downstream Passage Evaluation Plan (DPEP) to conduct hydraulic and biological monitoring of the spillway and the trap and haul AWS intake. The DPEP shall include an implementation schedule. Subject to Commission approval, EWEB shall implement the DPEP, after completion of the spillway, gate and hoist modifications.

Within 6 months after completion of the DPEP, EWEB shall in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission a DPEP report documenting the results of the monitoring and describing any findings that require implementation of the next phase, the Downstream Adaptive Management Plan (DAMP). The cycle of DPEP to DAMP has the potential to repeat. The interaction between the DPEP and the DAMP is described in Section 4.1.7.3 below.

4.1.7.2 DPEP elements

In general, the DPEP will provide for evaluation of fish passage downstream past Trail Bridge Dam. It is understood that actions taken for spring Chinook salmon and bull trout are also likely to benefit native migratory trout. The DPEP shall include the following elements:

- 1) Survival and injury evaluation using up to four size classes of fish that may include:
 - a. Fry (35mm-60mm),
 - b. sub yearling Chinook (60mm - 100 mm Fork Length [FL]),
 - c. Juvenile Chinook (100-200 mm FL),
 - d. Sub-adult bull trout and native migratory trout (250 mm - 350 mm FL), and
 - e. Adult bull trout and Chinook (>450 mm FL).
- 2) EWEB may use natural or hatchery origin Chinook, bull trout, and resident trout for the survival and injury evaluation, provided the Fish Agencies have issued any required permits for use of these fish and sufficient numbers are available for research purposes.
- 3) For all size classes listed above, EWEB shall conduct evaluation studies that use an appropriate technology and methodology capable of estimating survival and injury to within +/- 2.5% at the 90% confidence level.
- 4) To the extent possible, EWEB will also attempt to assess indirect and/or delayed mortality effects for the express purpose of informing spillway operations and modifications as described in Section 4.1.7.3 2).
- 5) EWEB may propose, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, different and reasonable study methodologies and

- technologies depending on the size class of fish being tested. These may include single release, multiple release, mark-recapture, test and control release, or other scientifically sound methods, and may use PIT tags, active tags (e.g., acoustic, radio, balloon) or other appropriate technologies.
- 6) Autonomous data loggers or “sensor fish” will be released through the spillway at the same flows and locations as live fish, during the evaluation to determine precise locations of potential injury or sources of mortality.
 - 7) Evaluation of the spillway at two flow conditions:
 - a. A “low flow” (650 to 800 cfs) condition typical of late summer or fall flow, and
 - b. A “high flow” (1,000 to 1,300) condition typical of spring flow.
 - 8) Experimental methods to evaluate the spillway will be chosen that best address the following objectives:
 - a. Provide statistically significant estimates of direct and indirect/delayed mortality for each size group resulting from passage through the spillway;
 - b. Provide statistically significant estimates of injury for each size group resulting from passage through the spillway;
 - c. Identify most likely causes/sources of injury/mortality to inform corrective actions; and
 - d. Combine testing of spillway and AWS entrainment in same evaluation methodology (see paragraph 9) below).
 - 9) Methods to evaluate downstream fish passage through the trap and haul AWS with the goal of assessing the behavior of fish in the vicinity of the AWS intake and the proportion of fish that are entrained at the AWS relative to passing downstream via the spillway.
 - a. Methods of evaluation may include PIT tags, acoustic tags, video cameras, or other appropriate technology.
 - b. Multiple approaches may be considered to qualitatively assess fish behavior in the vicinity of the AWS intake, as well as quantitatively estimate the proportion of downstream migrants that may be entrained in the AWS intake.
 - c. Fish to be included in evaluations may include bull trout, Chinook salmon, and/or native migratory trout, depending on the technology selected.

4.1.7.3 Spillway biological evaluation and Downstream Adaptive Management Plan (DAMP)

The DPEP will include the Downstream Adaptive Management Plan (DAMP), to evaluate and modify downstream fish passage at Trail Bridge Dam, which will include the following:

- 1) The results of all evaluations described in Section 4.1.7.2 above that meet the stated criteria in Section 4.1.1.2 for consideration will be evaluated. If the results of the DPEP, as determined by EWEB in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service indicate, that the spillway passage route does not exceed fish passage standards provided in Section 4.1.1.2, EWEB’s obligation for continued evaluation of the spillway using the DPEP will be fulfilled. “Exceeding fish passage standards” will be defined as study result estimating greater than the 2% mortality standard. However, if the estimate of mortality is greater than the 2% mortality standard, but within the margin of error, EWEB in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service may determine that

- the standard has been met. Alternatively, EWEB in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service may determine that additional evaluations or modified spillway operations are needed to achieve the standard, or to improve study methods or effort to reduce error around the estimate.
- 2) If fish passage standards provided in Section 4.1.1.2 are exceeded (as defined in 1) above), EWEB shall prepare, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service and file with the Commission, a report describing the causes of injury and mortality, and a plan, designs, and schedule for implementing spillway measures to address the causes of injury or mortality from the spillway passage route. Upon Commission approval, EWEB shall implement the plan to modify the spillway passage route. The design modifications will strive to remedy the causes in the most expeditious way practicable. Examples of possible modifications include, but are not limited to:
 - a. Modifications to the spillway gate (adjust orifice dimensions),
 - b. Modifications to the spillway walls and floor,
 - c. Resurfacing the spillway,
 - d. Modifications to the spillway flip bucket and lip,
 - e. Modifications to the tailrace pool.
 - 3) The cycle of evaluation and modification described in the DPEP and in 1) and 2) above will continue until the standards in Section 4.1.1.2 are not exceeded, but will not repeat for more than 10 years, cumulatively from the completion of the initial modifications of the downstream fish passage facilities (spillway and AWS).
 - 4) At the end of the 10 year evaluation period described in paragraph 3) above, if injury and mortality rates are within the fish passage standards provided in Section 4.1.1.2, including the margin of error (as defined in 1) above), the passage standard will be considered to have been met. If the passage standard is not met, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, and file with the Commission a plan and schedule for implementation of one of the following actions: construction of a new outflow structure designed to efficiently and safely pass fish; dam removal; or other measures. Upon Commission approval, EWEB shall implement the plan.
 - 5) The results of assessing potential entrainment at the trap and haul AWS intake described in Section 4.1.7.2 above will be considered in the DAMP.
 - a. If qualitative and quantitative assessments do not show a substantial risk of entrainment at the AWS intake as determined by EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, EWEB's obligation for continued evaluation of the AWS intake using the DPEP will be fulfilled.
 - b. If qualitative assessments of fish behavior in the vicinity of the AWS intake indicate that entrainment is a substantial risk, or if quantitative assessments indicate that substantial (e.g., >1% of downstream migrants of either Chinook or bulltrout) numbers of fish are observed to be entrained in the AWS as determined by EWEB in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, EWEB will develop a plan and schedule to take corrective actions, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. EWEB shall file the plan with the Commission and, upon Commission approval, implement the plan.

- 6) During operation of the Trail Bridge power plant, as described in Section 4.1.3.2, Table 4.1.3.2 above, EWEB shall evaluate fish movement into the penstock utilizing video technology and report to the FWG and Fish Agencies the results of this monitoring. If qualitative assessments indicate that entrainment is a substantial risk, then EWEB will take corrective action, which could include an additional quantitative study or operational changes.
- 7) After meeting fish passage standards provided in Section 4.1.1.2 during the 10 year evaluation cycle described in paragraph 3 above, EWEB shall monitor Project fish passage facilities, and in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, prepare and file with the Commission an annual report. The annual monitoring report is anticipated to include summaries of visual observations of fish, copies of spillway and gate inspection reports, how inspection findings will be addressed if needed, and documentation of the number of each species, age classes, and condition of all observed fish. The report will also include summaries of all analysis, if any, conducted on downstream fish passage, injury and mortality, in relation to fish passage facility operations, project operations (e.g. shut downs), and environmental conditions (e.g., instream flow).
- 8) If in the course of annual monitoring of operations of the Trail Bridge spillway, and gate hoist system facilities after the initial 10 year evaluation period described in paragraph 3) above, and implementation of an action implemented pursuant to paragraph 4) above, mortality or serious injury exceeds the standards provided in Section 4.1.1.2, EWEB in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, will develop and file with the Commission a plan to implement corrective measures consistent with the then existing facilities.

4.2 Flow Releases and Instream Flows

Instream flows requirements will be implemented as either a “block release” or “minimum instream” flow, defined as follows:

- Block release: A release from a controlled point which does not vary as flows within the reach increase or decrease, with a compliance point at the release structure.
- Minimum instream flow: The instream flow needed to comply with a minimum threshold value, as measured at a compliance point within the river reach. An increase above a defined block release may be necessary to meet a minimum instream flow.

The measures in this Section 4.2 will be implemented using an adaptive management framework. These, along with conditions described in the ODEQs 401 Certification, are intended to be responsive to potential changes in flow and temperature in the Project boundary due to the effects of climate change.

4.2.1 Upper Carmen Bypass Reach

4.2.1.1 Required flow releases

- 1) EWEB shall take the following actions regarding instream flows in the Upper Carmen Bypass Reach for the term of the New License:

- a) Within 6 years after New License issuance, provide a minimum block flow release of 30 cfs year-round from the Carmen Diversion Dam into the upper Carmen Bypass Reach to provide instream flows to support fish, wildlife, and aquatic habitat.
- b) Commencing on the date EWEB begins the flow release required in Subsection 4.2.1.1.1)a) above, comply with the water quality certification, including its conditions, regarding this measure issued by ODEQ.

4.2.1.2 Flow release system

- 1) EWEB shall design, construct, operate and maintain a system for providing the flow releases required by Section 4.2.1.1 above from the Carmen Diversion Dam to the upper Carmen Bypass Reach and for the purpose of providing the additional flow releases required by Section 4.2.2.1 below from the Carmen Diversion Dam to the upper Carmen Bypass Reach to supplement flow to the lower Carmen Bypass Reach. Within 2 years after New License issuance, EWEB shall file for Commission approval a plan and schedule for the flow release system to provide the required flow releases from the Carmen Diversion Dam. The plan will include a description of the flow release system, including at least a 60 cfs capacity for the flow release system, and any compliance monitoring equipment and its operation. EWEB shall complete construction of the flow release system within 3 years of New License issuance, unless otherwise approved by the Fish Agencies and USDA Forest Service. EWEB shall prepare the plan and schedule in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. Upon Commission approval, EWEB shall implement the plan and schedule.
- 2) EWEB shall monitor compliance with the required flow releases at the point or points of flow release from the Carmen Diversion Dam and shall determine the amount of the flow release at least every 30 minutes. EWEB shall provide an annual summary of these flow release data to the FWG and the Commission (which will be publicly available) each year. EWEB shall provide the raw 30-minute data to the FWG annually. EWEB shall also make these data available upon request with reasonable notice as the data are acquired during the year.
- 3) EWEB shall monitor and determine spill from Carmen Diversion Dam based on reservoir elevation. EWEB shall provide raw reservoir elevation data (including appropriate rating curve) and an annual summary to the FWG each year including data on date, timing, duration, magnitude and frequency of spill events at Carmen Diversion Dam. EWEB shall also make these data available upon request with reasonable notice as the data are acquired during the year.

4.2.2 Lower Carmen Bypass Reach

4.2.2.1 Required flow releases

EWEB shall take the following actions for the term of the New License to provide instream flows in the lower Carmen Bypass Reach:

- 1) Coordinate with USGS and fund installation, operation, and maintenance of a gage in the lower Carmen Bypass Reach as described in Section 4.2.2.3 below.

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- 2) Provide a block flow release of 30 cfs year-round from the Carmen Diversion Dam into the upper Carmen Bypass Reach as specified in Section 4.2.1.1 above to support increased fish habitat.
 - 3) Provide additional flow releases, if necessary, from Carmen Diversion Dam designed to maintain a target minimum flow of 160 cfs in lower Carmen Bypass Reach as follows:
 - a) For compliance, EWEB shall measure instream flow using the USGS gage in the lower Carmen Bypass Reach.
 - b) EWEB shall base the additional flow releases on the average flow from the previous month as measured using the USGS gage in the lower Carmen Bypass Reach, excluding: i) any flows released from the Carmen Diversion Dam during that previous month and ii) any flows spilled at the Carmen Diversion Dam the previous month that are caused by closure of the Carmen diversion tunnel gate in response to Project-related activities. Average monthly flow at the USGS gage excluding i) and ii) above are collectively referred to as the Monthly Average Base Flow.
 - c) EWEB shall provide any additional flow releases from Carmen Diversion Dam as follows:
 - i) EWEB shall release from Carmen Diversion Dam for a month (the next month) flow in an amount reflecting the difference, if any, determined by subtracting the Monthly Average Base Flow for the previous month in cfs from 160 cfs. EWEB shall release this amount of flow, if any, as a continuous block release for the entire next month, beginning the first day of the month and continuing through the last day of the month.
 - ii) EWEB shall release no less than the 30 cfs specified in Section 4.2.1.1 above from Carmen Diversion Dam in any month.
 - iii) In tabular form to illustrate examples of potential flow release amounts that Subsection 4.2.2.1.3)c)i) above could require EWEB to release, EWEB shall release flow greater than 30 cfs from Carmen Diversion Dam in the next month as shown in Table 4-1 when the Monthly Average Base Flow in the lower Carmen Bypass Reach in the previous month is less than 130 cfs.
 - iv) It is recognized that if the Monthly Average Base Flow for the next month is less than the Monthly Average Base Flow for the previous month, an average of 160 cfs may not be present in the lower Carmen Bypass Reach during that next month.

Table 4-4. Potential flow release amounts at Carmen Diversion Dam.

a. Previous month average flow (cfs)	b. Previous month flow release from Carmen Diversion Dam (cfs)	c. Monthly average base flow for previous month (cfs) [a. minus b.]	d. Next month release = 160 minus monthly average base flow (cfs) [160 minus c.]
165	30	135	30
160	30	130	30
155	30	125	35
150	35	115	45
145	45	100	60*
140	60	80	80*

*Subsection 4.2.2.1.4 below applies.

- 4) EWEB has the option to propose and to file an application for an amendment to the New License with the Commission (Amendment) or a request that the Commission exercise its authority to reopen the New License (Reopener) if the target minimum flow of 160 cfs will not be met for any month after EWEB releases at least a total of 60 cfs from Carmen Diversion Dam. Before filing for an Amendment or a Reopener, EWEB shall implement the following sequential process to attempt to resolve the issue:
 - a) EWEB shall consult with the FWG first to try to reach consensus on the situation.
 - b) If the FWG cannot reach consensus, then EWEB shall initiate dispute resolution as provided in Section 7 of the Settlement Agreement.
 - c) If the FWG does not reach consensus through dispute resolution, EWEB shall request dispute resolution by the Policy Committee.
 - d) If the Policy Committee does not reach consensus after dispute resolution, EWEB may then file an Amendment or a Reopener.
 - e) If the above steps are taken, EWEB’s filing of an Amendment or a Reopener will not be inconsistent with the Settlement Agreement and EWEB can file the Amendment or Reopener and state in its filing that the settlement parties as part of settlement support EWEB’s option to file such an Amendment or a Reopener.
 - f) If EWEB files an Amendment or a Reopener, all parties retain their right to file with FERC to oppose or to support the action that EWEB requests FERC to take in the Amendment or Reopener. Any party’s filing with FERC to oppose or to support the action that EWEB requests FERC to take in the Amendment or Reopener will not be inconsistent with the Settlement Agreement.

4.2.2.2 Adjustment in flow release procedures

In the event that EWEB is required to provide additional flow releases from Carmen Diversion Dam as provided in Section 4.2.2.1.3) above after New License issuance, EWEB shall develop an analysis of the releases from Carmen Diversion Dam in comparison with the flows at the USGS gage described in Section 4.2.2.3 below and provide the analysis to the FWG for review for a minimum period of 30 days. Based on that review and in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, EWEB shall determine if refinement of the release procedures as described in Section 4.2.2.1 above, is warranted to better achieve the

160-cfs minimum target flow in the lower Carmen Bypass Reach, and if so, revise the release procedures in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. If Commission approval or an amendment to the New License is required for the revised release procedures, EWEB shall request Commission approval or file an application for a New License amendment. Upon Commission approval, EWEB shall implement the revised release plan. EWEB shall include with any application for an amendment to the New License all comments filed by members of the FWG during the consultation process, including any statement that the members of the FWG support the application.

4.2.2.3 Funding of USGS gage

Within 3 months after the effective date of the Settlement Agreement, EWEB, in consultation with the USGS and the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall fund work by the USGS as needed to install, to operate, and to maintain for the term of the New License a flow gage in the lower Carmen Bypass Reach, with the gage to be located about 0.4 km (0.2 mi) upstream of Trail Bridge Reservoir, as near to the location of the pressure transducer used in relicensing studies as the USGS determines is feasible. The installation of the gage will include funding for purchase and installation of data acquisition equipment and recording hardware and software as needed to calculate flows on a timely basis, and to document the flow record, and to provide real-time and publicly-accessible data reporting capability.

4.2.2.4 Monitoring near Blue Pool

EWEB shall monitor river elevation in the lower Carmen Bypass Reach downstream of Blue Pool (about 1.4 km [0.8 mi] downstream of Tamolitch Falls) with the existing pressure transducer or equivalent for a five-year period following initiation of the flow releases specified in Section 4.2.1.1 above and installation of the USGS gage described in Section 4.2.2.3 above. EWEB may, in consultation with the FWG, move the existing transducer or equivalent or extend the monitoring period beyond five years. EWEB shall provide raw data and an annual summary of the monitoring data to the FWG each year. EWEB shall also make these data available upon request with reasonable notice as the data are acquired during the year.

4.2.3 Smith Bypass Reach

4.2.3.1 Required flow releases

- 1) EWEB shall take the necessary actions for the term of the New License to provide instream flows in the Smith Bypass Reach within 6 years after New License issuance as follows:
 - a) Provide a minimum block flow release of 10 cfs from the Smith Dam into the Smith Bypass Reach year-round.
 - b) Provide a total minimum block flow release of 35 cfs from the Smith Dam into the Smith Bypass Reach from 16 August through 31 October.
 - c) Ensure total minimum instream flows of 30 cfs from 1 November through 15 April as measured at the USGS gage described in Section 4.2.3.4 below.
 - d) Ensure total minimum instream flows of 25 cfs from 16 April through 15 August as measured at the USGS gage described in Section 4.2.3.4 below.

- e) Provide a greater than 500 cfs channel maintenance flow for at least five hours at least every five years unless a flow of such a magnitude and duration has already occurred during the five-year period. EWEB may adjust the frequency, duration, and magnitude of channel maintenance flows in consultation with the FWG.

The block flow release of 10 cfs provided in Subsection 4.2.3.1.1)a) above is counted in determining compliance with Subsections 4.2.3.1.1)b), c) and d) above.

- 2) EWEB shall monitor compliance with the required block flow release for Subsections 4.2.3.1.1)a) and 1)b) above at the point of release at Smith Dam by determining the amount of the flow release at least every 15 minutes. EWEB shall provide an annual summary of this flow release data to the FWG and the Commission each year (which will be publicly available). EWEB shall provide raw data to the FWG annually. EWEB shall also make these data available upon request with reasonable notice as the data are acquired during the year.
- 3) Commencing on the date EWEB begins the flow releases provided in Subsection 4.2.3.1.1) above, EWEB shall comply with the water quality certification, including its conditions, regarding this measure issued by ODEQ.

4.2.3.2 Pulse flow releases and minor geomorphic modifications

- 1) Any member of the FWG may request that EWEB shape flow releases from Smith Dam to provide pulses of water to enhance accessibility and distribution for spawning Chinook salmon from 16 August through 31 October, provided that the cumulative water released does not exceed the water acre foot cap during that time period (volume equivalent to 35 cfs continuous flow release for 2.5 months). Upon receipt of such a request, EWEB shall convene the FWG at the earliest time reasonably practicable (but not to exceed 5 business days) to review the request and to discuss and develop possible courses of action. If the FWG mutually agrees on a pulse flow to distribute spawning Chinook salmon throughout the Smith Bypass Reach, then EWEB shall implement the pulse flows as soon as reasonably practicable.
- 2) Any member of the FWG may request that EWEB perform a feasibility study concerning potential minor geomorphic modifications in Smith River channel to improve adult Chinook salmon passage. Minor geomorphic modifications are one-time channel modifications performed at a specific location. If the FWG mutually agrees that a feasibility study is warranted, EWEB shall perform the feasibility study. If the FWG mutually determines that the feasibility study indicates the potential minor geomorphic modifications will enhance passage for adult Chinook salmon and will not contribute to destabilization of the river or existing structures and gages, EWEB shall apply for the necessary authorizations to perform the work. When the authorizations are issued and final, EWEB shall perform the work.

4.2.3.3 Flow release structure

EWEB shall design, construct, operate and maintain a system for providing the flow releases required by the New License from Smith Dam to the Smith Bypass Reach. Within 3 years after New License issuance, EWEB shall file for Commission approval a plan and schedule for the flow release system to provide the flow releases from Smith Dam required in Section 4.2.3.1

above. The plan will include a description of the release system, including a minimum capacity of 35 cfs for the flow release system, and any compliance monitoring equipment and its operation. EWEB shall complete construction of the flow release system within 4 years after New License issuance, unless otherwise approved by the Fish Agencies and USDA Forest Service. EWEB shall prepare the plan and schedule in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. Upon Commission approval, EWEB shall implement the plan and schedule.

