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United States Department of the Interior

FISH AND WILDLIFE SERVICE

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FEDERAL ENERGY REGULATORY COMMISSION

Reply To: 8330.00453(04)
File Name: Pelton biological opinion
TS Number: 05-325

November 2, 2004

Magalie R. Salas
Secretary, Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Subject: Biological Opinion for the Pelton Round Butte Hydroelectric Project, FERC No. 2030 (U.S. Fish and Wildlife Service Reference No. 1-7-04-F-0045)

Dear Ms. Salas:

This biological opinion responds to your request for formal consultation with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1536 *et seq.*), as amended (ESA). This consultation pertains to the Federal Energy Regulatory Commission's (Commission) relicensing of the Pelton Round Butte Hydroelectric Project (Project), Commission No. 2030. The Service received your June 18, 2004, letter requesting consultation on June 21, 2004, at which time formal consultation was initiated. Your letter also included a biological evaluation, which you stated would serve as the Commission's biological assessment pursuant to 50 CFR 402.12. By letter dated August 17, 2004, we notified you that we had received your letter and the attached biological evaluation, and had determined that it met the information requirements set forth in the implementing regulations for section 7 of the ESA (50 CFR 402.14(c)). At issue are the effects of the proposed action to the bull trout (*Salvelinus confluentus*) and bald eagle (*Haliaeetus leucocephalus*). You also stated that the Project will not adversely modify proposed bull trout critical habitat, and declined to conference on effects to proposed critical habitat. The Service has issued its final rule designating bull trout critical habitat, dated October 6, 2004. This consultation is undertaken under Section 7(a)(2) of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.).

Based on information provided in your biological evaluation, the Service agrees that formal consultation is necessary due to the potential for adverse effects to bull trout. The biological evaluation determined that the proposed action may affect, but is not likely to adversely affect bald eagles. We are also providing concurrence with your effect determination regarding bald eagles.

TAKE PRIDE IN AMERICA

Copies of this cover letter were sent to the Commission's Service List to inform them that the final biological opinion has been filed with the Commission. Interested persons on the Service List can request copies of this biological opinion by contacting the Commission. Please contact Peter Lickwar or me at the Bend Field Office at (541) 383-7146 if you have any questions or comments regarding this consultation.

Sincerely,

Nancy Gilbert

Nancy Gilbert
Field Supervisor

cc: Service List (w/o enclosures)
Regional Office, Attn: Larry Salata
Federal Energy Regulatory Commission, Attn: Nick Jayjack
Portland General Electric, Attn: Julie Keil
Warm Springs Power Enterprises, Attn: Jim Manion

Endangered Species Act - Section 7(a)(2)

Biological Opinion and Concurrence on the Issuance of a New License for the Pelton Round Butte Hydroelectric Project
Deschutes, Crook, Jefferson, Marion, and Wasco Counties, Oregeon

Action Agency:	Federal Energy Regulatory Commission
Applicants:	Portland General Electric and the Confederated Tribes of the Warm Springs
Consultation Conducted by:	U.S. Fish and Wildlife Service, Bend Field Office, Bend, OR
Date Issued:	November 2, 2004
USFWS Log No.:	1-7-04-F-0045
File No.:	8330.00453(04)
TS No.:	05-325

Bend Field Office Supervisor Nancy Gilbert [signature] Date: Nov. 2, 2004
Nancy Gilbert

I. BACKGROUND

1.1 Objective of this Consultation

This is an interagency consultation between the Federal Energy Regulatory Commission (Commission) and the U.S. Fish and Wildlife Service (Service) pursuant to section 7(a)(2) of the Endangered Species Act (ESA). Section 7(a)(2) of the ESA requires each Federal agency, in consultation with the Service, to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The Federal Power Act (FPA) authorizes the Commission to license privately owned and operated hydroelectric projects. The Commission may also condition such licenses for the protection and mitigation of environmental resources, including listed species and designated critical habitat. Consequently, the Commission must initiate consultation with the Service under the foregoing statutes if it determines its actions may affect ESA-listed species or designated critical habitat.

1.2 Project Status

The Pelton Round Butte Hydroelectric Project (Project) is currently co-licensed to Portland General Electric (PGE) and the Warm Springs Power Enterprises (WSPE) as Commission No. 2030; WSPE is a corporation owned by the Confederated Tribes of the Warm Springs (Tribes). PGE and WSPE are Joint Applicants (JA) for the new Project license. The existing license expired on December 31, 2001, and since that time the Project has been operating on annual licenses. The JA's, Service, and other relicensing parties signed a Settlement Agreement on July 13, 2004, which resolved the Project's remaining issues. The JA's filed the Settlement Agreement with the Commission on July 30, 2004.