4.2.3.4 Funding of USGS gage

Within 3 years after New License issuance, EWEB, in consultation with the USGS and the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall file a plan and a schedule for Commission approval to fund work by the USGS as needed to install, to operate and to maintain for the term of the New License a flow and water temperature gage in the Smith Bypass Reach at a location that the USGS determines is feasible. EWEB shall make all reasonably practicable efforts to ensure that the gage will be operable by the time the release structure is operable. The plan will include funding for installation of data acquisition equipment and recording hardware and software as needed to calculate flow and water temperature in the Smith Bypass Reach on a timely basis, and to document the flow and water temperature record, and to provide real-time and publicly-accessible data reporting capability. Data recorded at the gage will be monitored and used to calculate downramping rates in the Smith Bypass Reach, as described in Section 4.2.4 1) d) below. Upon Commission approval, EWEB shall implement the plan.

4.2.4 Spill reduction and ramping in Smith Bypass Reach

- 1) To reduce spill from the Smith Dam into the Smith Bypass Reach, EWEB shall follow the Operational Guidelines for Smith Reservoir and Bypass Reach in Attachment C subject to adjustment of the Operational Guidelines and also operation of the Project in a manner designed to protect public health and safety, property, and the environment. To reduce spill from the Smith Dam into the Smith Bypass Reach and to limit Project-induced downramps in the Smith Bypass Reach, EWEB shall:
 - a) Run the Carmen Powerhouse at “speed no load” to divert up to 300 cfs of water from Smith Reservoir to Trail Bridge Reservoir when Carmen Powerhouse generation must be interrupted and EWEB reasonably determines it is necessary to avoid spills at Smith Dam.
 - b) Install and operate a minimum 800 cfs turbine bypass valve at the Carmen Power Plant to divert a minimum of 800 cfs of water from Smith Reservoir to Trail Bridge Reservoir when EWEB reasonably determines it is necessary to avoid spills at Smith Dam. Within 12 months after New License issuance, EWEB, in consultation with the FWG and subject to approval of the Fish Agencies and USDA Forest Service, shall prepare and file for Commission approval a plan and schedule for design, construction, operation, and maintenance of the turbine bypass valve. The schedule will provide that the turbine bypass valve will be completed within 5 years after New License issuance. Upon Commission approval, EWEB shall implement the plan and schedule.
 - c) Control flow releases from the Smith Dam Spillway Gate to limit downramp rates at the end of Project-induced spill events in the Smith Bypass Reach to 3" per hour as measured at the USGS gage described in Section 4.2.3.4 above.

- d) Control flow releases from the Smith Dam Spillway Gate to limit downramp rates at the end of all other spill events in the Smith Bypass reach not covered in d) above to 3" per hour as measured at the USGS gage described in Section 4.2.3.4 above to the extent reasonably practicable, recognizing that during storm events flow releases must be conducted with priority for protection of public safety and project facilities including the Smith and Trail Bridge dams.
- 2) EWEB shall monitor and measure gate opening and reservoir elevation for Smith Reservoir and spillway. EWEB shall provide raw gate opening and reservoir elevation data (and appropriate rating curve) to the FWG each year. In addition, EWEB shall provide an annual summary to the FWG each year that includes frequency, duration, magnitude, and date of occurrence of spill events at Smith Dam. EWEB shall also make these data available upon request with reasonable notice as the data are acquired during the year.

4.3 Habitat Protection, Mitigation, and Enhancement

4.3.1 Upper Carmen Bypass Reach

4.3.1.1 Objectives

The overall goal of this plan is to support a population of native cutthroat trout in upper Carmen Bypass Reach. Supporting a cutthroat trout population will require cooperation among interested parties, primarily EWEB and ODFW. EWEB has established the following objectives for fish and habitat protection, mitigation, and enhancement in the upper Carmen Bypass Reach:

- 1) Support native cutthroat trout population.
- 2) Control of non-native brook trout population.
- 3) Maintain sufficient spawning gravel to meet cutthroat trout management objectives described in this plan.
- 4) Provide passage at Carmen Diversion Dam if criteria described in this plan are met.

4.3.1.2 Description of element

- 1) EWEB shall develop a comprehensive implementation plan and schedule for fish and habitat measures in the upper Carmen Bypass Reach not later than 6 months after New License issuance. EWEB shall develop the plan and schedule, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. The plan will include the following, and shall be consistent with all subsections contained in Section 4.3.1 of this Aquatics Management Plan:
 - a) Schedule of implementation,
 - b) Cutthroat and brook trout population monitoring plan,
 - c) Brook trout control plan,
 - d) Coordination between trout monitoring and brook trout control, and
 - e) Spawning gravel monitoring plan.

Upon Commission approval, EWEB shall implement the plan.

- 2) Brook trout population control in the upper Carmen Bypass Reach and Carmen Diversion Reservoir will be a shared responsibility of EWEB and ODFW. EWEB shall provide to ODFW 50% of the annual funds necessary¹⁰ to implement the brook trout control plan and ODFW shall provide 50% of funds¹¹ to implement the plan. ODFW will submit to EWEB, by 1 January, a budget and request for funds for that years brook trout control effort. EWEB's contribution to and ODFW's implementation of the brook trout population control plan will begin as soon as reasonably practicable after License issuance. Brook trout control measures will be implemented annually (or less frequently) for a minimum of 10 years and a maximum of 14 years from New License issuance.
- 3) If EWEB constructs a small fish ladder for cutthroat trout as described in Section 5) below, EWEB shall monitor the cutthroat and brook trout populations once every ten years after the ladder is constructed. EWEB will, in consultation with the Fish Working Group and subject to approval by the Fish Agencies and USDA Forest Service, determine if brook trout population control is warranted using criteria in 5) a, below as guidance. EWEB will fund brook trout control as provided above for no more than two years following each 10-year monitoring event.
- 4) EWEB anticipates that ODFW, at its discretion, may release cutthroat trout in the upper Carmen Bypass Reach in an effort to establish a self-sustaining population. EWEB is not responsible for any funding of cutthroat trout stocking efforts.
- 5) No sooner than the 10th year and no later than the 15th year after New License issuance, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, EWEB shall design, consistent with ODFW fish passage criteria (OAR 635-412-0035 as attached in Attachment D), and construct, operate, and maintain a small (5–10 cfs) fish ladder at the Carmen Diversion Dam, for the purpose of supporting safe, timely, and effective upstream passage of native migratory cutthroat, if brook trout control efforts, and fish population monitoring implemented by EWEB and ODFW indicate that:
 - a) The ratio of cutthroat trout (>150 mm) to brook trout (>150 mm) in the upper Carmen Bypass Reach downstream of Carmen Diversion Dam is no less than 1:1 (i.e., 1 native cutthroat trout for every brook trout) for at least two consecutive years and without the stocking of cutthroat trout.
 - b) A cutthroat trout population consisting of fry and juvenile (1+) four years after the last release of cutthroat or at least two pairs of actively spawning natural (i.e., not stocked) adults is documented for at least two consecutive years.

If the criteria described in 5) a) and b) above are not met by the 15th year after License issuance, EWEB shall cease funding of brook trout control and implementation of

¹⁰ The annual budget will be based on costs for personnel, supplies and services, travel, and ODFW indirect rates.

¹¹ ODFW anticipates utilizing existing district staff, vehicles, and supplies.

cutthroat and brook trout population monitoring, and EWEB's obligation to design, construct, operate, and maintain a ladder at Carmen Diversion Dam will end.

If the criteria described in 5) a. and b. above are met by the 15th year of the License, EWEB shall, within 6 months, prepare in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, and file with the Commission a plan and schedule for the construction of the ladder at Carmen Diversion Dam. Upon Commission approval, EWEB shall implement the plan and schedule.

The determination under this section whether the criteria in the Section 5) a) and b) above are met or not met shall be made in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service.

4.3.1.3 Hydraulic and biological evaluation of fish passage facilities

If EWEB constructs the Carmen Diversion Dam fish ladder, EWEB shall conduct hydraulic and biological monitoring to verify that the ladder functions as designed. Within 6 months after EWEB's completion of construction of the ladder, EWEB shall prepare, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, and file with the Commission a plan(s) and schedule to conduct hydraulic and biological monitoring of the ladder (Monitoring Plan). Within 6 months after EWEB's completion of the implementation of the Monitoring Plan, EWEB shall prepare a report(s) documenting the results of the monitoring and the data collected. EWEB shall evaluate hydraulics by confirming that the as-built facilities function as designed for the Carmen Diversion Dam fish ladder. After consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, EWEB shall file the report with the Commission. If EWEB's implementation of the Monitoring Plan verifies that the fish ladder functions as designed, no further hydraulic or biological monitoring by EWEB is required.

If EWEB constructs the Carmen Diversion Dam fish ladder, within 6 months after EWEB's completion of the implementation of the Monitoring Plan for the Carmen Diversion Dam ladder, EWEB shall prepare, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, and file with the Commission an Operations and Maintenance Plan to provide for the operation of the fish ladder. EWEB shall base the Operations and Maintenance Plan on the results of the Monitoring Plan. Upon Commission approval, EWEB shall implement the Operations and Maintenance Plan.

4.3.1.4 Fish passage biological monitoring and adaptive management

As provided in Subsection 4.3.1.3 above, EWEB shall prepare, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, and file with the Commission a plan and schedule for an upstream passage study to confirm that the Carmen Diversion Dam fish ladder is operating as designed. In general, the plan will provide for the capture, tagging, and release of fish at a site downstream of the Carmen Diversion Dam fish ladder entrance. The plan will further provide for EWEB to use PIT tags or other appropriate technology as determined by EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, to track native migratory cutthroat trout through the fish ladder. EWEB shall develop the plan and schedule based on the seasonal pattern of passage timing by adult native

migratory cutthroat trout at the fish ladder. EWEB shall provide in the plan a measure(s) for recording the migration rate of individual native migratory cutthroat trout through the Carmen Diversion Dam fish ladder.

4.3.1.5 Study implementation and reporting

EWEB shall implement the plan and schedule and annually report to the FWG. EWEB shall prepare a written report on plan implementation, in consultation with the FWG and approval by the Fish Agencies and USDA Forest Service, and file the report with the Commission along with comments by members of the FWG and how EWEB addressed or responded to the comments.

If, based on the results from EWEB's implementation of the plan and schedule, the Carmen Diversion Dam fish passage facilities are not operating as designed, EWEB shall prepare a plan and schedule for minor modifications or additions to the fish ladder or operations designed to improve upstream passage conditions. After consultation with the FWG and approval by the Fish Agencies and USDA Forest Service, EWEB shall file with the Commission a schedule and plan for implementing modifications or additions to the fish ladder or operations. Upon Commission approval, EWEB shall implement the schedule and plan.

4.3.1.6 Monitoring, maintenance, and contingency actions

The objectives of this plan will be implemented and maintained through two monitoring actions conducted by EWEB: 1) fish population monitoring, and 2) spawning gravel availability monitoring, each of which is described below.

EWEB shall include in its comprehensive implementation plan for the upper Carmen Bypass Reach, implementation of the following monitoring activities, which are designed to assess population estimate, enumerate population age structure, identify the number of spawners, if possible, and quantity of spawning gravel for cutthroat trout. EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service, implement these monitoring activities.

4.3.1.7 Fish population monitoring

EWEB shall monitor cutthroat and brook trout populations in the Carmen Diversion Reservoir and upper Carmen Bypass Reach from Carmen Diversion Dam downstream to the limit of the anticipated inundated habitat delineated in Figure 4-1, but not further than transect #1 located at the bedrock lip marked on the same figure, annually, beginning the year after License issuance and continuing through the 15th year after License issuance.

EWEB shall develop the methods used for monitoring in the comprehensive implementation plan described in Section 4.3.1.2. The results of fish population monitoring will determine if conditions warrant construction of a fish ladder, as described in Section 4.3.1.2.

4.3.1.8 Spawning gravel availability monitoring

EWEB shall document suitable cutthroat trout spawning habitat in the upper Carmen Bypass Reach in the 4th, 5th, and 6th years after EWEB implements the 30 cfs continuous flow release from Carmen Diversion Dam. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall develop and implement a plan to measure the

amount of cutthroat trout spawning habitat present in the upper Carmen Bypass Reach during the three-year period. The surface area (m²) of suitable spawning habitat averaged over the three-year period will be the Performance Standard for the upper Carmen Bypass Reach.

EWEB shall conduct monitoring of spawning gravel availability every 5 years. If the amount of spawning area drops below 85% of the Performance Standard, EWEB shall augment spawning gravel to achieve the Performance Standard. Augmented gravel will be placed directly downstream of the Carmen Diversion Dam (Site 1 on Figure 4-1; approximately 25% of total) and at Site 2 directly downstream of transect #7 on Figure 4-1 (approximately 75% of total). Criteria for spawning gravel, and methods to document and monitor gravel will be developed in the comprehensive implementation plan, as described in Section 4.3.1.2. EWEB may adjust the gravel distribution, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, based on spawning gravel monitoring results.

EWEB's obligation to monitor cutthroat trout spawning gravel and maintain the gravel Performance Standard will continue past the 15th year and for the duration of the License only if the conditions for constructing the ladder as described above are met and the ladder is built.

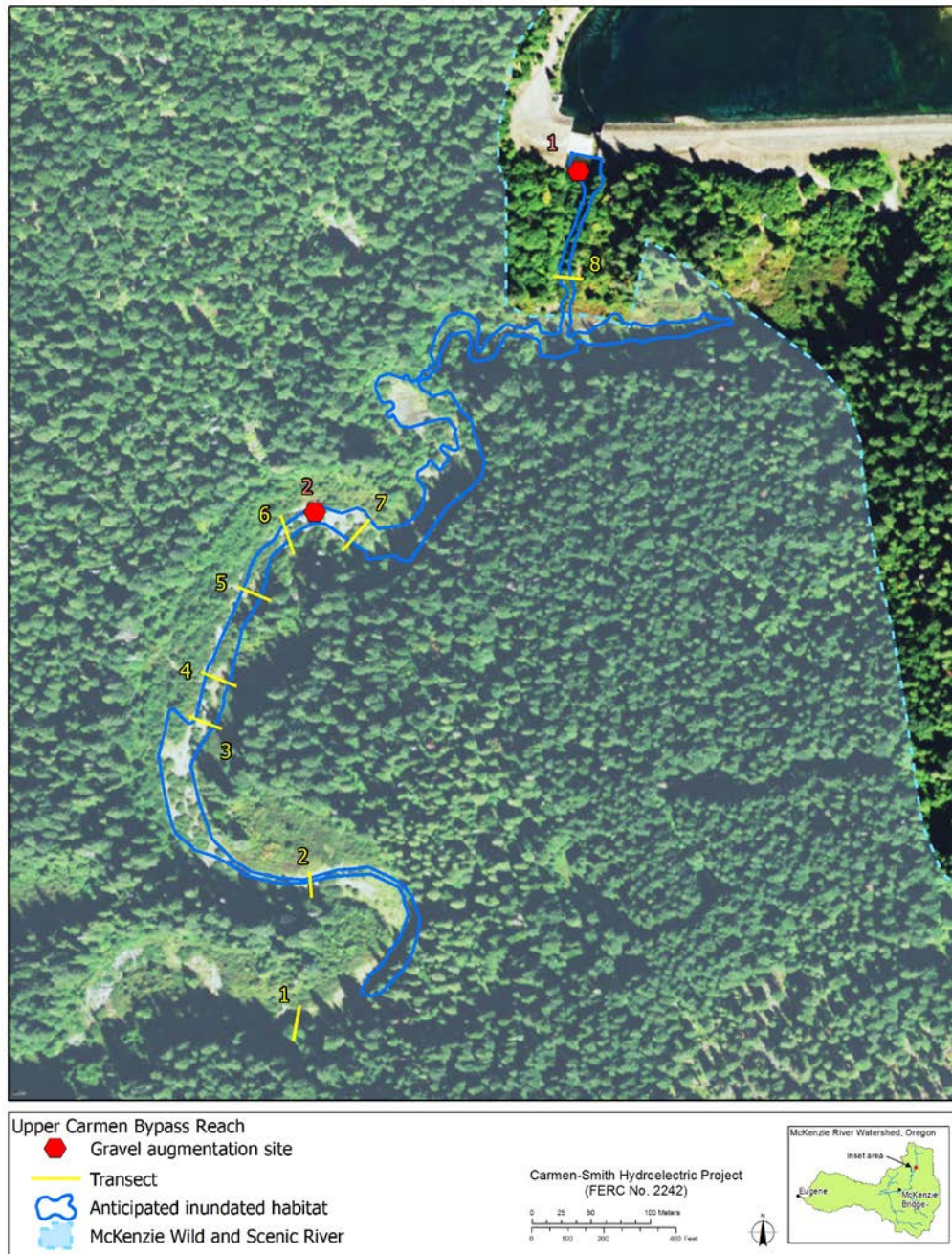


Figure 4-1. Anticipated inundated habitat within the upper Carmen Bypass Reach from a continuous 30 cfs spill, and gravel augmentation sites.

4.3.2 Lower Carmen Bypass Reach

4.3.2.1 Objectives

EWEB's goal for the implementation of habitat measures in lower Carmen Bypass Reach is to increase the area of spawning habitat for spring Chinook salmon throughout the reach to a minimum of 300 m², if reasonably practicable, and then to maintain this amount (or higher as described below) of spawning habitat for the term of the New License.

Additionally, if EWEB is unable to achieve the minimum spawning habitat in Smith River of 320 m², then EWEB will evaluate whether any reasonably practical opportunities exist to increase Spawning Habitat in lower Carmen Bypass Reach as described in Sections 4.3.5.3 and 4.3.5.5.

To achieve this goal, EWEB shall implement the following actions:

- 1) Addition of gravel in the lower Carmen Bypass Reach as described in Section 4.3.2.2 below;
- 2) Placement and maintenance of a large woody debris (LWD) average frequency of at least 80 pieces per mile in the lower Carmen Bypass Reach between Trail Bridge Reservoir and the confluence with Kink Creek as described in Section 4.3.2.2 below; and
- 3) Provision of the required flow release as described in Section 4.2.2 above.

Although not quantitatively defined, the lower Carmen Bypass Reach habitat measures EWEB implements will also increase rearing and other habitat (in addition to spawning habitat for Chinook salmon) for Chinook salmon, bull trout, other native fish species, and macroinvertebrate forage for these fish within the reach. EWEB, in consultation with the FWG, shall consider, but shall have no independent obligation to increase, rearing and other habitat for native fish species in the lower Carmen Bypass Reach in the design and implementation of habitat measures and in its evaluation and consideration of the results from the monitoring of habitat measures.

4.3.2.2 Description of element

- 1) EWEB shall develop a comprehensive implementation plan and schedule for habitat measures in the lower Carmen Bypass Reach not later than 3 years after New License issuance. EWEB shall develop the plan and schedule in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. Upon USDA Forest Service approval, EWEB shall implement the plan and schedule. The plan will include the following and be consistent with all subsections contained in Section 4.3.2 of this Aquatics Management Plan:
 - a) schedule for the implementation (developed after any additional field inventory, determination of access needs, and resulting timing considerations). The schedule will provide that the licensee shall complete "Phase I" (Section 4.3.2.3) within 7 years after New License issuance unless the licensee implements any of the adaptive management provisions in Section 4.3.2 (e.g., Section 4.3.2.3 Phase I evaluation 2)) and the licensee shall initiate implementation of "Phase II" (Section 4.3.2.4), if applicable, within 1 year after the completion of Phase I,
 - b) the quantity and dimensions of materials (consistent with USDA Forest Service standards for LWD, as described in Section 4.3.2.4) to be used in habitat measures,

- c) location of all measures and delivery methods (e.g., motorized wheel barrow, cable yarded bucket, helicopter),
 - d) plans for providing and managing road access and staging areas for gravel augmentation sites, and
 - e) additional monitoring and maintenance details regarding spawning/habitat criteria and LWD placement.
- 2) In the plan and schedule, EWEB shall provide for implementation in two phases as described in 4.3.2.3 Phase I and 4.3.2.4 Phase II below.

4.3.2.3 Phase I

Phase I implementation

- 1) EWEB’s objective for Phase I will be to maximize the creation of Chinook salmon spawning habitat through careful placement of augmented gravel, followed by an evaluation of the response of the augmented gravel to flow. EWEB shall perform the following actions during Phase I of the gravel augmentation implementation:
- a) Conduct a pre-implementation inventory of the lower Carmen Bypass Reach, recording the size and location of all spawning habitat within the specified criteria values in Table 4-2 below within the reach. Calculate the total spawning habitat area within the criteria values.
 - b) Place 200 tons of gravel at sites selected by EWEB in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. EWEB shall determine, in consultation with the FWG, if additional field work is needed to identify these sites.
 - c) In the site selection process, EWEB shall consider the following items:
 - i) Sites will be selected to represent “careful placement,” which is intended to maximize development of spawning habitat with the augmented gravel while considering and attempting to retain the natural hydraulics of the reach channel. These sites are likely to be in velocity shadows near boulders and outside of high-velocity mid-channel areas.
 - ii) Quantities of gravel placed should be designed to minimize potential adverse effects to the reach channel such as bank cutting.
 - iii) The vehicular access, and staging area needs for any gravel placement methods will be considered in selecting sites. Methods for gravel placement may include (either or both) helicopter or ground-based systems. Ground-disturbing activities necessary for gravel augmentation will be coordinated with the USDA Forest Service. All ground-disturbing activities will be kept as minimally invasive as reasonably practicable, and will be subject to cultural resource, botanical, and other required surveys. All access and staging areas will be on the east side of the reach. No new permanent roads will be built for gravel augmentation purposes. Some incidental tree removal may be needed to create temporary access roads and staging areas. Any new temporary roads will remain on the terrace above the reach, will not enter the inner gorge of the reach, will not be observable from the reach surface or bank, and will not cross any streams.