A complete administrative record of this consultation is on file at the Bend Fish and Wildlife Office of the U.S. Fish and Wildlife Service. This biological opinion is based primarily upon information provided in the following documents:

- Commission's Draft Environmental Impact Statement (Commission 2004a);
- April 22, 2004, Revised Biological Evaluation (Commission 2004b) which is incorporated herein by reference;
- JA's Updated Preferred Proposed Alternative (JA 2004a);
- July 13, 2004, Pelton Round Butte Hydro Project Settlement Agreement and attachments (JA 2004b);
- Framework to Assist in Making Endangered Species Act Determinations (USDI 1998a);
- Bull Trout Interim Conservation Guidance (USDI 1998b);
- Final rule listing bull trout in the Columbia River Basin as threatened (USDI 1998c);
- Status of Oregon's Bull Trout (Buchanan et al. 1997);
- Information in the Service's files.

1.3 Concurrence for May Affect, Not Likely To Adversely Affect Determination for the Bald Eagle

Bald eagles within the action area occur in one of the five established recovery regions in the United States, and are addressed within the Pacific Region Bald Eagle Recovery Plan. According to the Pacific Bald Eagle Recovery Plan, most bald eagle nests in the Pacific Recovery Area are located in uneven-aged conifer stands near water bodies which support an adequate food supply of fish and waterfowl for eagles. The biological evaluation states the number of bald eagle breeding pairs in the Lake Billy Chinook portion of the action area has increased from three to eight since 1989. These birds appear to be year-round residents. Between 1989 and 2002, nesting productivity averaged 1.25 young and overall nesting success averaged 74 percent. Bald eagles also use the action area during the fall and winter months. Between 1989 and 2002 late-winter bald eagle counts at Lake Billy Chinook ranged from 17 to 215; in three of these years peak counts were over 125 birds.

Construction activities can disturb occupied bald eagle's nests when they occur within a non-line-of-sight distance of 0.4 kilometer (0.25 mile) or line-of-sight distance of 0.8 kilometer (0.50 mile) during the January 1 to August 31 nesting period. Disturbance can also occur when blasting is conducted within 1.6 kilometers (1.0 mile) of an active nest. Activities within 0.4 kilometer (0.25 mile) of roost trees could disturb roosting eagles from November 1 to April 30. The Service concurs with your biological evaluation's determination that the proposed action is not likely to adversely affect the bald eagle. Our concurrence is based on the following information and rationale:

- There are no activities identified in the proposed action which may have significant direct or indirect adverse effects to bald eagles in the action area.
- There will be no construction activities within several miles of any existing bald eagle nests, which will ensure compliance with the requirement to avoid construction within the non-line-of-sight distance of 0.4 kilometer (0.25 mile) or line-of-sight distance of 0.8 kilometer (0.50 mile), as well as blasting within 1.6 kilometers (1.0 mile), during the January 1 to August 31 nesting period
- There will be no construction activities within several miles of any existing bald eagle roost sites, which will ensure compliance with the requirement to avoid disturbance within 0.4 kilometer (0.25 mile) of bald eagle roost trees from November 1 to April 30.
- Fish species in Lake Billy Chinook and Project tributaries that bald eagles rely on as forage will not be adversely affected by the proposed action.
- Waterfowl species that the bald eagle relies on as forage will not be adversely affected by the proposed action.
- Recreation will be managed to minimize potential impacts to bald eagles, and to ensure that recreational use in the action area is consistent with natural resource objectives.
- Public access and travel access will be managed to minimize potential impacts to bald eagles.
- The status of bald eagles in the Project area will be monitored by bald eagle nesting productivity surveys, communal roost surveys, and winter use surveys.
- Annual reports will be filed with the Service on the status of bald eagles in the action area, as well as the status of bald eagle forage species.

- Information from Terrestrial Resources Management Plan studies will be used to adapt terrestrial management activities to ensure that resource goals for terrestrial species, including the bald eagle, are fully achieved.