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- iv) Road management requirements during implementation will be determined by the USDA Forest Service, as reasonably necessary to be consistent with recreation, riparian, and other resource needs (see also Section 4.5 of the *Roads, Waste Areas and Staging Areas Management Plan* [Martha Goodavish Planning & Design and Stillwater Sciences 2008]). Temporary roads will remain closed to public vehicular use except when opened for gravel augmentation activities, which are expected to last for between three and thirty days once every five to ten years. Closure barriers will be constructed using natural materials. Between periods of use, temporary access areas (including roads and landings) will be left in a self-maintaining condition that does not result in delivery of fine sediments to stream channels, and could include appropriate water bar installation. Revegetation such as light scarification (1 inch to 3 inches deep) and seeding with native grass species will be conducted when determined appropriate by the USDA Forest Service based on ground conditions and expected needs for future use, while allowing for possible future access for gravel augmentation efforts as needed.
- d) Within one year after EWEB completes gravel augmentation, EWEB shall release a smoothing flow from Carmen Diversion Dam designed to level and to distribute the augmented gravel into a configuration hydraulically consistent with the local topography (i.e., minimizing raising the reach bed profile with gravels which might mobilize under moderate flows because of exacerbated bed shear stress and scour)—hereafter referred to as an “even” distribution. This smoothing flow release will consist of at least one release from Carmen Diversion Dam of 1,000 cfs or greater as measured at the USGS gage described in Section 4.2.2.3 above. The smoothing flow duration will be at least 8 hours. If EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, determines that manual redistribution of gravel is warranted, EWEB shall perform localized manual redistribution of gravel.
- e) EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall determine if a second “smoothing flow” release is necessary, and the magnitude of this second smoothing flow, based on observations and results from the first smoothing flow release. If the first smoothing flow results in a generally even distribution of gravel at the augmented gravel sites, EWEB will not provide a second release. If the first smoothing flow does not result in a generally even distribution of gravel at the augmented gravel sites, EWEB shall provide a second release of 1,000 cfs or greater, as measured at the USGS gage described in Section 4.2.2.3 above, and shall adjust the magnitude and duration of this second flow release as needed to smooth the augmented gravel. If EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, determines that manual redistribution of gravel on a lesser scale is warranted, EWEB shall perform localized manual redistribution of gravel.

Table 4-5. Spring Chinook salmon spawning habitat criteria values used to enumerate total spawning habitat.

Minimum patch size	Water velocity	Water depth	Substrate (D ₅₀)
1.3 m ² (14 ft ²); minimum of 0.9 m (3 ft) wide	0.2 to 0.8 m/s (0.8 to 2.5 ft/s)	≥ 0.2 m (≥ 0.8 ft)	10 to 50 mm (0.4 to 2.0 in)

Phase I evaluation

- 1) EWEB’s objective for the Phase I evaluation is to inform Phase II implementation design by assessing how well augmented gravel in the lower Carmen Bypass Reach is being retained in useable areas and patch sizes to provide spawning habitat that meets criteria for Chinook salmon in the spawning season, whether selected sites and placement methods resulted in efficient use of the gravels, and whether geomorphologic constraints (e.g., reach steep channel gradients or strongly confined channel) or other reasons beyond the reasonable control of EWEB are limiting the potential for creating spawning habitat. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall evaluate and provide a report on the results of the Phase I gravel augmentation.

- 2) EWEB shall perform evaluations within one year after EWEB completes the smoothing flow event(s) described in Subsections 4.3.2.3.1)d) and e) above and after at least one 5-year flow of 1,200 cfs or greater to determine the response of augmented gravel to a naturally-occurring high flow event. To ensure this flow occurs as soon after placement as possible, EWEB shall close the Carmen Diversion gate during the appropriate high flow event. If a flow event of greater than 1,900 cfs occurs during an evaluation period, EWEB shall evaluate the effect of the flow event on augmented gravel and, in consultation with the FWG and subject to approval by the Fish Agencies and the USDA Forest Service, prepare and implement a plan for corrective actions. The plan will be subject to 10-year gravel limitation of 750 tons as described in Section 4.3.2.5.3)b).

- 3) EWEB shall perform the following for the evaluation:
 - a) Conduct a post-placement inventory of spawning habitat in the reach, recording specific patch location and size meeting the criteria valves in Table 4-2, and recording features influencing the hydraulic characteristics of the successful patches.
 - b) Record the flow at the time of the inventory.
 - c) Determine the total criteria habitat spawning area based on specific augmented gravel sites and reach-wide.
 - d) Compare the location and size of spawning habitat patches with the pre-Phase I implementation inventory to assess factors influencing the success and failure of augmented gravel sites.

Phase I decisions

Based on the evaluation of the results of the Phase I gravel augmentation, EWEB shall take the following actions:

- 1) Fully successful. If Phase I augmentation results in a minimum of at least 300 m² of Chinook criteria spawning habitat reach-wide, then EWEB is not obligated to implement any additional gravel augmentation. EWEB shall implement the actions provided in Section 4.3.2.5 below with the amount of criteria spawning habitat up to a maximum of 400 m² established as the Long-Term Maintenance Standard; or
- 2) Partially successful. If Phase I augmentation results in the creation of at least 50 m², but less than a total of at least 300 m² of Chinook salmon criteria spawning habitat, at gravel augmentation sites, then EWEB shall implement Phase II below; or
- 3) Unsuccessful. If Phase I augmentation results in the creation of less than 50 m² of Chinook salmon criteria spawning habitat at gravel augmentation sites, then EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall develop, within 1 year, an alternative evaluation plan which will include a schedule for completing next steps. Those next steps may include, but are not limited to:
 - a) An evaluation of the results of gravel movement and deposition to determine if the movement of augmented gravel indicates that continued augmentation in Phase II below with a reduced Long-Term Maintenance Standard should be implemented; or
 - b) An evaluation of habitat that is actively used by spawning Chinook salmon within the lower Carmen Bypass Reach, but that is not within the criteria values in Table 4-2 below, including the area of the lower Carmen Bypass Reach inundated by the daily water surface elevation fluctuations of Trail Bridge Reservoir. Based on that evaluation, EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, may designate and count toward the 300 m² spawning habitat minimum any habitat that is not within the stated criteria if the non-criteria habitat is equally producing fry relative to criteria habitat (not significantly different at an alpha value of 0.05 between production of fry from redds in criteria and non-criteria habitat). If the spawning habitat including the non-criteria habitat, equals at least 300 m² of habitat, EWEB shall implement the actions in Section 4.3.2.5 below with the amount of spawning habitat up to a maximum of 400 m² established as the Long-Term Maintenance Standard. If the spawning habitat, including the non-criteria habitat that is “equally producing” as provided in this paragraph b), is less than 300 m², then EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall add additional gravel as necessary to achieve a minimum of 300 m² (total) spawning habitat in the lower Carmen Bypass Reach. Steps a) and b) will be completed before going to Step c).
 - c) EWEB shall prepare, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, an evaluation and report on whether geomorphologic constraints (e.g., steep reach channel gradients or strongly confined channel) or other reasons beyond the reasonable control of EWEB are limiting the potential for creating spawning habitat. If the

determination is made that the geomorphic constraints or other reasons beyond the reasonable control of EWEB are limiting the potential for achieving the amount of spawning habitat designated in a) and b), EWEB is not obligated to augment any additional gravel in the lower Carmen Bypass Reach.

4.3.2.4 Phase II

Phase II implementation

EWEB's objective for Phase II is to create a total of 300 to 400 m² of Chinook salmon spawning habitat in the lower Carmen Bypass Reach. EWEB shall implement Phase II within one year after EWEB's completion of the Phase I evaluation and report unless EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, determines a different time period should be used. EWEB shall be responsible for the following actions in Phase II, based on EWEB's evaluation report concerning the results from Phase I described above:

- 1) EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall develop a Phase II gravel augmentation plan as an addendum to the comprehensive implementation plan for habitat enhancements in the lower Carmen Bypass Reach described above.
- 2) EWEB shall determine Phase II gravel placement at sites based on the results of the Phase I gravel augmentation and previous studies of the reach. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall select the additional sites for Phase II gravel augmentation.
- 3) EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall augment up to a maximum of 800 tons of gravel in Phase II as needed to provide at least 300 m² of spawning habitat.
- 4) Within one year after EWEB's completion of Phase II gravel placement, EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall implement the actions provided in Phase I implementation Subsections 4.3.2.2.2)d) and e) above as needed to smooth the augmented gravel.

Phase II evaluation

- 1) After EWEB completes the smoothing flow(s) and any manual localized redistribution of augmented gravel for Phase II, EWEB shall evaluate the increased and total amount of Chinook salmon criteria spawning habitat in lower Carmen Bypass Reach during fall spawning flows as compared with the Phase I results. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall evaluate and provide a report on the results of the Phase II gravel augmentation.
- 2) EWEB shall perform the following for the evaluation:
 - a) Conduct a post-placement inventory of spawning habitat in the reach, recording specific patch location and size meeting the criteria values in Table 4-2, and recording features influencing the hydraulic characteristics of the successful patches.

- b) Record the flow at the time of the inventory.
- c) Determine the total criteria habitat spawning area, and the amount that area has increased since EWEB completed Phase I.
- d) Compare the location and size of spawning habitat patches with the Phase I results to assess factors influencing the success and failure of augmented gravel sites.

Phase II decisions

Based on the evaluation of the results of Phase II gravel augmentation, EWEB shall take the following actions:

- 1) Fully successful. If Phase II augmentation results in a minimum of at least 300 m² of Chinook salmon spawning habitat reach-wide, then EWEB shall implement the actions in Section 4.3.2.5 below with the amount of spawning habitat up to a maximum of 400 m² established as the Long-Term Maintenance Standard; or
- 2) Partially successful. If Phase II augmentation results in less than a total of 300 m² total of Chinook salmon spawning habitat reach-wide, then EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA-Forest Service, shall develop, within 1 year, an alternative plan which will include a schedule for completing next steps. Those next steps may include, but are not limited to:
 - a) Establishment of a lower amount of Chinook salmon spawning habitat as the Long-Term Maintenance Standard, or,
 - b) An evaluation of habitat that is actively used by spawning Chinook salmon within the lower Carmen Bypass Reach, but that is not within the criteria values in Table 4-2 below, including the area of the lower Carmen Bypass Reach inundated by the daily water surface elevation fluctuations of Trail Bridge Reservoir. Based on that evaluation, EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, may designate and count toward the 300 m² spawning habitat minimum any habitat that is not within the stated criteria if the non-criteria habitat is equally producing fry relative to criteria habitat (not significantly different at an alpha value of 0.05 between production of fry from redds in criteria and non-criteria habitat). The Long-Term Maintenance Standard for purposes of Section 4.3.2.5 will then be established as the counted non-criteria habitat plus the criteria habitat up to a maximum of 400 m². Steps a) and b) will be completed before going to Step c).
 - c) EWEB shall prepare, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, an evaluation and report on whether geomorphologic constraints (e.g., steep reach channel gradients or strongly confined channel) or other reasons beyond the reasonable control of EWEB are limiting the potential for creating spawning habitat. If the determination is made that these geomorphic constraints or other reasons beyond the reasonable control of EWEB are limiting the potential for achieving the amount of spawning habitat designated in a) and b), EWEB is not obligated to augment any additional gravel in the lower Carmen Bypass Reach.

4.3.2.5 Monitoring, maintenance and contingency actions**1) Monitoring Frequency**

- a) EWEB shall include in its comprehensive implementation plan for the lower Carmen Bypass Reach the following periodic monitoring and maintenance activities for the term of the New License, which are designed to ensure spawning habitat standards and LWD standards (as provided in Section 4.3.2.6 below) are maintained. EWEB shall commence implementation of these monitoring and maintenance activities in the fall of the calendar year after both: (a) the Long-Term Maintenance Standard is established and (b) the first 1,200 cfs (5-year recurrence interval) event or 5-year period (whichever is more frequent). EWEB shall continue to perform monitoring after any 1,200 cfs event or after 5 years (whichever is more frequent) for the New License term, with additional gravel augmentation to be completed within one year after EWEB completes the habitat monitoring if the total habitat present is below the Long-Term Maintenance Standard.

2) Monitoring Performance

- a) EWEB shall conduct a post-placement inventory of the reach, recording specific patch location and size meeting the criteria values in Table 4-2 or satisfying the requirements of Subsection 4.3.2.3 Phase I decisions 3) c) as demonstrated in Phase I or Phase II, and the flow at the time of the inventory. EWEB shall determine the total spawning criteria and non-criteria area. EWEB shall compare the location and size of spawning habitat patches with the results of the immediately previous monitoring.

3) Decisions based on monitoring results.

EWEB shall take the following actions based on the results of monitoring:

- a) Long-Term Maintenance Standard achieved. If the total amount of spawning habitat is at least equal to the Long-Term Maintenance Standard, EWEB is not obligated to take any action in the lower Carmen Bypass Reach until EWEB performs the next required monitoring.
- b) Long-Term Maintenance Standard not achieved. If the total amount of spawning habitat is less than the Long-Term Maintenance Standard, EWEB shall augment gravel within the reach to attempt to achieve the standard. EWEB's obligation to augment gravel will not exceed a total of 750 tons in any 10-calendar year period.
 - i) EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, may develop an alternative plan for long-term management if either of the two following conditions occurs:
 - 1') If monitoring results indicate a total of less than 300 m² of spawning habitat during each of three successive monitoring events, or
 - 2') If flows during any 5-year period are not greater than 1,200 cfs and the total amount of spawning habitat is reduced from the

Long-Term Maintenance Standard at the beginning of the five-year period to less than 125 m² at the end of the period.

- ii) The alternative plan for long-term management will describe the next steps, which may include, but are not limited to:
 - 1') A determination if a reduced Long-Term Maintenance Standard is appropriate based on information to date; or
 - 2') An evaluation of habitat that is actively used by spawning Chinook salmon within the lower Carmen Bypass Reach, but that is not within the criteria values in Table 4-2 below, including the area of the lower Carmen Bypass Reach inundated by the daily water surface elevation fluctuations of Trail Bridge Reservoir. Based on that evaluation, EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, may designate and count toward the 300 m² spawning habitat that is not within stated criteria if the non-criteria habitat is equally producing fry relative to criteria habitat (not significantly different at an alpha value of 0.05 between production of fry from redds in criteria and non-criteria habitat). If the spawning habitat, including the non-criteria spawning habitat is less than 300 m², then EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall add additional gravel (subject to the 10-year gravel limitation) as necessary to achieve a minimum of 300 m² (total) of Chinook salmon spawning habitat in lower Carmen Bypass Reach. Steps 1') and 2') will be completed before going to Step 3').
 - 3') EWEB shall prepare, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, an evaluation and report on whether geomorphologic constraints (e.g., steep reach channel gradients or strongly confined channel) or other reasons beyond the reasonable control of EWEB are limiting the potential for creating spawning habitat. If the determination is made that these geomorphic constraints or other reasons beyond the reasonable control of EWEB are limiting the potential for achieving the amount of spawning habitat designated in 1') and 2'), EWEB is not obligated to augment any additional gravel in the lower Carmen Bypass Reach.

4.3.2.6 Large woody debris monitoring and maintenance

EWEB shall perform visual surveys of LWD in the lower Carmen Bypass Reach between Trail Bridge Reservoir and the confluence with Kink Creek during the monitoring described in Section 4.3.2.5 to determine the frequency of LWD per mile in the reach. EWEB shall count all LWD \geq 40 feet long and \geq 24 inches diameter (Qualifying LWD), which are either wholly or partially within the lower Carmen Bypass Reach bankfull channel. EWEB shall also count as Qualifying LWD, LWD with attached rootwads if they are less than 40 feet in length but are still equal to or greater than 24 inches in diameter. If, based on a visual survey, the overall average frequency of Qualifying LWD is less than 80 pieces per mile, EWEB shall implement actions within 2 years to

increase the Qualifying LWD average frequency to 80 pieces per mile, unless EWEB determines, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, that the additional LWD is not necessary.

4.3.3 Carmen Diversion Reservoir

4.3.3.1 Objectives

The objective of this plan element is to increase habitat quality and quantity for juvenile and adult native cutthroat trout to increase their abundance in Carmen Diversion Reservoir and maintain these habitat structures for the term of the New License.

4.3.3.2 Description of element

EWEB shall develop a comprehensive implementation plan and schedule for habitat structures in Carmen Diversion Reservoir not later than 12 months after New License issuance. EWEB shall develop the plan and schedule in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. Upon Commission approval, EWEB shall implement the plan and schedule. The plan will include:

- 1) type of materials to be used (boulders and/or anchored Large Woody Debris (“LWD”), stumps/root wads, brush bundles),
- 2) timing of implementation, such that the habitat structures would be placed within 3 years after New License issuance,
- 3) source of materials,
 - a) LWD salvaged at the booms and dam will be used to the extent possible, based on the large woody debris management plan (Section 4.5),
- 4) volume and size of materials,
- 5) configurations (including construction drawings/design) and locations for the placement of materials,
- 6) method of placement of materials,
- 7) detailed long-term monitoring, maintenance, and contingency activities, and
- 8) considerations for recreation and aesthetic interests.

EWEB shall determine, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, locations for habitat structures. Determination of habitat structure site locations will consider the following:

- evaluation of the possibility of relocating (adult) habitat structures from the proposed area in the NW part of the reservoir to the eastern end of the reservoir to avoid popular fishing areas

- identification of the most popular bank fishing spots to direct juvenile habitat structures away from these sites so there is less impact to anglers from this mitigation measure

EWEB shall install no more than a total of 15 habitat structures, for both adult and juvenile cutthroat trout in Carmen Diversion Reservoir. The installed habitat structures are intended to be dispersed throughout the reservoir and of low profile.

EWEB, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall define what constitutes a structure (e.g., number/material type/complexity and an agreed upon distance/spacing apart).

Adult cutthroat habitat structures

The goal of the adult habitat structures is to improve the quality and quantity of habitat for adult native cutthroat trout. The habitat structures are intended to increase adult cutthroat trout abundance; however, increases in abundance are not a measurable objective leading to maintenance actions. EWEB shall provide adult habitat structures in the form of LWD, stumps/root wads, or boulders anchored along the reservoir bottom. EWEB shall, in consultation with the FWG and subject to approval by Fish Agencies and USDA Forest Service, select up to 15 sites for adult habitat structures, recognizing that the total number of adult and juvenile structures combined will not exceed 15. In general, adult habitat structures may be placed where cutthroat trout were observed during the *Fish Population Distribution and Abundance* study (Stillwater Sciences 2006a), as shown in Figure 4-2. Habitat structures will provide cover and ambush habitat for cutthroat trout on relatively flat or moderately sloped substrate. Habitat structures will be placed at a sufficient depth to minimize the potential for boating accidents, and will be designed for complexity, stability, and longevity.

Shallow-water habitat structures

The goal of the juvenile habitat structures is to improve the quality and quantity of habitat for fry and juvenile cutthroat trout. The habitat structures are intended to increase juvenile cutthroat trout abundance; however, increases in abundance are not a measurable objective leading to maintenance actions. EWEB shall provide juvenile habitat structures in the form of LWD, stumps/root wads, cobbles, boulders, and/or anchored bundles of brush and/or small trees in shallow-water areas. EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, select up to 15 sites for juvenile habitat structures, recognizing that the total number of adult and juvenile structures combined will not exceed 15. In general, juvenile habitat structures may be placed in the upstream-most portions of Zones C2 and C5, and along the perimeter of Zones C6 and C7 as shown in Figure 4-2, provided that placement in these locations does not significantly interfere with bank angling. Habitat structures would be designed to provide cover for juvenile cutthroat trout. These habitat structures may need to be anchored to shore to minimize the potential for movement. Habitat structure design will also take into account hazards to boating, and will be designed for complexity, stability, and longevity.

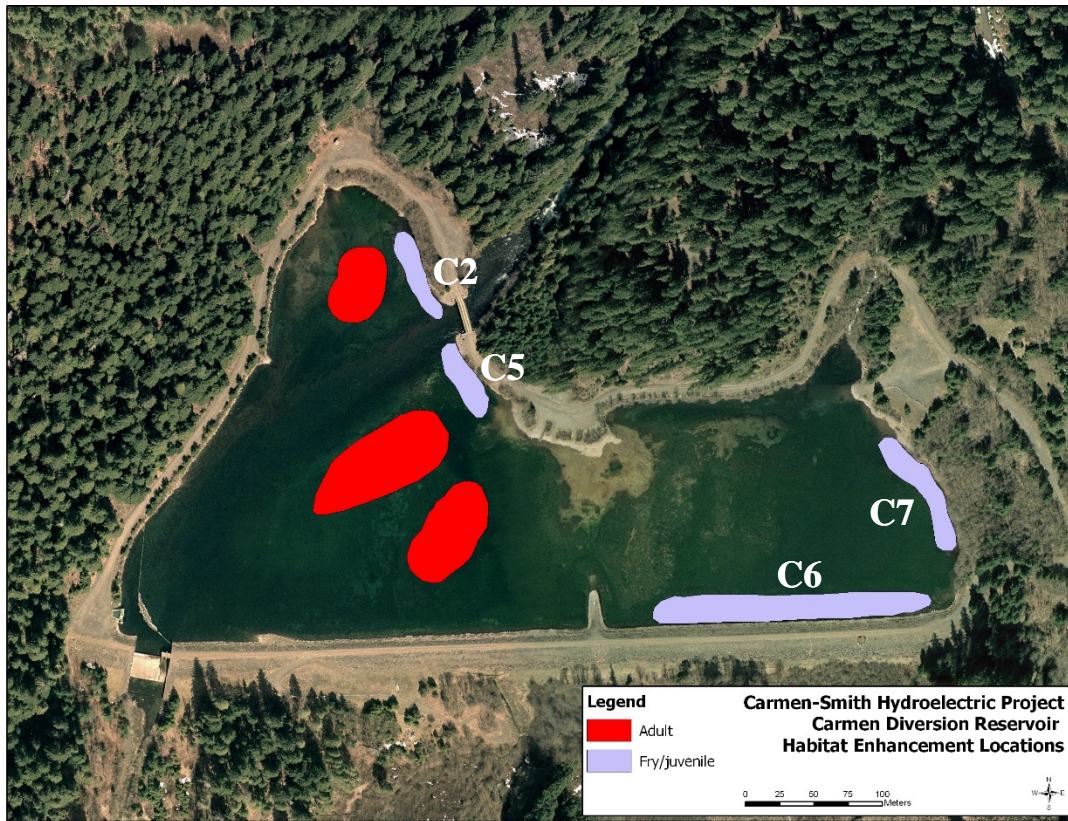


Figure 4-2. Carmen Diversion Reservoir potential habitat enhancement locations.

4.3.3.3 Monitoring, maintenance, and contingency actions

EWEB shall conduct all monitoring and maintenance activities and contingency actions in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. EWEB shall conduct visual (e.g., underwater camera) monitoring once every five years beginning the year after installation and continuing for the duration of the New License to ensure that habitat structures are maintained. Visual assessments will be compared with original design drawings, as modified by actual implementation. Monitoring will be conducted by video camera, during reservoir drawdowns, or using professional divers. If habitat structures appear to be substantially degraded compared with their original implementation condition by being reduced in size or complexity, upgrades and/or replacement will be designed and implemented within one year after monitoring.

4.3.4 Smith Reservoir

4.3.4.1 Objectives

The objective of this plan element is to increase habitat quality and quantity for juvenile and adult native salmonids to increase their abundance in Smith Reservoir and maintain these habitat structures for the term of the New License.

4.3.4.2 Description of element

EWEB shall develop a comprehensive implementation plan and schedule for habitat structures in Smith Reservoir not later than 4 years after New License issuance. EWEB shall develop the plan and schedule in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. Upon Commission approval, EWEB shall implement the plan and schedule. The plan will include:

- 1) type of materials to be used (boulders and/or anchored LWD, stumps/root wads, brush bundles),
- 2) timing of implementation, such that the habitat structures would be placed within 5 years after New License issuance,
- 3) source of materials,
 - a. LWD salvaged at the booms and dam will be used to the extent possible, based on the large woody debris management plan (Section 4.5),
- 4) volume and size of materials,
- 5) configurations (including construction drawings/design) and locations for the placement of materials,
- 6) method of placement of materials including access methods,
- 7) detailed long-term monitoring, maintenance, and contingency activities, and
- 8) considerations for recreation and aesthetic interests including avoidance of structural work near the dispersed campsites along the reservoir as described in Table 4-3 and identified in Figure 4-3.

Table 4-6. Dispersed camping and day use areas near Smith Reservoir*.

Dispersed site name	UTM 1	UTM 2
Sites accessed by boat		
Lake Site #1 (old road bed)	0576125	4908032
Lake Site # 2 (gravel flat)	0576090	4908215
Sites accessed from Upper Smith Reservoir Road		
Day Site # 1	0576246	4907488
Day Site # 2	0576303	4907222
Camp Site #1	0576319	4907106
Camp Site # 2	0576342	4906952

* UTM coordinates for the two Lake sites were taken just off the shoreline (20 feet) from these sites. UTM coordinates the road accessed sites were taken in the sites. GPS accuracy 17 feet or better for all sites.

EWEB shall install no more than a total of 20 habitat structures, for both adult and juvenile cutthroat trout in Smith Reservoir. The installed habitat structures are intended to be dispersed and of low profile.

EWEB, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall define what constitutes a structure (e.g., number/material type/complexity and an agreed-upon distance/spacing apart).

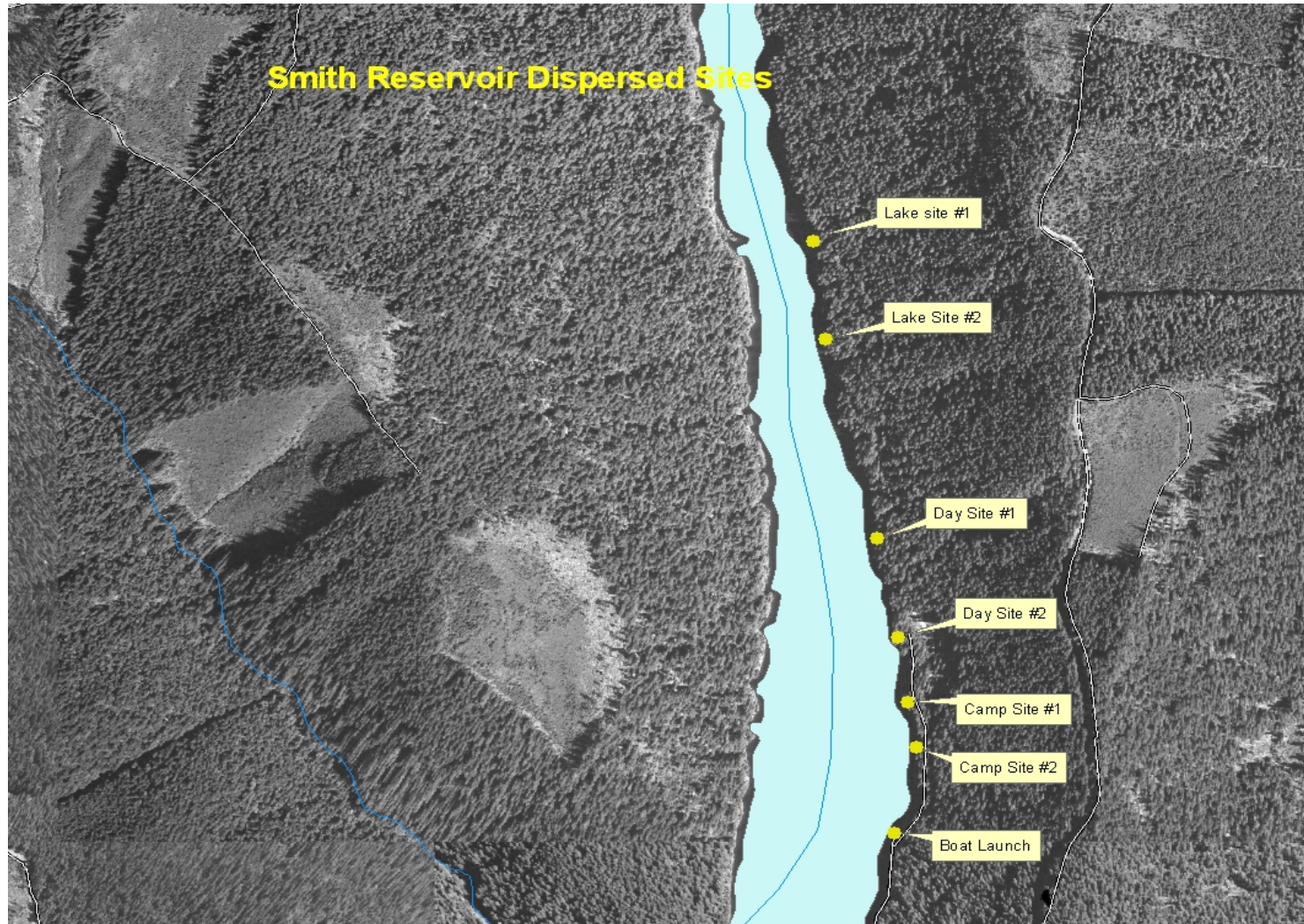


Figure 4-3. Dispersed camping and day use areas near Smith Reservoir.

Deep-water habitat structures

The goal of the deep-water habitat structures is to improve the quality and quantity of habitat for adult salmonids. The habitat structures are intended to increase adult salmonid abundance; however, increases in abundance are not a measurable objective leading to maintenance actions. EWEB shall provide deep-water habitat structures in the form of LWD, stumps/root wads, and boulders submerged on the reservoir bottom in deep-water areas (between 2,538 and 2,568 ft elevation). EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, select up to 20 sites for habitat structures in deep-water, recognizing that the total number of structures in deep and shallow water combined will not exceed 20. Location and design of the structures will balance the need for effective adult habitat while providing relatively small and dispersed structures to reduce the attraction of anglers. In general, deep water habitat structures may be placed where fish were observed during the *Fish Population Distribution and Abundance* study (Stillwater Sciences 2006a), which are primarily located in the northern portion of the reservoir (Figure 4-4). In addition, selecting locations for habitat structures in the northern portion of the reservoir would encourage fish distribution in this area and may reduce their proximity to the spillway and intake. Habitat structures would also provide cover and ambush habitat for adult native fish. Due to the bathymetry of Smith Reservoir, suitable locations for deep-water habitat structures are limited (Figure 4-4). Habitat structures would be located at an elevation of 2,568 ft or deeper to minimize the potential for boating accidents, and will be designed for complexity, stability, and longevity.

Shallow-water habitat structures

The goal of the shallow-water habitat structures is to improve the quality and quantity of fry and juvenile habitat. The habitat structures are intended to increase juvenile salmonid abundance; however, increases in abundance are not a measurable objective leading to maintenance actions. EWEB shall provide shallow-water habitat structures in the form of LWD, stumps/root wads, cobbles, boulders, and bundles of brush and/or small trees in shallow-water areas (between 2,575–2,582 ft elevation). EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, select up to 20 sites for habitat structures in shallow-water, recognizing that the total number of structures in deep and shallow water combined will not exceed 20. Location and design of the structures will balance the need for effective juvenile habitat while providing relatively small and dispersed structures. Locations under consideration for habitat structures include the margins of the northern portion of the reservoir including the Smith River delta (Figure 4-4). Similar to the deep-water habitat structures, locations for shallow-water habitat structures will be selected to encourage fish distribution in the northern portion of the reservoir, thus reducing their proximity to the spillway and intake. Habitat structures would be designed to provide cover for juvenile salmonids. These habitat structures will be anchored to the shore to minimize the potential for movement, and will be designed to function with fluctuating reservoir elevations. Habitat structure design will also take into account hazards to boating, and will be designed for complexity, stability, and longevity.

4.3.4.3 Monitoring, maintenance, and contingency actions

EWEB shall conduct all monitoring and maintenance activities and contingency actions in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. EWEB shall conduct visual (e.g., underwater camera) monitoring once every five years beginning the year after installation and continuing for the duration of the New License to ensure habitat structures are maintained. During each structural monitoring event, visual assessments will be conducted, and habitat structures will be compared with original design drawings, as modified by actual implementation. Monitoring will be conducted during reservoir drawdowns,

or using professional divers. If habitat structures appear to be degraded compared with their original implementation condition by being reduced in size or complexity, restoration plans will be designed and implemented within 1 year after monitoring.

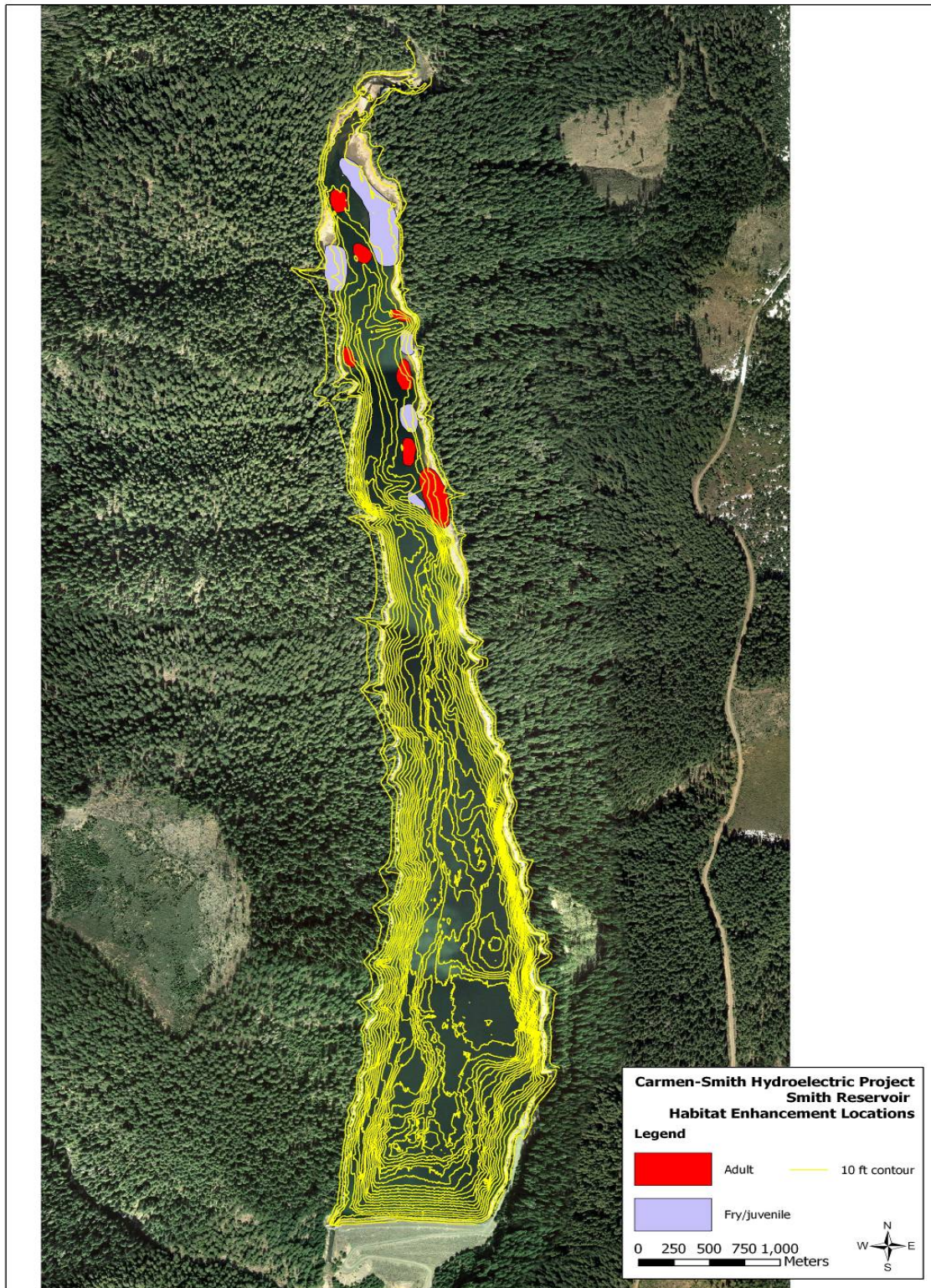


Figure 4-4. Smith Reservoir potential habitat enhancement locations.

4.3.5 Smith Bypass Reach

4.3.5.1 Objectives

EWEB's goal for implementation of habitat measures in Smith Bypass Reach is to increase the area of spawning habitat for Chinook salmon throughout the reach to a minimum of 320 m², if reasonably practicable, and then to maintain this amount (or higher as described below) of spawning habitat for the term of the New License. To achieve this goal in the Smith Bypass Reach, EWEB shall implement the following actions:

- 1) Construction of 30 engineered Chinook salmon spawning habitat structures (Engineered Structures) in the Smith Bypass Reach. Because the actual number of Engineered Structures EWEB will be able to construct may be limited by the feasibility of constructing structures in certain locations in the Smith Bypass Reach, EWEB may determine, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, that EWEB shall be obligated to construct fewer than 30 Engineered Structures because it is not reasonably feasible to construct 30 Engineered Structures provided, however, that EWEB will construct no fewer than 25 Engineered Structures;
- 2) Addition of an initial 2,000 tons of gravel in the Smith Bypass Reach as described in Section 4.3.5.2 below;
- 3) Placement and maintenance of a large woody debris (LWD) frequency of at least 80 pieces per mile in the Smith Bypass Reach as described in Section 4.3.5.2 below; and
- 4) Provision of the required flow releases in the Smith Bypass Reach as described in Section 4.2.3 above.

Although not quantitatively defined, the Smith Bypass Reach habitat measures EWEB implements will also increase rearing and other habitat (in addition to spawning habitat for Chinook salmon) for Chinook salmon, bull trout, other native fish species, and macroinvertebrate forage for these fish within the reach. EWEB, in consultation with the FWG, shall consider, but shall have no independent obligation to increase, rearing and other habitat for native fish species in the Smith Bypass Reach in the design and implementation of habitat measures and in its evaluation and consideration of the results from the monitoring of habitat measures.

4.3.5.2 Description of element

- 1) EWEB shall develop a comprehensive implementation plan and schedule for habitat measures in the Smith Bypass Reach not later than 4 years after New License issuance. EWEB shall develop the plan and schedule in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. Upon Commission approval, EWEB shall implement the plan and schedule. The plan will include the following, and be consistent with all subsections contained in Section 4.3.5 of this Aquatics Management Plan:
 - a) a schedule for the implementation (developed after additional field inventory, determination of access needs and resulting timing considerations). The schedule will provide that the licensee shall complete "Step 2" (Section 4.3.5.2.2)) within

9 years after New License issuance unless the licensee implements adaptive management provisions of Section 4.3.5 (e.g., Section 4.3.5.2.2c)),

- b) construction drawings/designs for habitat measures,
- c) the quantity and dimensions of materials (consistent with USDA Forest Service standards for large woody debris, as described in Section 4.3.5.3.3) to be used in habitat measures,
- d) the location of all Engineered Structures, and
- e) additional monitoring details regarding spawning habitat criteria and accessibility as described in Section 4.3.6.3 below.

2) In the plan and schedule, EWEB will provide for implementation in three steps:

Step 1: During the initial phase, EWEB shall design and construct the Engineered Structures and place 2,000 tons of gravel at those Engineered Structures. EWEB shall place less than 2,000 tons only with approval by the Fish Agencies and USDA Forest Service. EWEB shall select the locations for the Engineered Structures in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. EWEB shall complete construction of the Engineered Structures within three years, based on construction feasibility and EWEB constructing the structures as expeditiously as reasonably practicable. EWEB shall construct at least one-third of the Engineered Structures in the first year of the initial phase, and at least one third every year thereafter. EWEB, in consultation with the FWG, shall evaluate and provide a report on the results of the first year construction and use that report and evaluation to inform subsequent design and construction of Engineered Structures.

EWEB shall augment gravel according to the approved implementation plan. EWEB shall smooth any augmented gravel within one year. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall design all Engineered Structures to withstand at least a 1,000 cfs flow event.

Concurrently with construction of the Engineered Structures, EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall place any additional LWD needed to achieve a LWD frequency of 80 pieces per mile in the Smith Bypass Reach as provided in Section 4.3.5.3.3) below.

Step 2: Within one year after EWEB completes augmentation of gravel for each Engineered Structure constructed in a specific year, EWEB shall release a smoothing flow regime designed to level and to distribute evenly the augmented gravel at the Engineered Structures. For this flow regime, EWEB shall release: three releases at or above 500 cfs with a duration for each of about three hours, and one release greater than 800 cfs with a duration of about two hours. EWEB, in consultation with the FWG, shall evaluate and provide a report on the results of the gravel augmentation locations after each smoothing flow to assess the effect of the flow release and the need for any remaining flow releases.

EWEB shall work in consultation with the FWG to adjust the smoothing flow regime adaptively, if not all of the gravel augmentation locations are responding appropriately to the smoothing flows. For example, EWEB may determine, in consultation with the FWG, that an 800 cfs smoothing flow is too large for some of the locations and longer duration, smaller magnitude smoothing flows may be appropriate for those locations. If EWEB, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, determines that manual redistribution of gravels is warranted, EWEB shall perform localized manual redistribution of gravels.

Step 3: After EWEB has completed the construction of all Engineered Structures, gravel augmentation, smoothing flows, and LWD placement and EWEB, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, has determined that the augmented gravel “has been appropriately distributed,” EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall develop and implement a plan to measure the amount of Chinook salmon criteria spawning habitat (Spawning Habitat) (as defined below) present throughout all of the Smith Bypass Reach during the next three to five Chinook salmon spawning seasons.

4.3.5.3 Adaptive Management Step

EWEB shall use the following Chinook salmon spawning habitat criteria:

- Minimum polygon area: 1.3 m² (14 ft²)
 - Substrate: D50 = 10–50 mm (0.4–2.0 inches)
 - Velocity: minimum 0.2 m/s (0.8 fps); maximum 0.8 m/s (2.5 fps)
 - Depth: minimum 0.2 m (0.8 ft.); maximum—none.
- a) If the determined amount of Spawning Habitat for each of the first three Chinook salmon spawning seasons differs by an amount less than 15% from the first spawning season to the second spawning season, and from the second spawning season to the third spawning season, then the average of those three Chinook salmon spawning seasons, if greater than 320 m², establishes the Maintenance Objective for the remainder of the term of the New License. Once the Maintenance Objective is established, 90% of that amount will become the Maintenance Threshold for the remainder of the License, unless the Maintenance Objective is greater than or equal to 450 m², in which case the Maintenance Threshold is 400 m².

If EWEB determines, in consultation with the FWG, and subject to approval by the Fish Agencies and USDA Forest Service, based on the results of the evaluation, that any reasonably practical additional opportunities will increase the amount of Chinook salmon spawning habitat, EWEB shall implement the additional opportunities within the scope of Section 4.3.5 of this plan. Once EWEB has implemented the additional opportunities, EWEB shall measure the resulting spawning habitat for another 3–5 years, consistent with the monitoring

and procedures, as described in Step 3, paragraphs a) and b) of this Section 4.3.5.2, to determine if the minimum 320 m² is met. If EWEB determines, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, based on the results of the evaluation, that there are no opportunities to increase Chinook salmon spawning habitat, or if EWEB implementation of any reasonably practical additional opportunities does not result in at least 320 m², then EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall develop an evaluation to examine whether:

- i) a number less than 320 m² for the Maintenance Objective should be established as an Alternative Maintenance Objective (in which case, 90% of the Alternative Maintenance Objective will become the Alternative Maintenance Threshold), and/or
- ii) any reasonably practical opportunities exist to increase Spawning Habitat in other reaches above Trail Bridge Dam, and/or
- iii) Chinook salmon non-criteria spawning habitat is equally producing fry relative to criteria habitat (not significantly different at an alpha value of 0.05 between production of fry from redds in criteria and non-criteria habitat). If non-criteria habitat is “equally producing” as provided in prior sentence, EWEB shall include the non-criteria habitat producing Chinook salmon fry in meeting the 320 m² spawning habitat minimum.