1.4 Consultation History

The Service received the Commission's June 18, 2004, letter requesting consultation on June 21, 2004, at which time formal consultation was initiated. The Service had previously consulted with the Commission regarding the Project's original license. The biological opinion for that consultation was issued on October 2, 2001, and expires on December 31, 2006. In addition, a 10(a)(1)(A) scientific collection permit has been issued to PGE at the Project to conduct studies on bull trout. That permit was issued by the Service on May 2, 2001, and expires on May 1, 2005.

The Service has been actively involved in the Project's relicensing proceeding since 1995. We have met frequently with the Tribes, PGE, and natural resource agencies to discuss studies and measures need to protect fish and wildlife resources affected by the Project. Since the listing of the bull trout on June 10, 1998, the Service has also worked to ensure that the proposed mitigation measures avoid or minimize impacts to bull trout. The Service worked with both PGE and Tribes for several years during the preparation of their Draft License Applications. The Service filed comments on the PGE and the Tribe's Draft License Application's on March 26 and July 9, 1999, respectively. After the Tribes and PGE agreed to become Joint Applicant's, the Service reviewed and commented on their Draft Joint Application Amendment on December 15, 2000. After filing Preliminary Terms and Conditions with the Commission on August 12, 2002, the Service and other parties entered into Settlement Agreement negotiations with the JA's in January, 2003. These negotiations led to the Project Settlement Agreement, which was signed on July 13, 2004 (2004b).

Significant milestones and informal discussions between the Service, the National Marine Fisheries Service (NOAA Fisheries), PGE, Tribes, and the Oregon Department of Fish and Wildlife (ODFW) regarding this consultation include the following:

- January 3, 2003, Commission letter designating PGE and the Tribes as non-Federal representatives for the purposes of informal consultation;
- February 8, 2003, draft biological evaluation transmitted to the Service by the JA's;
- February 19, 2003, meeting between the Service and the JA's regarding consultation;
- February 24, 2003, Service receives revised draft biological evaluation from the JA's;
- March 3, 2003, Service sends JA's comments on draft biological evaluation;
- March 14, 2003, JA's file draft biological evaluation with the Commission;
- September 17, 2003, meeting between the Service, NOAA Fisheries, JA's, and the ODFW to discuss consultation process;
- September 24, 2003, Commission requests that the Service initiate formal consultation on the Project;
- November 5, 2003, Service declines to initiate formal consultation on the Project because the Commission's September 24, 2003, consultation request did not include all the required information;

- December 17, 2003, Service telephone discussion with JA's and NOAA Fisheries regarding timeline for revising and filing draft biological evaluation to comport with the Settlement Agreement process;
- December 29, 2003, JA's file a Description of Proposed Preferred Alternative with the Commission, which is in part intended to assist the Commission in updating their description of the proposed action for purposes of ESA consultation;
- April 6, 2004, Commission conducts a meeting with the JA's, NOAA Fisheries, the Department, and American Rivers to discuss a procedural schedule for completing the Project relicensing and ESA consultation;
- April 27, 2004, JA's file the Updated Proposed Preferred Alternative and a revised draft biological evaluation with the Commission;
- June 21, 2004, Service receives the Commission's letter requesting formal consultation and transmitting JA prepared biological evaluation, which will serve as the Commission's biological assessment for consultation;
- July 30, 2004, JA's file the July 13, 2004, Project Settlement Agreement with the Commission;
- August 4, 2004, the Commission issues public notice and requests comments on the July 13, 2004, Settlement Agreement;
- August 17, 2004, Service sends letter accepting the Commission's biological evaluation and initiating formal consultation.
- September 3, 2004, Commission deadline for Settlement Agreement comment and reply comments closes.

II. DESCRIPTION OF PROPOSED ACTION

2.1 Proposed Action

The proposed action under consideration in this biological opinion is the issuance of a new license for the Project. The April 22, 2004, biological evaluation states that the new license will be based on the June, 2001, Final Joint Application Amendment (JA 2001) and the December 31, 2003, Description of Proposed Preferred Alternative (Preferred Alternative (JA 2003)). In addition, the Commission's June 18, 2004, letter initiating consultation noted that the JA's had also filed an Updated Proposed Preferred Alternative (Updated Preferred Alternative (JA 2004a)), dated April 26, 2004. The April 22, 2004, biological evaluation mentioned that a comprehensive Settlement Agreement was being developed for submittal to the Commission. The Settlement Agreement was signed on July 13, 2004, and filed with the Commission on July 30, 2004 (JA 2004b). On August 4, 2004, the Commission issued a public notice and requested comments on the Settlement Agreement. Comments were due by August 24, 2004, and reply comments were due by September 3, 2004. The Oregon Department of Fish and Wildlife (ODFW) and American Rivers filed comments on August 17 and 18, 2004, respectively. Both parties supported the Settlement Agreement. The Settlement Agreement is very similar to the Preferred Alternative, but has details and mitigation measures that were negotiated among the parties between December, 2003, and July, 2004. The July 13, 2004, Settlement Agreement and its attachments provide additional details regarding the proposed action.