EWEB shall provide this written evaluation for opportunities in the Smith Bypass Reach, and the actions listed in paragraphs i), ii), and iii) if appropriate, to the FWG for a minimum of 30 days for review and comment. Based on that review and comments, EWEB, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall implement the appropriate opportunities or actions.

If EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, determines to establish an Alternative Maintenance Objective less than 320 m² and the activities in paragraphs ii) and iii) above have not resulted in determined Chinook salmon spawning habitat at least equal to the difference between the Alternative Maintenance Objective and 320 m², then EWEB shall establish and fund a Smith Fund as described in Section 4.3.5.3.4) below.

- b) If the determined amount of Spawning Habitat for any of the first three Chinook salmon spawning seasons differs by an amount of 15% or more, from the first spawning season to the second spawning season or from the second spawning season to the third spawning season, EWEB shall verify this is not due to mapping error by resampling at least 20 percent of the habitat within the reach. If the verification mapping confirms that less than a 15% decrease has occurred, EWEB shall comply with Subsection 4.3.5.2.2) Step 3 a). If the verification mapping confirms that a greater than 15% decrease has occurred, then EWEB, in

consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall continue to implement the plan to determine the amount of Spawning Habitat in Smith Bypass Reach for an additional one or two Chinook salmon spawning seasons, until such time that either three consecutive years of stable habitat have been recorded, or up to five years have been measured, whichever is sooner. If after five years of monitoring three consecutive stable years have not occurred, the average amount measured during the last three years of the five years will be the Maintenance Objective.

Once the Maintenance Objective is established, 90% of that amount will become the Maintenance Threshold for the remainder of the License, unless the Maintenance Objective is greater than or equal to 450 m², in which case the Maintenance Threshold is 400 m². If the average of the determined Spawning Habitat for the three Chinook salmon spawning seasons is less than 320 m², then EWEB, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall develop an evaluation to examine opportunities to improve Engineered Structures, gravel augmentation, or other activities in the Smith Bypass Reach. If EWEB determines, in consultation with the FWG, and subject to approval by the Fish Agencies and USDA Forest Service, based on the results of the evaluation, that any reasonably practical additional opportunities will increase the amount of Chinook salmon spawning habitat, EWEB shall implement the additional opportunities within the scope and limitations of Section 4.3.5 of this plan. Once EWEB has implemented the additional opportunities, EWEB shall measure the resulting spawning habitat for another 3–5 years, consistent with the monitoring and procedures, as described in Step 3, paragraphs a) and b) of this Section 4.3.5.2.2), to determine if the minimum 320 m² is met. If EWEB determines, in consultation with the FWG, and subject to approval by the Fish Agencies and USDA Forest Service, based on the results of the evaluation, that there are no reasonably practical opportunities to increase Chinook salmon spawning habitat, or if EWEB implementation of additional opportunities does not result in at least 320 m², then EWEB, in consultation with the FWG, and subject to approval by the Fish Agencies and USDA Forest Service, shall develop an evaluation to examine whether:

- i) a number less than 320 m² for the Maintenance Objective should be established as an Alternative Maintenance Objective (in which case, 90% of the Alternative Maintenance Objective will become the Alternative Maintenance Threshold), and/or
- ii) any reasonably practical opportunities exist to increase Spawning Habitat in other reaches above Trail Bridge Dam, and/or
- iii) Chinook salmon non-criteria spawning habitat is equally producing fry relative to criteria habitat (not significantly different at an alpha value of 0.05 between production of fry from redds in criteria and non-criteria habitat). If non-criteria habitat is “equally producing” as provided in prior sentence, EWEB shall include the non-criteria habitat producing Chinook salmon fry in meeting the 320 m² spawning habitat minimum.

EWEB shall provide this written evaluation for opportunities in the Smith Bypass Reach, and the actions listed in paragraphs i), ii), and iii) if appropriate, to the FWG for a minimum of 30 days for review and comment. Based on that review and comments, EWEB, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall implement the appropriate opportunities or actions.

If EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, determines to establish an Alternative Maintenance Objective less than 320 m² and the activities in paragraphs ii) and iii) above have not resulted in determined Chinook salmon spawning habitat at least equal to the difference between the Alternative Maintenance Objective and 320 m², then EWEB shall establish and fund a Smith Fund as described in Section 4.3.5.3.4) below.

- c) During implementation of Steps 1–3 above, if the amount of spawning habitat in one year decreases more than 50% in the following year due to a flow event over 800 cfs with a duration of greater than 4 hrs, EWEB shall restore the habitat to the average habitat measured before the event, and begin the evaluation described in Subsections 4.3.5.2.2) Step 3 a) and b) above.

4.3.5.4 Monitoring, and maintenance

EWEB shall include in its comprehensive implementation plan for the Smith Bypass Reach, EWEB implementation of the following periodic monitoring and maintenance activities for the term of New License, which are designed to ensure spawning habitat and LWD standards are maintained and Engineered Structures are functioning. EWEB shall commence implementation of these monitoring and maintenance activities in the calendar year after implementation of all habitat enhancements including construction of Engineered Structures, gravel augmentation, and LWD is complete as described in Steps 1 through 2 in Subsection 4.3.5.2.2) above.

4.3.5.5 Contingency Actions

- 1) Monitoring by mapping spawning habitat described in 4.3.5.4 above are as follows:
 - a) EWEB shall perform monitoring by mapping Spawning Habitat (as defined in Section 4.3.5.2 above) in Smith Bypass Reach every 5 years (after EWEB has completed Steps 1 through 3 in Subsection 4.3.5.2.2) above) or after a major bed mobilization event in Smith Bypass Reach occurs (>800 cfs flow for more than 2 hours), whichever is more frequent. EWEB shall provide a complete report including the results and supporting data and analysis of the mapping to the FWG. If the mapping indicates total Spawning Habitat in Smith Bypass Reach is less than the Maintenance Threshold, or less than the Alternative Maintenance Threshold (whichever applies), then EWEB shall, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, develop and implement a habitat plan so that the amount of Spawning Habitat is returned to the Maintenance Objective or Alternative Maintenance Objective (whichever applies), which could include additional gravel augmentation (within the Gravel Cap described below), and improvements, modifications, and or additions to

Engineered Structures. EWEB shall provide relevant data annually if requested by the FWG.

- b) EWEB's obligation to augment gravel will not exceed 2,000 tons in any 10-year period (Gravel Cap). However, if EWEB has augmented 2,000 tons of gravel in any 10-year period and the Spawning Habitat mapped in Smith Bypass Reach is less than the Maintenance Threshold, or is less than the Alternative Maintenance Threshold (whichever applies), EWEB, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall determine if a reevaluation of augmentation is needed. If a reevaluation is not approved (such as if a rare and extremely high flow event occurs between monitoring periods), the existing Maintenance Threshold and Maintenance Objectives will remain in place, and EWEB shall augment gravel to return the amount of Spawning Habitat to the Maintenance Objective during the first year when the addition of gravel is no longer restricted by the Gravel Cap. If a reevaluation is approved, EWEB, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall develop an evaluation to examine opportunities to improve Engineered Structures, gravel augmentation, or other activities in the Smith Bypass Reach. If EWEB determines, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, based on the results of the evaluation, that any reasonably practical additional opportunities will enhance the amount of Chinook salmon spawning habitat, EWEB shall implement the additional opportunities within the scope and limitations of Section 4.3.5. If EWEB determines, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, based on the results of the evaluation, that there are no reasonably practical opportunities to enhance Chinook salmon spawning habitat, then EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall develop an evaluation to examine whether:

- i) a number less than 320 m² for the Maintenance Objective should be established as an Alternative Maintenance Objective (in which case, 90% of the Alternative Maintenance Objective will become the Alternative Maintenance Threshold), and/or
- ii) any reasonably practical opportunities exist to increase Spawning Habitat in other reaches above Trail Bridge Dam, and/or
- iii) Chinook salmon non-criteria spawning habitat is equally producing fry relative to criteria habitat (not significantly different at an alpha value of 0.05 between production of fry from redds in criteria and non-criteria habitat). If non-criteria habitat is "equally producing" as provided in prior sentence, EWEB shall include the non-criteria habitat producing Chinook salmon fry in meeting the 320 m² spawning habitat minimum.

However, if EWEB has augmented, 2,000 tons of gravel in any 10-year period and the Spawning Habitat mapped is less than the Maintenance Threshold, or is less than the Alternative Maintenance Threshold (whichever applies) and the activities in paragraphs ii) and iii) above have not resulted in determined Chinook salmon spawning habitat at least equal to the difference between the Alternative

Maintenance Objective and 320 m², then EWEB shall establish and fund a Smith Fund or, if applicable, adjust its funding to an existing Smith Fund as described in Section 4.3.5.3.4) below.

2) Surveys of engineered structures:

- a) EWEB shall perform visual surveys of the Engineered Structures during the mapping (described in Subsection 4.3.5.3.1) to assess structure performance and establish any need for maintenance based on a procedure developed by EWEB in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. EWEB shall provide a report summarizing the results of its visual survey to the FWG. If EWEB's visual survey shows that more than 20% of all of the Engineered Structures are nonfunctioning, EWEB shall repair, modify, or replace the structures that are nonfunctioning within one year, if reasonably practicable. However, there will be no obligation for EWEB to repair, to modify or to replace such nonfunctioning Engineered Structures if the amount of spawning habitat is more than the Maintenance Threshold, or the Alternative Maintenance Threshold (whichever is applicable), and the LWD frequency requirements are achieved. If mapped Spawning Habitat is less than the Maintenance Threshold or is less than the Alternative Maintenance Threshold (whichever is applicable), EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall evaluate modification or replacement of Engineered Structures even if they are functioning in an effort to increase Spawning Habitat to the applicable Maintenance Objective. EWEB shall, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, determine and implement actions to modify or to repair any Engineered Structure that is causing, or potentially could cause, significant damage to infrastructure such as roads, pedestrian bridges, or trails.
- b) An Engineered Structure will only be considered nonfunctioning if it meets the following conditions:
 - i) Key pieces of LWD in the Engineered Structure are out of the Smith Bypass Reach wetted channel during summer flows or have been displaced to the degree that they are no longer effectively retaining gravels or providing stable spawning habitat.

3) Surveys of LWD frequency:

- a) EWEB shall perform visual surveys of LWD in the Smith Bypass Reach during the mapping described in Subsection 4.3.5.3.1) above to determine the frequency of LWD per mile in the reach. EWEB shall count all LWD \geq 40 feet long and \geq 24 inches diameter (Qualifying LWD), which are either wholly or partially within the Smith Bypass Reach bankfull channel. EWEB shall also count as Qualifying LWD, LWD with attached rootwads if they are less than 40 feet in length but are still equal to or greater than 24 inches in diameter. If, based on a visual survey, the overall frequency of Qualifying LWD is less than 80 pieces per mile, EWEB shall implement actions to increase Qualifying LWD frequency to 80 pieces per mile within 2 years, unless EWEB determines, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, that the additional LWD is not necessary.

4) Smith Fund

- a) Commencing in the year following any year in which EWEB determines, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, that an Alternative Maintenance Objective and the activities in paragraphs a) and b) in Step 3 of Subsection 4.3.5.2.2) above do not result in the presence of 320 m² of determined Chinook salmon spawning habitat, EWEB shall establish a Smith Fund and be obligated to contribute to the fund as provided in this paragraph. For the purpose of determining EWEB's contribution to the Smith Fund, EWEB shall calculate the actual costs EWEB incurs under Steps 1, 2, and 3 of Subsection 4.3.5.2.2) above for 50% of the gravel initial augmentation (placement of the initial 2,000 tons of gravel) and for 10% of the Engineered Structures initial construction (collectively, the Base Amount). When 320 m² of determined Chinook salmon spawning habitat is not present as described above after EWEB has completed implementation of Steps 1, 2, and 3 of Subsection 4.3.5.2.2) above and continuing until 320 m² of determined Chinook salmon spawning habitat is present as described above, EWEB shall contribute to the Smith Fund at the end of each succeeding five-year period, the amount of money, if any, determined by subtracting from the Base Amount (adjusted for inflation), the amount of money that EWEB has expended in the five-year period for gravel augmentation and construction, repair, modification, and maintenance of Engineered Structures and implementation of the activities in paragraphs a) and b) in Step 3 of Subsection 4.3.5.2.2) above. EWEB shall provide to the FWG a summary of the analysis used to determine any contribution it makes to the Smith Fund.
- b) In the year following EWEB's establishment of the Smith Fund and first funding of the Smith Fund, EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall develop a plan for use of the Smith Fund to fund resource projects. Resource projects will be those EWEB activities that enhance Chinook salmon, cutthroat trout, or bull trout spawning and rearing habitat within the Project area.
- c) Any person or entity, including EWEB, may propose a resource project for funding from the Smith Fund. EWEB shall review all resource project proposals, and periodically provide a report to the FWG, describing each project proposal and recommending whether to fund one or more of the project proposals from the Smith Fund.
- d) EWEB shall convene a meeting of the FWG no sooner than 30 days after distribution of the report set forth in paragraph c) immediately above for consultation regarding the proposed resource projects and EWEB's recommendations in the report. EWEB shall, after consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, file with the Commission a plan and schedule for implementing one or more resource project proposals using funds from the Smith Fund. Upon Commission approval, EWEB shall implement the plan and schedule.
- e) For the escalation provided in paragraph a) above, all costs or payment amounts specified in dollars shall be deemed to be stated as of the year or years in which

EWEB incurs the actual costs in Steps 1, 2, and 3 of Subsection 4.3.5.2.2), and EWEB shall escalate such sums as of 1 September of each following year according to the following formula:

$$AD = D \times (NGDP/IGDP)$$

WHERE:

AD = Adjusted dollar amount as of 1 September of the year in which the adjustment is made.

D = Dollar amount prior to adjustment.

IGDP = GDP-IPD for the second quarter of the year of the previous adjustment date (or, in the case of the first adjustment, the second quarter of the year before the Effective Date).

NGDP = GDP-IPD for the second quarter of the year of the adjustment date.

“GDP-IPD” is the value published for the Gross Domestic Product Implicit Price Deflator by the U.S. Department of Commerce, Bureau of Economic Analysis in the publication Survey of Current Business, Table 1.1.9 (being on the basis of year 2000 = 100), in the third month following the end of the applicable quarter. If that index ceases to be published, any reasonably equivalent index published by the Bureau of Economic Analysis may be substituted by the agreement of the USDA Forest Service and EWEB. If the base year for GDP-IPD is changed or if publication of the index is discontinued, EWEB shall promptly make adjustments or, if necessary, select an appropriate alternative index acceptable to the USDA Forest Service to achieve the same economic effect.

4.3.6 Trail Bridge Reservoir

4.3.6.1 Objectives

EWEB’s goal for implementation of habitat structures in Trail Bridge Reservoir is to:

- 1) Increase fry, juvenile, and adult habitat for native salmonids in Trail Bridge Reservoir,
- 2) Increase survival of fry, juvenile, and adult native salmonids in Trail Bridge Reservoir,
- 3) Mitigate for reduced habitat quality potentially resulting from modifications to Potential Stranding Zones (Section 4.4.2), and
- 4) Maintain the habitat structures for the term of the New License.

4.3.6.2 Description of element

EWEB shall develop a comprehensive implementation plan and schedule for deployment of habitat structures in Trail Bridge Reservoir not later than 3 years after New License issuance. EWEB shall develop the plan and schedule in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. Upon Commission approval, EWEB shall implement the plan and schedule. The plan will include:

- 1) type of materials to be used (boulders and/or anchored LWD, stumps/root wads, brush bundles),
- 2) timing of implementation (assumed to be when reservoir is drawdown for fish passage construction), such that the habitat structures would be placed within 5 years after New License issuance,
- 3) source of materials,
 - a) LWD salvaged at the booms and dam will be used to the extent possible, based on the large woody debris management plan (Section 4.5),
- 4) volume and size of materials,
- 5) configurations (including construction drawings/design) and locations for the placement of materials,
- 6) method of placement of materials including access methods,
- 7) detailed long-term monitoring activities maintenance, and contingency activities, and
- 8) considerations for recreation and aesthetic interests.

EWEB shall install no more than a total of 40 habitat structures consisting of logs (as defined in Section 4.5 (Large Woody Debris Management)—20' long x 1' diameter) and additional elements as described below, distributed between both shallow and deep water (depths defined below), in Trail Bridge Reservoir. The total number of logs to be added to the reservoir shall not exceed 50 to the extent that these logs are available from the Willamette National Forest. The installed habitat structures are intended to be dispersed and of low profile. Further description is provided below.

EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall define what constitutes a structure (e.g., number/material type/complexity and an agreed upon distance/spacing apart).

Deep-water habitat structures

The goal of the deep-water habitat structures is to improve the quality and quantity of habitat for adult salmonids (principally subadult and adult bull trout, as well as other adult native trout). The habitat structures are intended to increase adult salmonid abundance; however, increases in abundance are not a measurable objective leading to maintenance actions. EWEB shall provide deep-water habitat structures in the form of anchored LWD, stumps/root wads, and/or boulders, submerged on the bottom at appropriate depths (at or deeper than elevation 2,063 ft). EWEB shall, in consultation with the FWG and subject to approval by Fish Agencies and USDA Forest Service, select up to 40 sites for habitat structures in deep-water, recognizing that the total number of structures in deep and shallow water combined will not exceed 40. Location and design of the structures will balance the need for effective adult habitat while providing relatively small and dispersed structures. In general, habitat structures will be placed where the water is greater than 5 m deep at low pool in areas where adult and subadult bull trout were observed during the *Fish Population Distribution and Abundance* study (Stillwater Sciences 2006a), such as the southwest portion of the reservoir and just downstream of the Smith arm (Figure 4-5). Habitat structures would provide cover and ambush habitat for subadult and adult bull trout on relatively flat or moderately sloped substrates. Due to the bathymetry of Trail Bridge Reservoir, suitable locations are limited (Figure 4-5). Habitat structures would be placed at elevation 2,063 ft (approximately 5 m below low pool) or deeper to minimize the potential for boating accidents, and will be designed for complexity, stability, and longevity.

Shallow-water habitat structures

The goal of the shallow-water habitat structures is to improve habitat for fry and juvenile salmonids. The habitat structures are intended to increase fry and juvenile salmonid abundance; however, increases in abundance are not a measurable objective leading to maintenance actions. EWEB shall provide shallow-water (e.g., between reservoir elevations 2,070–2,078 ft) habitat structures in the form of anchored clusters of small whole trees, other woody debris, and/or single large whole trees extending perpendicular from the shore into the reservoir. EWEB shall, in consultation with the FWG and subject to approval by Fish Agencies and USDA Forest Service, select up to 40 sites for habitat structures in shallow-water, recognizing that the total number of structures in deep and shallow water combined will not exceed 40. Location and design of the structures will balance the need for effective fry and juvenile habitat while providing relatively small, dense, and dispersed structures below the fluctuation zone. In general, habitat structure locations will include the outfall of the Sweetwater Creek culvert to provide cover habitat for juvenile bull trout exiting Sweetwater Creek, in shallow-water margins in the Carmen arm near the Carmen Power Plant, and along the northern and eastern shores of Trail Bridge Reservoir (Figure 4-5).

Habitat structures are intended to remain submerged (with the exception of whole trees anchored to the shore) to provide habitat and cover for juvenile and fry Chinook salmon and bull trout and to be compatible with fluctuations in water surface elevation. Habitat structures will be designed without areas that retain water during reservoir fluctuation to reduce the potential for associated stranding. Structure placement and design will not increase hazards to boating, and will be designed for complexity, stability, longevity, and their ability to provide habitat connectivity through all anticipated reservoir elevations. Shallow-water habitat structures will be designed to be as “dense” as possible to provide protection for fry against adult salmonids that may want to use them for ambush habitat.

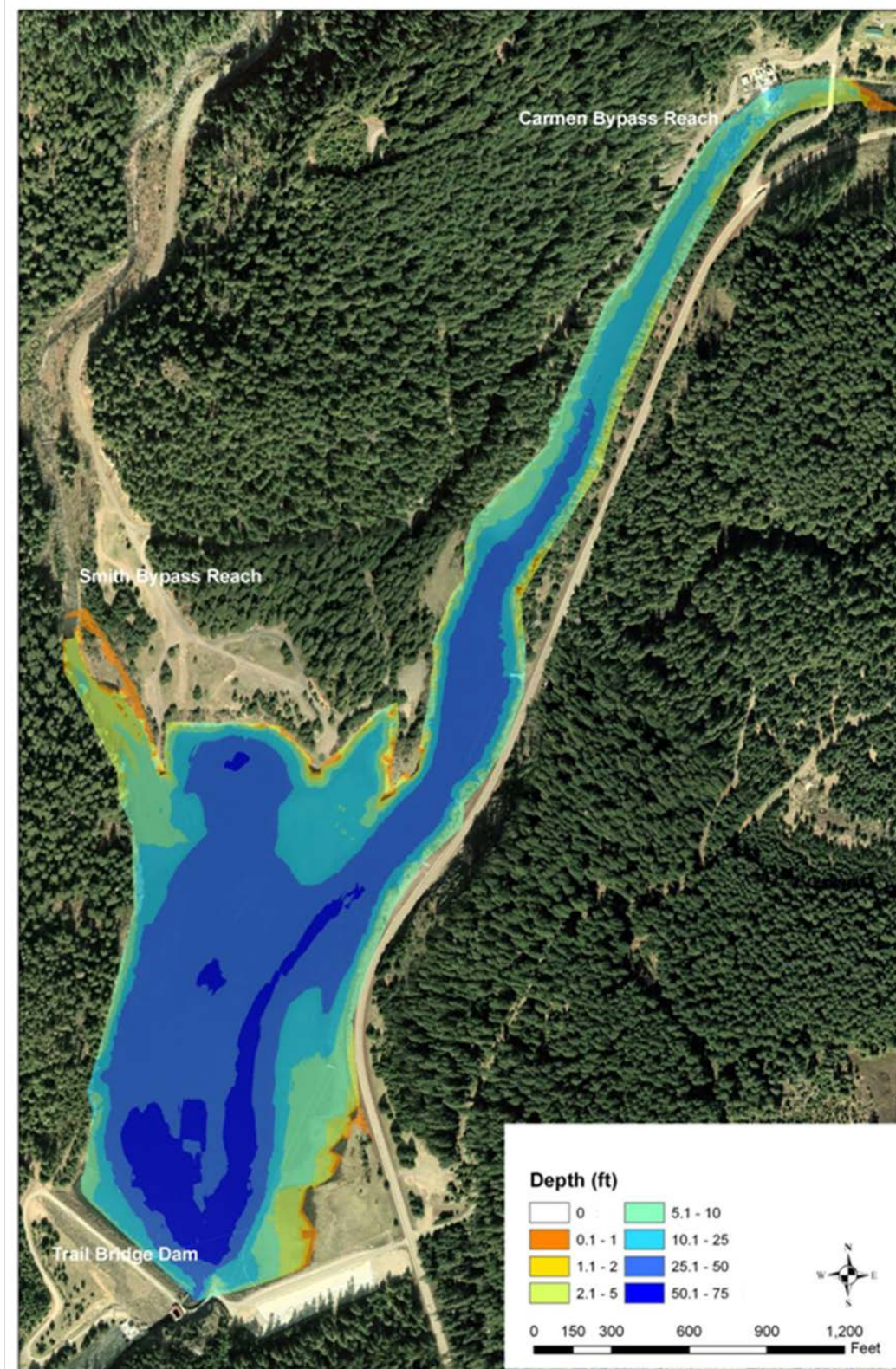


Figure 4-5. Water depth in Trail Bridge Reservoir.

4.3.6.3 Monitoring, maintenance, and contingency actions

EWEB shall conduct two types of monitoring consisting of (1) effectiveness monitoring for fish use of habitat structures, and (2) structural monitoring to ensure habitat structures are maintained to their original implementation condition. Both types of monitoring are described below.

Effectiveness monitoring

Effectiveness monitoring of treated and control areas will be conducted during the early summer for three seasons, after sufficient numbers of Chinook salmon fry are present, as determined by EWEB in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. The intention of effectiveness monitoring will be to determine if habitat structures are successful at creating rearing habitat, and providing protective cover for target species/lifestages, and to determine if particular configurations appear to work better than others.

Effectiveness monitoring to determine if fish use habitat structures will consist of:

- 1) Direct observation (e.g., snorkel, SCUBA, and/or video) at enhanced and control (untreated) sites during day and night.
- 2) Determine use by fish species and life stage, at each type of habitat structure, as well as fish use by reservoir elevation.

Habitat structures will be deemed successful if salmonids use them for rearing at a statistically significant higher density than is observed in control areas. If habitat structures are successful, future maintenance and replacement of habitat structures will be informed by the effectiveness monitoring results. However, if individual habitat structures are not successful, they will either be modified, moved, or not considered as mitigation for potential reduction in rearing habitat associated with physical bank modifications in stranding zones.

Structural monitoring

EWEB shall conduct all monitoring activities and maintenance actions in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. EWEB shall conduct visual (e.g., underwater camera) monitoring once every five years beginning the year after installation and continuing for the duration of the License to ensure habitat structures are maintained to their original implementation condition. During each structural monitoring event visual assessments will be conducted, and habitat structures will be compared with original design drawings, as modified by actual implementation. Monitoring will be conducted by video camera, during reservoir drawdowns, or using professional divers. If habitat structures appear to be degraded compared with their original implementation condition by being reduced in size or complexity, upgrades will be designed and implemented as informed by the effectiveness monitoring.

4.3.6.4 Restrict angler access to sensitive areas

EWEB shall work with interested agencies to provide input to the appropriate enforcement agency to restrict fishing at known bull trout holding habitat to provide protection for subadult and adult bull trout from angling pressure. If the appropriate enforcement agency is in agreement, EWEB shall include in the Recreation and Aesthetic Resources Management Plan a measure to provide signs designating restricted angler access to specified areas within Trail Bridge Reservoir.

4.3.6.5 Fund fishing regulation enforcement and outreach

EWEB shall provide funding to the USDA Forest Service for Forest protection Officer time (up to ½ full-time equivalent [FTE]) to enforce and to provide information about federal and Oregon fishing regulations and restrictions applicable to Project reservoirs and the bypass reaches, including protection of subadult and adult bull trout and Chinook salmon from illegal angling, for the term of the New License. The USDA Forest Service will provide a written summary of activities and enforcement actions for federal and Oregon fishing regulations at the annual FWG meeting.

4.3.7 Carmen-Smith Spawning Channel

4.3.7.1 Objectives

The objective of providing protection, mitigation, and enhancements of habitat in the Carmen-Smith Spawning Channel is to maintain suitable Chinook salmon spawning and rearing habitat throughout the entire channel for the term of the License. EWEB shall take actions designed to achieve this objective by periodic gravel augmentation, maintaining existing gravel retention structures (logs), maintaining appropriate flows in the spawning channel, and adding escape cover for use by emergent fry and juveniles.

4.3.7.2 Background

In a 2003 Biological Opinion, NOAA Fisheries and USFWS specified that EWEB would be required to augment gravel in the Carmen-Smith Spawning Channel (NMFS 2003 and USFWS 2003). EWEB made gravel additions to the channel in 2005 and 2006 and in 2005 replaced or resealed all the log retention structures. The channel was originally designed to function solely as Chinook salmon spawning habitat with gravel 30 inches (0.76 m) deep and no rearing habitat. The design flow for the channel was 80 cfs. Some rearing habitat has subsequently developed along the spawning channel through both natural vegetation recruitment and planned additions of small trees and brush.

4.3.7.3 Description of element

EWEB shall develop an implementation plan and schedule for maintenance of the Carmen-Smith Spawning Channel no later than 3 years after New License issuance. EWEB shall develop the plan and schedule in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. Upon Commission approval, EWEB shall implement the plan and schedule. This plan will include:

- 1) A schedule of monitoring actions.
- 2) Triggers for gravel augmentation and dimension specifications and source criteria for augmented gravel.
- 3) Spawning habitat monitoring methods and frequency.
- 4) Log weir monitoring and maintenance methods.
- 5) Gravel cleaning methods and frequency.

- 6) A plan for determining density, spacing and habitat structure design to guide the placement of future rearing habitat elements for salmonid fry.
- 7) Installation of a staff gage and associated monitoring and reporting requirements.
- 8) Coordination with Passage Plan Section 4.1.8 (Upstream Passage at the Carmen-Smith Spawning Channel).

EWEB shall, for the term of the License, perform the following:

- 1) Maintain suitable Chinook salmon spawning gravel throughout the channel with an average gravel depth throughout the channel of approximately 0.76 m.
- 2) Maintain minimum flows of 80 cfs in the spawning channel.
- 3) Develop and maintain fry and juvenile rearing habitat.

Within 5 years after New License issuance, EWEB shall develop, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, and implement a plan to add rearing habitat for fry and juvenile salmonids to the spawning channel. In general, small trees and brush will be placed with appropriate spacing along the margins of the channel and at least one brush bundle will be placed in the holding pool at the upstream end of the spawning channel.

4.3.7.4 Monitoring, maintenance and contingency actions

EWEB shall conduct the following monitoring for the duration of the License in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service.

Spawning habitat

EWEB shall monitor the distribution and depth of spawning habitat in the spawning channel to ensure that suitable spawning habitat is maintained throughout the channel. EWEB shall include monitoring protocols in the implementation plan provided in Section 4.3.7.3 above. EWEB shall include in the implementation plan actions to survey the gravel and condition of log structures in the spawning channel every five years to confirm suitability of Chinook salmon spawning habitat. If the results of monitoring indicate that suitable spawning habitat is not adequately distributed and/or average gravel depth is less than 0.76 m, then EWEB shall, in consultation with FWG and subject to approval by the Fish Agencies and USDA Forest Service, develop and implement a plan to augment gravel in the spawning channel.

Minimum flow

EWEB shall monitor the flow in the spawning channel to ensure that the minimum design flow of 80 cfs is being met. EWEB shall include procedures for monitoring and reporting of the flow in the spawning channel in the Operations and Maintenance Plan specified in Section 4.1.8.3) of the Aquatics Management Plan.

Rearing habitat

EWEB shall monitor rearing habitat structures to ensure they are providing expected rearing habitat for the duration of the License. EWEB shall conduct visual assessment monitoring every

five years. EWEB shall augment or replace rearing enhancement structures that are substantially degraded or are functioning at an unacceptable level.

4.4 Flow Fluctuations

4.4.1 Fluctuations in Trail Bridge Reservoir

4.4.1.1 Fluctuation restrictions

Ramping is defined as those Project-induced increases (upramps) and decreases (downramps) over time in Trail Bridge Reservoir water surface levels (elevations) for the purpose of Project construction, operation, and maintenance. Such Project-induced increases and decreases do not include changes in water surface elevations due to natural increases or decreases in water flow.

For fluctuation restrictions provided in this section, the distance between the highest and lowest water elevation measured will not vary by more than a specified amount (the restriction) during the applicable time period. EWEB shall implement the provisions of this section except as provided in proposed New License Article 17 and the construction management plan, implemented under that New License article.

- 1) EWEB shall not exceed the following daily fluctuations in Trail Bridge Reservoir for the term of the New License:
 - a) 7-foot fluctuation from 15 March through 31 October each year
 - b) 12-foot fluctuation from 1 November through 14 March each year
- 2) EWEB shall comply with the following restrictions on fluctuation rate in Trail Bridge Reservoir for the term of the New License:
 - a) No greater downramp than:
 - i) 12 inches per hour from 15 March through 31 August
 - ii) 14 inches per hour from 1 September through 31 October
 - iii) 24 inches per hour from 1 November through 14 March
 - b) No greater upramp than:
 - i) 38 inches per hour all year round
- 3) EWEB shall maintain a minimum elevation of 2,083 feet in Trail Bridge Reservoir from 15 August through 31 October for the term of the New License, which is intended to aid upstream passage of bull trout into Sweetwater Creek by providing a minimum depth of 1 foot of water in the Sweetwater Creek culvert at the entrance.

4.4.1.2 Monitoring

EWEB shall monitor Trail Bridge Reservoir elevations and the rate that reservoir elevations change for the term of the New License. For this monitoring, EWEB shall use the existing Sutron system to record elevation measurements every 15 minutes. EWEB shall analyze these 15-minute measurements on an hourly basis for compliance with the fluctuation rate restrictions in

Section 4.4.1.1 above (e.g., EWEB shall analyze the fluctuation rate from 2:00 to 3:00, 2:15 to 3:15, 2:30 to 3:30, etc.). EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, may propose and install a different system or device for measuring the rate at which Trail Bridge Reservoir elevations change over time.

For this monitoring, EWEB shall measure reservoir elevation on a 15-minute increment, and reservoir elevation change (i.e., fluctuation rate) on an hourly basis. EWEB shall provide an annual summary of these data to the FWG and the Commission (which will be publicly available) each year. EWEB shall provide, but is not limited to providing, the following information in an annual summary:

- 1) daily maximum upramp rates and downramp rates (inches per hour),
- 2) 50th and 90th percentile values for those rates for the following seasonal time frames (15 March through 14 June, 15 June through 31 August, 1 September through 31 October, 1 November through 14 March) for each calendar year,
- 3) upramp and downramp rates plotted as exceedance curves by seasonal time frame and additive by year,
- 4) the 50th and 90th percentile values for daily maximum upramp and downramp rates by seasonal time frame and additive by year, and
- 5) 15-minute measured reservoir elevations for each year.

4.4.2 Trail Bridge Reservoir fish stranding management measures

4.4.2.1 Overview

EWEB operates Trail Bridge Reservoir as a re-regulating facility for peaking operations at Carmen Power Plant, which provides an important component of EWEB's peak power production capabilities. To provide this peaking capability and provide certainty about the level of impacts from stranding to fisheries resources, the Settlement Parties agreed to adopt an adaptive approach as described in this Section 4.4.2, which allows flexible ramping rates within the limitations provided in Section 4.4.1. This adaptive approach is based on attaining a 2% or less stranding rate (Stranding Standard, Section 4.4.2.2) for Chinook salmon fry as provided in this Section 4.4.2, which will be monitored for a minimum of 5 years. The Stranding Standard applies to Chinook salmon, which are intended to represent the potential stranding rates for bull trout and other native species.

If, after 5 years of monitoring and adaptation, the Stranding Standard has not been attained, EWEB shall continue to monitor and adapt for one or two more 5-year periods, until such time the Stranding Standard is met. If the Stranding Standard is not met within these time periods, EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall develop and implement options to address stranding rates above the Stranding Standard for the remainder of the New License term.

4.4.2.2 Stranding standard

EWEB shall achieve a Stranding Standard, applied as an enforceable standard, as provided in Section 4.4.2 of this Aquatics Management Plan of not more than a 2% loss of the production of Chinook salmon fry by stranding by reservoir fluctuations within Trail Bridge Reservoir, based on a 3-year rolling average, as further described in Section 4.4.2.9 (collectively, Stranding Standard).

4.4.2.3 Fish stranding reduction plan

EWEB shall implement the following fish stranding reduction plan, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. The fish stranding reduction plan consists of the following actions to reduce stranding of fish in Trail Bridge Reservoir:

- 1) Physically modify potential stranding zones (PSZs) identified as provided in Section 4.4.2.5.
- 2) Conduct an evaluation of the effectiveness of physical modifications implemented in PSZ 15.
- 3) Monitor stranding for at least a five-year period.
- 4) Adaptively manage reservoir facilities, operations, and/or other actions based on the results of monitoring if stranding of more than 2% of the annual Chinook salmon production occurs, as described in Section 4.4.2.7.
- 5) For the life of the New License, provide annual summaries of Trail Bridge Reservoir elevation data to the FWG and the Commission (which will be publicly available). The minimum requirements of the summaries include: (a) daily maximum upramp rates and downramp rates (inches per hour), (b) 50th, 75th, and 90th percentile values for those rates for the following seasonal time frames (15 March through 30 June, 1 July through 31 August, 1 September through 31 October, 1 November through 14 March) for each calendar year, (c) upramp and downramp rates plotted as exceedance curves by seasonal time frame and additive by year, (d) the 50th, 75th, and 90th percentile values for daily maximum upramp and downramp rates by seasonal time frame and additive by year, and (e) 15-minute measured reservoir elevations for each year. EWEB shall provide raw data to the FWG annually. EWEB shall make these data available upon request with reasonable notice as it is acquired during the year.

EWEB shall include the provisions in Sections 4.4.2.2 through Section 4.4.2.9 in the development of any future plans required by this fish stranding reduction plan, as indicated in those sections.

4.4.2.4 Terms and definitions

EWEB shall use the following terms and their definitions in its fish stranding reduction plan.

- 1) **Physical modifications:** Physical changes made to the Trail Bridge Reservoir topography existing at New License issuance that are designed to reduce stranding potential for Chinook salmon and are determined by EWEB in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and

USDA Forest Service, construct any physical modifications during the time periods least sensitive to fish populations, and design all physical modifications, using all available information including information obtained from the PSZ 15 physical modifications evaluation provided in Section 4.4.2.6 below.

- 2) **Operational restrictions:** A change in operations or facilities designed to reduce stranding as provided in Section 4.4.2.7, and developed by EWEB in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service.
- 3) **Preventative measures:** Preventative actions that EWEB may implement after consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service to reduce stranding potential for Chinook salmon. Such actions include, but are not limited to:
 - a) increasing fry and juvenile fish habitat in the Smith and lower Carmen bypass reaches by implementing additional actions above and beyond those habitat enhancement or other actions that are otherwise required by this Aquatics Management Plan, which may induce fish to rear longer in the bypass reaches before entering the Trail Bridge Reservoir; and
 - b) implementing additional rearing habitat enhancements in the Trail Bridge Reservoir, above and beyond those habitat enhancement or other actions that are otherwise required by this Aquatics Management Plan, to attract or to retain small fish away from potential stranding areas.

If EWEB has completed all reasonably available “direct” preventative actions, EWEB may also include as preventive actions “indirect” actions that will not directly affect stranding in the Trail Bridge Reservoir, but will increase overall survival for fry and juvenile fish in the general Project area (e.g., increasing fish habitat below Trail Bridge Dam).

- 4) **Operational backstop:** EWEB shall maintain the Trail Bridge Reservoir elevation at or above 2,084 ft and there will be no Project-induced reservoir elevation changes greater than 2 feet per day and no Project-induced reservoir elevation changes greater than 2 inches per hour for a period of 60 days when peak numbers of Chinook salmon and bull trout are present in the reservoir. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall determine the timing of the 60-day period, and may determine based on available data, that a different minimum reservoir elevation, other than 2,084 ft, better minimizes fry stranding potential and should be used in the definition of Operational Backstop.
- 5) **Mitigation for losses in previous years:** Mitigation actions to compensate for any stranding that exceeds the applicable stranding value in Section 4.4.2.7 after the first five-year monitoring period. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall develop and implement a plan to provide this mitigation commensurate with the amount of Chinook salmon stranded in excess of the applicable stranding value in Section 4.4.2.7. This mitigation may include direct actions to reduce stranding potential of fry in Trail Bridge Reservoir and, if EWEB has completed all reasonably available direct actions, indirect actions that will not directly affect stranding in the Trail Bridge Reservoir but will increase overall survival for fry and juvenile fish in the general Project area. A potential “direct action” may

include, but is not limited to or required to be, enhancements in the remnant channel below Smith Dam. A potential “indirect action” may include, but is not limited to or required to be, enhancements in the swale adjacent to the Carmen-Smith Spawning Channel.

4.4.2.5 Physical Modification of Potential Stranding Zones

PSZs are identified in the *Flow Fluctuations and Stranding* report (Stillwater Sciences 2006c). EWEB may, in consultation with the FWG and subject to approval of the Fish Agencies and USDA Forest Service, identify additional PSZs during the New License term. The locations of the PSZs in Trail Bridge Reservoir are shown in Figure 4-6. EWEB shall implement all actions in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service:

- 1) PSZ 4: Construct egress channels.
- 2) PSZ 7: Remove part of delta and construct egress channels.
- 3) PSZ 15: Increase topographic slope, potentially construct egress channels, modify substrate, maintain habitat elements as provided in Section 4.4.2.6 below.

Unless the FWG agrees otherwise, for the physical modifications of PSZ 4 and PSZ 7, EWEB shall, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, gather the following minimum background information before EWEB performs the physical modifications: surveyed transects covering all potentially modified areas and substrate samples of target sites (using cores or other acceptable method). EWEB shall provide a report containing any background information to the FWG for discussion prior to collaborative design of the stranding zone modifications.

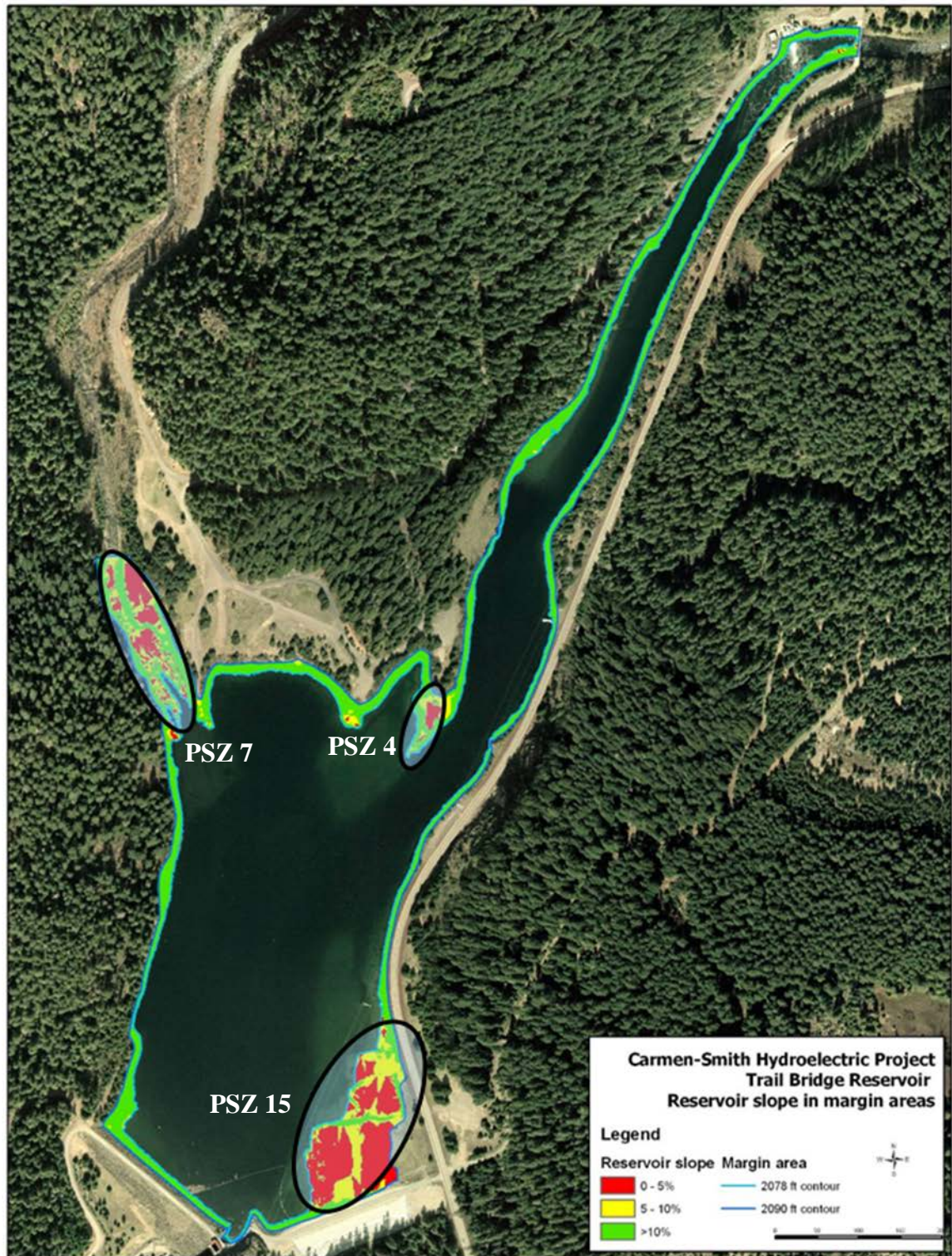


Figure 4-6. Slope gradient in Trail Bridge Reservoir for habitat between low (2,078 ft) and high (2,090 ft) pool elevation, with potential stranding zones shown.

4.4.2.6 PSZ 15 Physical modifications evaluation

- 1) EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall physically modify PSZ 15 in order to evaluate the effect of physical modifications on stranding and rearing habitat, as follows:
 - a) EWEB shall designate two areas in PSZ 15, one as a “treatment area” and one as a “control area.” These two areas in PSZ 15 are shown in Figure 4-7.
 - b) For the treatment area, EWEB shall implement specific physical modifications to reduce stranding while minimizing loss of rearing habitat quality to the extent reasonably possible, subject to the following requirements:
 - i) EWEB shall make the slope of any physical modification as low as reasonably possible to minimize the loss of rearing habitat.
 - ii) EWEB shall focus physical modifications on the areas with the highest risk for stranding.
 - iii) Unless the FWG agrees otherwise, prior to any decisions on physical modification design in PSZ 15, EWEB shall gather the following minimum background information: surveyed transects covering all potentially modified areas and substrate samples of target sites (using cores or other acceptable methods). EWEB shall also complete surveyed transects of the control area of PSZ 15 as soon as reasonably practicable following Trail Bridge Reservoir drawdown. EWEB shall provide a report containing the background information to the FWG for discussion prior to collaborative design of stranding zone treatments.

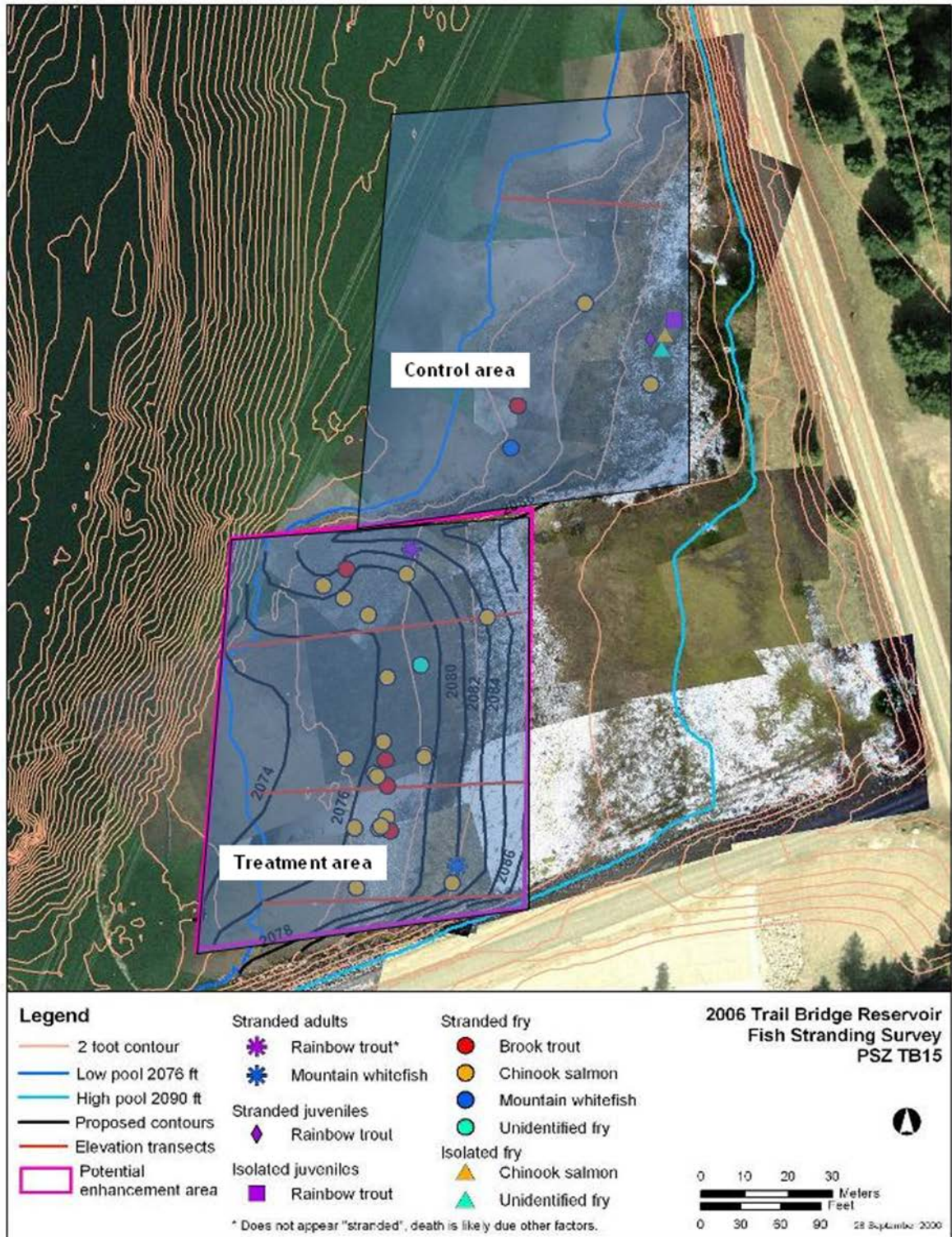


Figure 4-7. Treatment area and Control area of PSZ 15.

- 1) EWEB shall conduct spawning surveys and Trail Bridge Dam trap and haul fish counts of Chinook salmon migrating upstream. If EWEB determines, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, that there is a predictable and statistically valid relationship between spawning counts or Trail Bridge Dam trap and haul fish counts and production, then EWEB may discontinue outmigrant trapping.

Chinook salmon stranding monitoring

In the final Study Plan, EWEB shall follow methods similar to those used in the *2006 Stranding Study at Trail Bridge Reservoir* (Stillwater Sciences 2006c) study (i.e., monitoring transects, stratified by substrate, and estimates based on probability of detection) for stranding monitoring, but shall update and improve the methods based on the results of the 2006 stranding study and consideration of suggestions made by the Expert Review Panel. In the Chinook Salmon Stranding Study Plan, EWEB shall include the following actions (unless EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, determines to use different actions):

- 1) EWEB shall conduct stranding monitoring in the three PSZs with the highest risk of stranding as shown in the *Flow Fluctuations and Stranding* report (Stillwater Services 2006c) and shall also conduct stranding monitoring in at least two other habitat types within the Trail Bridge Reservoir. For each of these two additional areas, EWEB shall include in the area at least 100 m of reservoir margin length, and shall select the areas to be representative of other habitat types in the reservoir (e.g., rip-rap or steep bank).
- 2) EWEB shall use “fixed width” transects for its monitoring and shall extrapolate the results of that monitoring to unsampled transects.
- 3) EWEB shall conduct random or stratified sampling of transects each day of its monitoring.
- 4) EWEB shall conduct stranding monitoring each week during the first year of stranding monitoring. In the second or subsequent years of stranding monitoring, EWEB may determine, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, that previous results justify an adjustment to stranding monitoring to decrease the duration or frequency of the monitoring, as appropriate.
- 5) Pursuant to 4) above, EWEB shall conduct stranding monitoring weekly, with each monitoring event consisting of a four-day field effort. EWEB shall extrapolate the results of a four-day monitoring event to the remaining three days in the week when no monitoring occurs on those days.
- 6) EWEB shall conduct probability of detection surveys (i.e., probability of observing a fish that has become stranded) independently and monthly, using hatchery Chinook salmon fry. “Stranding cells” composed of enclosed areas may also be used to attempt to “naturally” strand fish to test surveyors’ ability to detect fish that are not placed by humans.

Data analysis

- 1) Based on the results of stranding monitoring, EWEB shall prepare a yearly estimate of the percentage loss of Chinook salmon production to stranding for each of the five years of monitoring (e.g., $X\% \pm Y\%$), and an estimate of a 3-year rolling average of the percentage loss of Chinook salmon production to stranding. EWEB shall take into account in preparing

the estimates the error inherent in the accuracy of production estimates, as well as the error inherent in the accuracy of stranding estimates. EWEB shall use a point estimate without inclusion of the inherent error in the accuracy of the 3-year rolling average in determining whether the Stranding Standard of 2% has been exceeded.

- 2) In calculating variance of stranding estimates, EWEB may include a direct calculation of variance for the kernel method used to estimate the detectability function, or may include a ratio estimator if a more parametric form is assumed for the detectability function (Thompson 1992). The variance of the stranding estimate is more critical to the estimate of stranding than the variance of the outmigrant trap estimate.

As an example, EWEB can calculate the point estimate of mortality due to stranding (M) as:

$$\hat{M} = \frac{\hat{Y}}{\hat{X}},$$

Where \hat{Y} is the estimate of Chinook salmon stranded, and \hat{X} is the estimate of Chinook salmon production. EWEB could then calculate the variance of the mortality due to stranding as:

$$\hat{V}(\hat{M}) = \left(1/\hat{X}^2\right) \cdot \left[\hat{M}^2\hat{V}(\hat{X}) + \hat{V}(\hat{Y})\right],$$

based on Cochran (1977)'s estimate of variance for a ratio estimator.

4.4.3 Flow fluctuations downstream of Trail Bridge Dam

4.4.3.1 Flow fluctuation restrictions

Ramping means those Project-induced increases (upramps) and decreases (downramps) over time in the McKenzie River water surface levels (elevations) for the purpose of Project construction, operation, and maintenance. Such Project-induced increases and decreases do not include changes in water surface elevations due to natural increases or decreases in water flow. For fluctuation restrictions provided in this section, the distance between the highest and lowest water elevation measured will not vary by more than a specified amount (the restriction) during the applicable time period. EWEB shall implement the provisions of this section except as provided in proposed License Article 17 and the construction management plan, implemented under that New License Article.

- 1) To limit operations leading to fluctuations, EWEB shall operate the Project within the following limits or Project-induced elevation changes in the McKenzie River downstream of Trail Bridge Dam for the term of the New License:
 - a) Upramp:
 - i) Normal operations: 0.20 feet per hour
 - ii) Scheduled maintenance requiring drawdown of a Project reservoir: 0.4 ft/hr
 - iii) EWEB shall provide the FWG two weeks prior notice of scheduled maintenance
 - b) Downramp: 0.20 feet per hour
 - c) Daily and weekly variation—downramp and upramp:

		<u>Daily</u>	<u>Weekly</u>
i)	1 April through 31 August	0.30 ft	0.30 ft
ii)	1 September through 31 October	0.20 ft	0.20 ft
iii)	1 November through 31 March	0.60 ft	0.80 ft

- 2) EWEB shall use the following criteria for the fluctuation restrictions in the McKenzie River downstream of Trail Bridge Dam provided in 1) above:
 - a) Compliance will be measured in 0.10-foot increments.
 - b) The compliance point will be the USGS Trail Bridge gage, located 0.6 km (0.4 mi) downstream of Trail Bridge Dam, using applicable USGS standards for flow measurement and data collection.
 - c) The restrictions will apply only to artificial (i.e., Project-induced) variations.
 - d) EWEB shall measure the river surface elevation every 15 minutes and analyze these 15-minute measurements on an hourly basis for compliance with the fluctuation restrictions (e.g., EWEB shall analyze the fluctuation rate from 2:00 to 3:00, 2:15 to 3:15, 2:30 to 3:30, etc.).
 - e) EWEB shall consult with the FWG to schedule maintenance actions to minimize impacts whenever reasonably practicable. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall prepare and implement a schedule for normal, routine maintenance activities. EWEB shall develop the schedule within 7 years of New License issuance. EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, may modify this schedule as necessary.

- 3) EWEB may conduct a study in the future related to revising the ramping rates in Subsection 4.4.3.1.1) above in the McKenzie River below Trail Bridge for flows greater than 1,200 cfs.

- 4) If EWEB chooses to conduct a study, EWEB shall develop the study plan and resulting report in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. The study will include monitoring as part of the evaluation of any new proposed ramping rates. Both the study plan and study report will be submitted to the FWG for a minimum of 30 days for review and comment. After receiving all agencies’ approval of the study plan, EWEB may implement the study.
 - a) EWEB shall only propose a revision to ramping rates if EWEB, based on the results of the study and in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, determines that the proposed revised ramping rate is “equally protective” of the natural resources as compared with the ramping rates in the New License and this Aquatics Management Plan. Whether a proposed revision is “equally protective” will be determined in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service. If EWEB demonstrates that the proposed revised ramping rate is demonstrably equally protective in terms of stranding of juvenile fish and other effects on aquatic and terrestrial resources, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, EWEB may state in an application to amend the New License that the Fish Agencies and

USDA Forest Service support the application. If EWEB determines, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, that the studied ramping rates are not equally protective of the natural resources as compared with the prior ramping rates set forth in Subsection 4.4.3.1.1), EWEB shall continue the ramping rates in Subsection 4.4.3.1.1). If EWEB implements the changed ramp rates, and condition(s) in the reach or the assumptions that drove the study change significantly, as identified by the FWG, EWEB shall develop and implement a monitoring plan in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service to confirm that the new ramp rates are still “equally protective”. If, based on the monitoring plan, the FWG determines that the changed ramp rates are no longer equally protective of the natural resources as compared to the prior ramping rates, EWEB shall revert to the prior ramping rates in Subsection 4.4.3.1.1).

- b) Because this study is not proposed now but could be proposed later, EWEB shall apply for and obtain any necessary permits or other authorizations including incidental take permits under the Endangered Species Act to perform the study if and when the study is proposed.

4.5 Large Woody Debris Management

EWEB shall take the following actions regarding large woody debris (LWD) management in the Project area for the term of the New License:

- 1) Collect LWD within the Project
- 2) Stockpile and store collected LWD
- 3) Prioritize LWD for implementation of enhancement plans
- 4) Coordinate efforts with the Vegetation Management Plan and the Roads, Waste Areas, and Staging Areas Management Plan

LWD is defined as structurally sound logs, with or without rootwads, that are greater than 6 m (approximately 20 ft) long and 0.3 m (1 ft) diameter at 4.5 ft from the large end.

EWEB shall schedule and perform LWD recovery and transport of LWD to storage site(s), and place it at habitat areas or areas identified that would benefit from the addition of LWD to maintain or restore ecological processes as described below.

4.5.1 Collect LWD

Salvaged wood collected on National Forest Lands belongs to the USDA Forest Service. EWEB shall develop, in consultation with USDA Forest Service, and implement an agreement with the USDA Forest Service for wood management in the Project area. EWEB shall collect LWD from Project reservoirs and roads. EWEB shall check for LWD during daily maintenance rounds and will stockpile and store it as soon as is reasonably practicable (usually within a week). Smaller

pieces of structurally sound wood that could be used as brush bundles or as elements in larger anchored habitat projects will also be collected.

LWD will not be shortened except to the extent needed to transport and stockpile, but shall not be reduced to less than 20 feet long unless the length creates a risk to human health, the environment, or property. Root wads will remain connected to the logs to the extent it is still possible to manage this material, as there is additional habitat value in the root sections. Unless they are identified as a safety hazard, trees that are leaning into or have fallen into reservoirs or bypass reaches and remain anchored, or are determined by EWEB and USDA Forest Service to be securely in place, will not be removed or modified.

Following a discrete event that results in a substantial amount of LWD being present in Project reservoirs or on Project roads, EWEB shall take the following actions:

- 1) Call designated FWG members to advise them of the situation.
- 2) Begin the process of corralling the LWD as soon as is reasonably practicable.
- 3) Initiate an emergency meeting or conference call of designated FWG members (including, but not limited to the USDA Forest Service) within 96 hours after the event has stabilized. The purpose of the emergency meeting is to receive FWG guidance on amounts and sizes of LWD to be collected and stored based upon the existing situation. EWEB shall develop, in consultation with the FWG and subject to approval by Fish Agencies and USDA Forest Service, and implement a plan for any LWD in excess of EWEB's available storage capacity. EWEB retains the responsibility for removing the LWD from Project reservoirs and roads and temporarily stockpiling the excess wood.
- 4) Store high quality LWD up to available storage capacity.
- 5) Dispose of LWD above storage capacity after coordination with USDA Forest Service as described in 3) above.

4.5.2 Stockpile LWD

EWEB shall stockpile all collected LWD (and some smaller pieces as described above). EWEB shall use methods of storage to minimize the need to shorten or decrease the size of LWD pieces and maintain important structural characteristics, such as root wads, to the extent possible. Locations will also be selected to reduce transport time and improve feasibility of getting LWD to enhancement projects. For example, a stockpile site will be designated in the Smith Bypass Reach to ease the transport of LWD to enhancement sites designated there. EWEB shall store the LWD in a secure site where there is reasonable protection from illegal firewood cutting, theft, or other non-designated consumptive uses. Additional storage sites may also be necessary if available storage capacity is exceeded, possibly following large storm events.

4.5.3 Prioritize LWD for enhancement projects

When LWD is stockpiled, EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall prioritize the use of LWD in the implementation of enhancement projects recognizing that the value and feasibility of LWD for specific

enhancement projects is related to the size of the material, ability to transport and place particular pieces, and structural qualities. The priorities for the use of LWD will be:

- 1) Smith Bypass Reach,
- 2) Trail Bridge Reservoir,
- 3) Smith Reservoir,
- 4) Carmen Diversion Reservoir,
- 5) Lower Carmen Bypass Reach,
- 6) Deer Creek Transmission Line Relocation Area, and
- 7) Ongoing maintenance of 1) through 6) above.

Other uses that may be prioritized are improving terrestrial downed wood habitat within the Project boundary primarily along the transmission line right-of-way and riparian habitat enhancement within the Project boundary as described in the Vegetation and Wildlife management plans. Any excess LWD will be available to the USDA Forest Service for enhancement projects in the McKenzie River upstream and downstream of Trail Bridge Reservoir and tributaries or for any other purposes. EWEB shall seek to use the LWD and smaller pieces of structurally sound wood, or provide them to other entities, while they are still structurally sound and can provide maximum value to habitat restoration/enhancement projects. Efforts will be made to prioritize and place wood within 10 years; EWEB, in consultation with the FWG and subject to approval by the Fish Agencies and USDA Forest Service, shall make available to other parties any LWD stored longer than 10 years to reduce decay during storage.

EWEB shall prepare and distribute an annual report on the status of the LWD management program, including the amount and types (e.g., size ranges) of LWD collected during the year and amount and location of material transported and used to meet the requirements of this plan.

5 REPORTING REQUIREMENTS

EWEB shall prepare an annual report regarding EWEB's implementation of this AMP. EWEB shall provide a draft of the annual report to the FWG for a 30-day comment period on the draft report. At the request of a FWG member, EWEB shall extend the comment period for an additional 30 days. EWEB shall submit a final report and response to comments on the draft report to the Commission within 90 days after the end of the comment period. EWEB shall include, at a minimum, the following information in the annual report:

- 1) A summary of the actions that EWEB implemented during the previous calendar year.
- 2) A discussion of any substantial differences between the actions provided in this AMP and the actions that EWEB implemented, including explanations for any substantial differences.
- 3) A summary of the actions EWEB plans to implement for the current calendar year.
- 4) A discussion of any substantial differences between the implementation schedule in this AMP and the schedule for the actions EWEB plans to implement in the current calendar year, including an explanation for any substantial differences.
- 5) Documentation of consultation with the FWG and approval by the agencies with approval authority regarding actions EWEB implemented under this AMP in the previous calendar year.
- 6) Results of any monitoring that occurred during the previous calendar year, conclusions that EWEB draws from the monitoring results, and any changes to this AMP EWEB proposes based on the monitoring results. EWEB shall consult with the FWG and obtain any necessary approvals as provided in Sections 2.2.2.1, 2.2.2.2, 2.2.2.3 and 2.3 of this AMP regarding any proposed changes to this AMP based on the monitoring results.

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Attachments

Attachment A

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ATTACHMENT A
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Attachment B

Section 8.12 of the Carmen-Smith Settlement Agreement

8.12 Notice.

Except as otherwise provided in this Section 8.12, any notice required by this Agreement will be written and will be sent by first-class mail or comparable method of distribution (including e-mail) to all Parties still in existence or their successors and will be filed with FERC if required by this Agreement. For the purpose of this Agreement, a notice will be effective seven days after the date on which it is mailed or otherwise distributed. When this Agreement requires notice in less than seven days, notice will be provided by telephone, facsimile, or electronic mail and will be effective when provided. For the purpose of notice, the list of authorized representatives of the Parties as of the Effective Date is attached as Exhibit I. The Parties will provide notice as provided in this Section 8.12 of any change in the authorized representatives designated in Exhibit I, and EWEB will maintain the current distribution list of such representatives.

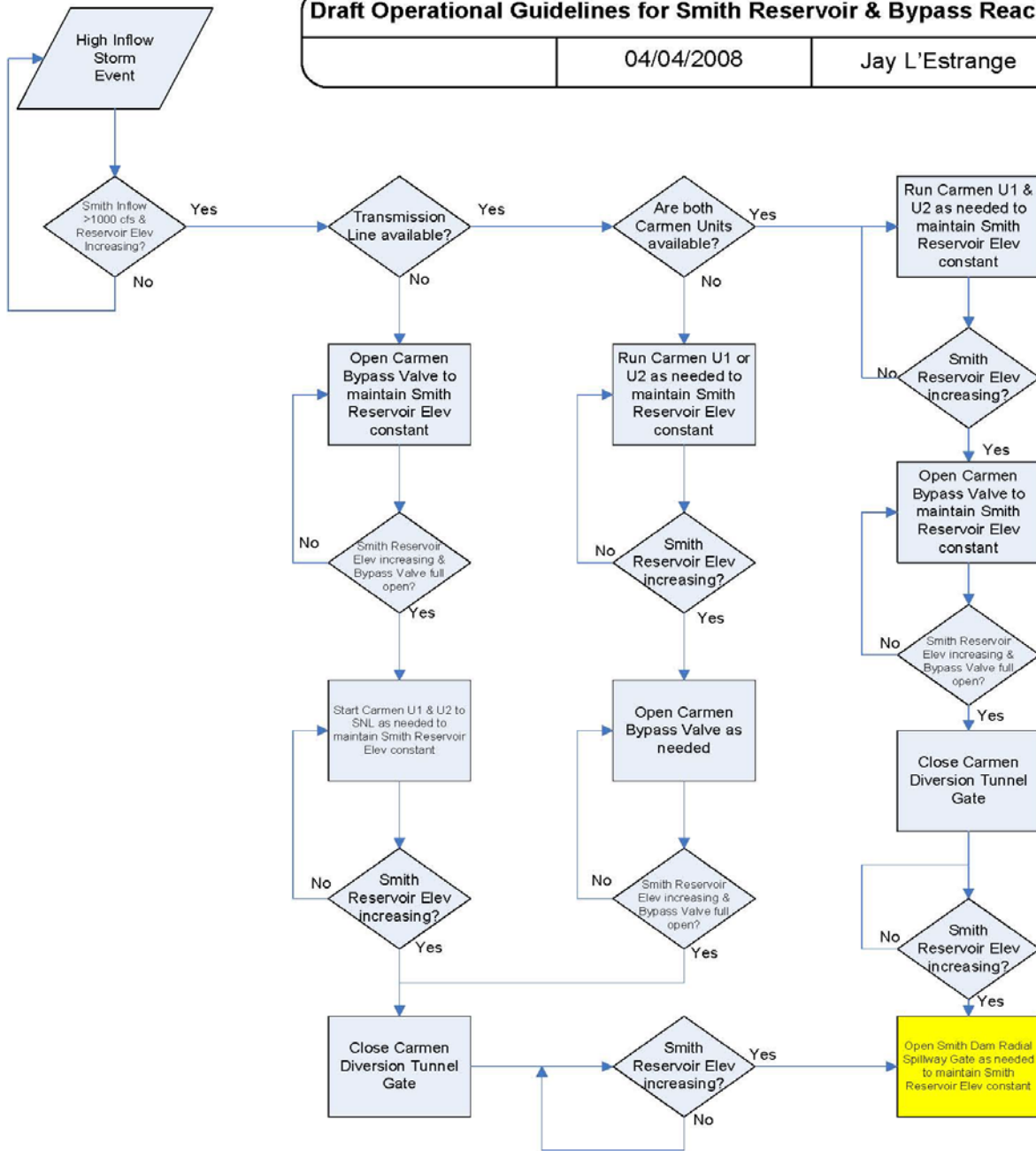
Attachment C

**Operational Guidelines for Smith Reservoir and Bypass
Reach**

Draft Operational Guidelines for Smith Reservoir & Bypass Reach

04/04/2008

Jay L'Estrange



- Notes
1. Carmen Diversion Tunnel capacity = 800 cfs at Smith Reservoir Elev of 2595 ft.
 2. Carmen Power Tunnel capacity = 6,000 cfs.
 3. Carmen Turbine capacity = 1,300 cfs @ full load, 150 cfs at speed-no-load.
 4. Turbine Bypass Valve capacity = 800 cfs.
 5. Smith Dam spillway gate capacity = 9,800 cfs @ Smith Reservoir Elev of 2608 ft.

Attachment D

OAR 635-412-0035 (Oregon Fish Passage Criteria)

OAR 635-412-0035

Fish Passage Criteria

(1) General requirements for fish passage are:

(a) Unless the owner or operator of an artificial obstruction chooses to provide year-round fish passage for all native migratory fish and life history stages, the Department shall determine:

(A) Native migratory fish currently or historically present at the site which require fish passage;

(B) Life history stages which require fish passage; and

(C) Dates of the year and/or conditions when passage shall be provided for the life history stages and native migratory fish.

(b) The person submitting the fish passage plan to the Department for approval shall submit all information necessary to efficiently evaluate whether the design will meet fish passage criteria;

(c) If site-specific circumstances indicate that the fish passage criteria are not adequate to provide fish passage, the Department may require in writing that additional fish passage criteria be met;

(d) If native migratory fish- or site-specific circumstances warrant it, the Department may provide an exception to any specific fish passage criterion if the Department determines in writing that fish passage shall still be provided;

(e) All fish passage structures shall be designed to take into consideration their upstream and downstream connection and prevent undesirable impacts to fish passage, including but not limited to scour and headcuts;

(f) If joint state and federal approval is required, the Department shall take into account federal requirements during approval;

(g) Primarily at sites with little existing site information or questionable design solutions, the Department may require monitoring and reporting to determine if a fish passage structure meets applicable criteria and/or is providing fish passage; and

(h) The person owning or operating an artificial obstruction shall maintain the fish passage structure in such repair and operation as to provide fish passage of native migratory fish at all times required by the Department.

(2) Requirements for fish passage at dams and other artificial obstructions which create a discontinuity between upstream and downstream water surface or streambed elevations are:

- (a) Fishways shall provide fish passage at all flows within the design streamflow range;
- (b) The fishway entrance shall be located and adequate attraction flow shall be provided at one or more points where fish can easily locate and enter the fishway;
- (c) Fishway water velocities shall:
 - (A) Range between 1 and 2 feet per second in transport channels;
 - (B) Average no greater than 5 feet per second in baffled-chute fishways, including but not limited to Alaska steeppasses and denils; and
 - (C) Not exceed 8 feet per second in discrete fishway transitions between the fishway entrance, pools, and exit through which fish must swim to move upstream, including but not limited to slots, orifices, or weir crests.
- (d) At any point entering, within, or exiting the fishway where fish are required to jump to move upstream, the maximum difference between the upstream and downstream water surface elevations shall be 6 inches, except it shall be 12 inches if only salmon or steelhead adults require fish passage;
- (e) In fishway locations through which fish must swim, water depths shall be a minimum of 6 inches where only juveniles require passage and 12 inches where adults require passage, except:
 - (A) Baffled-chute fishways, including but not limited to Alaska steeppasses and denils, shall have a minimum flow depth of 2 feet throughout the length of the fishway; and
 - (B) Water depths shall be a minimum of 2 feet within jump pools which shall be located downstream of any point entering, within, or exiting the fishway where fish are required to jump to move upstream.
- (f) All fishway locations through which fish must swim shall be at least 12 inches wide;
- (g) Fishway pools shall:
 - (A) Be sized according to the native migratory fish and life history stages requiring passage and to avoid over-crowding;
 - (B) Have $V \geq wQH/4$ at all flows within the design streamflow range, where:
 - (i) "V" is the water volume in cubic feet;
 - (ii) "w" is 62.4, the unit weight of water, in pounds per cubic foot;

(iii) "Q" is the fish ladder flow in cubic feet per second;

(iv) "H" is the energy head of pool-to-pool flow in feet; and

(v) 4 has a unit of foot-pounds per second per cubic foot.

(C) Where the fishway bends 90 degrees or more, have turning pools with a flowpath centerline double the length of non-turning pools; and

(D) Be placed at least every 25 feet of horizontal distance in baffled-chute fishways, including but not limited to Alaska steppasses and denils;

(h) The fishway exit should be located to minimize the risk of fish unintentionally falling downstream of the artificial obstruction;

(i) Fishway trash racks shall:

(A) Allow for easy maintenance and debris removal;

(B) Have a minimum clear space between vertical members of 9 inches, except:

(i) 10 inches shall be provided if adult chinook are present; and

(ii) At least 4 inches shall be provided if only juveniles are present; and

(C) Have a minimum clear space between horizontal members of 12 inches;

(j) The fishway shall:

(A) Have water temperatures which are within 1 degree Fahrenheit of the water entering the fishway;

(B) Be designed to assure that fish do not leap out of the fishway;

(C) Have all edges and fasteners which fish may contact ground smooth or chamfered;

(D) Not have protrusions extend into the flow path of the fishway;

(E) Have as much ambient lighting as possible;

(F) Have fishway components which are not detailed in OAR 635-412-0035(2), including but not limited to auxiliary water systems, designed considering the most recent National Marine Fisheries Service or U.S. Fish and Wildlife Service fish passage criteria and guidelines; and

(G) Meet the species-specific requirements in OAR 635-412-0035(7) if any of those native migratory fish require fish passage.

(k) Requirements for specific types of fishways include:

(A) Baffled-chute fishways, including but not limited to Alaska steppasses and denils, shall not be used in areas where downstream passage will occur through the baffled-chute fishway;

(B) All fishways of a specific type with accepted configurations shall comply with those configurations; and

(C) Fish passage plans for stream channel-spanning weirs, roughened channels (including but not limited to nature-like, rock, or engineered-stream fishways), and hybrid fishways (including but not limited to pool-and-chute ladders) which may combine criteria elements of natural streams and/or established fishway types (including but not limited to pool-and-weir, vertical slot, and baffled-chute fishways) shall clearly demonstrate how water depths, water velocities, water drops, jump pools, structure sizing, and fish injury precautions shall provide fish passage.

(l) For downstream fish passage:

NOTE: fish screening and bypass requirements for diverted water are separate from these requirements.

(A) Fish passage structures shall have an open water surface, except a submerged or enclosed conduit or orifice may be utilized if:

(i) Acceptable guidance or collection mechanisms are used and kept free from debris;

(ii) Water depth is greater than 4 inches during all flows;

(iii) Water velocity is greater than 2 feet per second during all flows;

(iv) Water is not pumped;

(v) Conduits have smooth surfaces and avoid rapid changes in direction to preclude fish impact and injury; and

(vi) Conduits are at least 10 inches wide.

(B) Plunging flow moving past an artificial obstruction via spillways, outlet pipes, or some other means which may contain fish shall:

(i) At all flows, fall into a receiving pool of sufficient depth, depending on impact velocity and quantity of flow, to ensure that fish and flow shall not impact the stream bottom or other solid features; and

(ii) Have a maximum impact velocity into a receiving pool, including vertical and horizontal velocity components, less than 25 feet per second; and

(C) Water depth over spillways shall be greater than 4 inches during all flows.

(3) Requirements for fish passage at road-stream crossing structures such as bridges and culverts are:

(a) Stream Simulation Option:

(A) Open-bottomed and closed-bottom road-stream crossing structures shall have beds under or within the structure that:

(i) Are equal to or greater than the active channel width, as measured at sufficient locations outside the influence of any artificial or unique channel constrictions or tributaries both upstream and downstream of the site;

(ii) Are equal to the slope of, and at elevations continuous with, the surrounding long-channel streambed profile, unless the Department approves maintaining a pre-existing road-impounded wetland;

(iii) Have, for open-bottomed road-stream crossing structures, a minimum of 3 feet vertical clearance from the active channel width elevation to the inside top of the structure;

(iv) Maintain average water depth and velocities that simulate those in the surrounding stream channel; and

(v) Are composed of material that:

(I) Assures the bed under or within the road-stream crossing structure is maintained through time;

(II) Is either natural (similar size and composition as the surrounding stream) or supplemented to address site-specific needs including, but not limited to, bed retention and hydraulic shadow;

(III) Contains partially-buried, over-sized rock if the road-stream crossing structure is greater than 40 feet in length;

(IV) Is mechanically placed during structure installation rather than allowed to naturally accumulate, unless the surrounding streambed is primarily bedrock; and

(V) Excluding partially-buried over-sized rock, is, for closed-bottom road-stream crossing structures, at a minimum depth of 20 percent of the structure height and a maximum depth of 50 percent of the structure height; and

(B) Trash racks shall not extend below the active channel width elevation and shall have a minimum of 9 inches clear spacing between vertical members; or

(b) Alternative Option: the Department may approve road-stream crossing structures for which clear justification is provided, based on fish performance and/or fish behavior data and hydraulic conditions, that the alternative design shall provide fish passage.

(4) Requirements for fish passage at artificial obstructions in estuaries, and above which a stream is present, are:

(a) Fish passage shall be provided at all current and historic channels;

(b) Fish passage structures shall meet the criteria of OAR 635-412-0035(2) or (3), except fish passage structures shall be sized according to the cumulative flows or active channel widths, respectively, of all streams entering the estuary above the artificial obstruction; and

(c) Tide gates and associated fish passage structures shall be a minimum of 4 feet wide and shall meet the requirements of OAR 635-412-0035(2) within the design streamflow range and for an average of at least 51% of tidal cycles, excluding periods when the channel is not passable under natural conditions.

(5) Requirements for fish passage at artificial obstructions in estuaries, floodplains, and wetlands, and above which no stream is present, are:

(a) Downstream Fish Passage:

(A) Downstream fish passage shall be provided after inflow which may contain native migratory fish;

(B) Downstream fish passage shall be provided until water has drained from the estuary, floodplain, or wetland, or through the period determined by the Department which shall be based on one, or a combination of, the following:

(i) A specific date;

(ii) Water temperature, as measured at a location or locations determined by the Department;

(iii) Ground surface elevation;

(iv) Water surface elevation; and/or

(v) Some other reasonable measure.

(C) Egress delays may be approved by the Department based on expected inflow frequency if there is suitable habitat and as long as passage is provided by the time the conditions in OAR 635-412-0035(5)(a)(B) occur;

(D) A minimum egress flow of 0.25 cubic feet per second (cfs) at one point of egress shall be provided;

(E) Egress flow of 0.5 cfs per 10 surface acres, for at least the first 100 surface acres of impounded water, shall be provided;

(F) All plunging egress flows shall meet the requirements of OAR 635-412-0035(2)(1)(B);

(G) If egress flow is provided by a pump, it shall be appropriately screened;

(H) The minimum water depth and width through or across the point of egress shall be 4 inches;

(I) The ground surface above the artificial obstruction shall be sloped toward the point(s) of egress to eliminate isolated pools; and

(J) An uninterrupted, open connection with a minimum water depth of 4 inches shall be present from the point of egress to the downstream waters of this state, unless another connection is provided as per OAR 635-412-0035(2)(1)(A).

(b) Upstream Fish Passage: a fishway or road-stream crossing structure with or without a tide gate shall be provided during the period determined by the Department if there is current or historic native migratory fish spawning or rearing habitat within the estuary, floodplain, or wetland area impounded by the artificial obstruction.

(6) Requirements for fish passage at traps are:

(a) A collection permit issued by the Department is required to operate all traps;

(b) Traps shall be constructed to prevent physical or physiological injury to native migratory fish;

(c) Traps shall meet all requirements of OAR 635-412-0035(2)(g);

(d) Traps located within a fishway (i.e., "in-ladder" traps) shall not inhibit native migratory fish from entering the fishway or trap and shall be removed if the Department determines that fish are not entering the trap;

(e) Native migratory fish shall be processed through traps with minimal possible delay and as frequently as necessary to avoid over-crowding;

(f) All native migratory fish, excluding those which have approved take authorization from the Department and which do not require fish passage as per OAR 635-412-0035(1)(a), shall be returned to the stream by one of the following methods:

(A) Movement from the trap to immediately-adjacent water which has fish passage; or

(B) Transport within a watered container, including but not limited to lifts, hoppers, locks, and trucks, from the trap to a location approved by the Commission.

(7) Additional requirements for specific native migratory fish are:

(a) *Acipenser* species (sturgeon):

(A) The fish passage structure shall not require fish to jump when entering, within, or exiting the structure;

(B) The fish passage structure, including trash racks, shall be sized to accommodate the largest individual expected to require fish passage; and

(C) Non-volitional transport within a watered container shall be allowed with Department approval.

(b) *Catostomus* and *Chasmistes* species (suckers):

(A) The fish passage structure shall not require fish to jump when entering, within, or exiting the structure;

(B) Fishways shall have a maximum water velocity of 4 feet per second;

(C) Fishways shall have a minimum water depth of 12 inches;

(D) Fishways shall maximize downstream flow between pools to avoid back eddies;

(E) Fishways shall have curved walls within turning pools; and

(F) Fishways shall have a slope less than 4 percent.

(c) *Lampetra* species (lamprey):

(A) Fishways shall not have overhanging surfaces;

(B) Fishways shall have rounded or chamfered edge surfaces over which *Lampetra* species may pass;

(C) Fishways shall, in locations with water velocities greater than 2 feet per second, have a passage route that:

(i) Has a smooth, impermeable, uninterrupted surface or a simulated streambed;

(ii) Has water velocities over the structure's surface less than 8 feet per second; and

(iii) Is wetted.

(d) *Oncorhynchus* species (trout and salmon): fish passage structures for *Oncorhynchus keta* (chum) shall not require fish to jump when entering, within, or exiting the structure.

(e) *Ptychocheilus* species (pikeminnow): fish passage structures shall meet the requirements of OAR 635-412-0035(7)(a).

(f) If more than one native migratory fish species requires passage at a site and the requirements for the different species are mutually exclusive, the Department shall determine passage criteria.

(8) Requirements for artificial obstruction removal are:

(a) Artificial obstruction removals shall follow the requirements of OAR 635-412-0035(10);

(b) If not completely removed, no parts of the remaining artificial obstruction shall:

(A) Constrict the stream channel; or

(B) Cause low flow depths less than the surrounding stream channel.

(c) After an artificial obstruction is removed the stream channel shall be restored; and

(d) The stream channel restoration shall address impacts to stream habitat caused by the artificial obstruction while in place and by its removal, including but not limited to upstream and downstream channel degradation, and provisions shall be made to address unexpected fish passage issues resulting from removal.

(9) Requirements for exclusion barriers are:

(a) Exclusion barriers shall only be placed in the following situations, when fish passage is not required or is provided by other means:

(A) To guide fish to an approved fish passage structure or trap;

(B) To prevent fish from leaving waters of this state and entering human-made water supply conduits;

(C) To prevent fish from entering waters of this state associated with operations of another artificial obstruction that could lead to fish injury; or

(D) To achieve other fish management objectives approved in writing by the Department; and

(b) Exclusion barriers shall comply with National Marine Fisheries Service or U.S. Fish and Wildlife Service criteria.

(10) Requirements for fish passage during construction of fish passage structures and periods when temporary artificial obstructions are in place are:

(a) All fish passage structures shall be constructed and temporary artificial obstructions shall be in place only during the site-specific in-water work period defined or approved by the Department;

(b) At times indicated by the Department as per OAR 635-412-0035(1)(a), downstream fish passage shall be provided and:

(A) The outfall of a stream flow bypass system shall be placed to provide safe reentry of fish into the stream channel; and

(B) If downstream fish passage during construction is not required and stream flow is pumped around the site, the site shall meet Department screening and/or bypass requirements.

(c) At times indicated by the Department as per OAR 635-412-0035(1)(a), upstream fish passage shall be provided and shall be based on the wetted-width or flows of the stream during the period of construction or temporary obstruction;

(d) In-stream construction sites shall be isolated from stream flow and fish;

(e) Prior to in-stream construction activities, all fish shall be safely collected, removed from the construction site or de-watered reach, and placed in the flowing stream by an authorized person with a collection permit issued by the Department; and

(f) After construction, the construction site shall be re-watered in a manner to prevent loss of downstream surface water as the construction site's streambed absorbs water.

(11) Requirements for experimental fish passage structures are:

(a) Experimental fish passage structures shall only be allowed in waters of the state after:

(A) Laboratory testing with native migratory fish or similar species indicates that the structure is feasible to provide fish passage;

(B) Field testing with a prototype structure, at a location where existing fish passage will not be compromised and where fish passage does not need to be

addressed under OAR 635-412-0020(2) and (3), indicates that the structure is likely to provide fish passage; and

(C) In addition to information needed to evaluate the structure's design for the specific location, the following are submitted to the Department and approved:

(i) A written summary of the laboratory and field testing and how the results indicate that fish passage shall be provided;

(ii) A monitoring and reporting plan to determine if the installed experimental fish passage structure meets applicable design objectives and is providing fish passage; and

(iii) A modification plan for the experimental fish passage structure if monitoring indicates that fish passage is not being provided, including standard thresholds that will initiate these modifications.

(b) If at any time an experimental fish passage structure is deemed by the Department in writing to not provide fish passage, the owner or operator, in consultation with the Department, shall make such modifications to the structure or operation as are necessary to provide fish passage, and, after a reasonable period, if modifications are deemed by the Department in writing to not provide fish passage, a fish passage structure that meets the standard criteria of OAR 635-412-0035 shall be installed as soon as practicable but no later than the end of the next complete in-water work period after notification by the Department;

(c) The owner or operator of an experimental fish passage structure shall allow the Department to inspect experimental fish passage structures at reasonable times;

(d) Five years after the experimental fish passage structure is installed and fish are present to attempt passage a final monitoring report shall be submitted to the Department and the Department shall determine if the experimental fish passage structure provides fish passage;

(e) If the Department determines that the experimental fish passage structure does not provide fish passage, a fish passage structure that meets the standard criteria of OAR 635-412-0035 shall be installed as soon as practicable but no later than the end of the next complete in-water work period after notification by the Department; and

(f) After three experimental fish passage structures of the same design concept are placed in waters of the state and deemed to provide fish passage by the Department, the experimental fish passage structure shall no longer be considered experimental.

Stat. Auth.: ORS 496.138

Stats. Implemented: ORS 509.585 & 509.610

Hist.: DFW 2-2006, f. & cert. ef. 1-9-06