The Project consists of three dams located on the Deschutes River in central Oregon. Water released from the Round Butte Dam's Lake Billy Chinook flows into the Pelton Dam's Lake Simtustus, and then into the Reregulation Dam's reservoir. The Project operates as a modified run-of-the-river system, where average daily discharge from the Reregulation Dam is approximately equal to the average daily inflow to Lake Billy Chinook. The Round Butte and Pelton facilities generate power during peak demand periods. The Reregulation facility stores and releases flows from the upstream developments, and balances inflows and outflows on a daily basis in the lower Deschutes River downstream of the Project. On August 28, 2002, the Commission issued an order amending the Project license to remove the 167.5 kilometer-long (100.5 mile) Bethel-Round Butte transmission line and right-of-way from the Project boundary. However, the 16.9 kilometer-long (10.5 mile) distribution line running from the Round Butte switchyard to the Reregulation Dam, and a 12.7 kilometer-long (7.9 mile) transmission line extending from the Pelton Dam Powerhouse to the Round Butte Switchyard are still part of the Project.

Regarding aquatics and fisheries issues, additional facilities will be constructed and operated under the terms of the proposed action. These include: upstream passage from the lower Deschutes River using the existing Pelton Trap, ODFW fish transport trucks, and the proposed Adult Release Facility; upstream passage from Lake Simtustus using the proposed Round Butte Dam fish trap; downstream passage using the proposed Selective Water Withdrawal (SWW) tower, Round Butte fish collection facility, and ODFW fish transport trucks; and reactivation of the existing Pelton Dam Skimmer in Lake Simtustus. The SWW tower will also be used to control the temperature of flows drawn from Lake Billy Chinook and ultimately released to the lower Deschutes River. The pattern of SWW withdrawals are expected to alter the hydrodynamics, temperature, and ecological function of Lake Billy Chinook. The Project and its facilities are more fully described in the Project license application (PGE 1999), the Final Joint Amended Application (JA 2001), and the Preferred Alternative (JA 2003).

Regarding terrestrial issues, the proposed action will develop and implement a Terrestrial Resources Management Plan (TRMP) (JA 2003). This comprehensive plan will address riparian and wetland issues, bald eagle and raptor management, travel and access management, wildlife monitoring, and other issues. The JA's will also implement interim measures regarding upland vegetation management; bald eagle nesting productivity, communal roost surveys, winter use surveys; and conduct surveys for potential avian electrocution hazards. These measures are more fully described in the Commission's biological evaluation (Commission 2004) and the JA's Preferred Alternative (JA 2003).

2.2 Conservation Measures

The conservation measures are actions that benefit or promote the recovery of listed species, and which are included as an integral part of the proposed action. These actions will be taken by the Commission or the JA's, and minimize or compensate for Project effects to listed species under consultation. The Preferred Alternative and Updated Preferred Alternative filed with the Commission dated December 29, 2003, and April 26, 2004, respectively, include several significant conservation measures which are described below. These provisions include: Interim Measures; Project Operating Plan; Fish Passage Plan; Terrestrial Resources Management Plan; description of the proposed Trout Creek Habitat Improvement Project; Pelton Round Butte Fund

Implementation Plan; and a Lower River Gravel Study Design. These are briefly discussed below. On July 30, 2004, the JA's filed a Settlement Agreement that provided additional details (JA 2004b).

2.2.1 Operational Changes

The Project Operating Plan describes the details of Project operations under the new license. Additional restrictions on stage-change limits as well as the installation and upgrading of stream gages on Project tributaries will allow the Project's flow releases into the lower Deschutes River to more closely track Project inflows. Project minimum flows have been increased, and contingency plans allow the Project to release additional flow between September 16 and November 15 of each year if Project inflows are less than 3,000 cubic-feet-per-second (cfs). The JA's must also file a plan to track indicators of long-term low-flow conditions in the lower Deschutes River. Finally, the Preferred Alternative provides for additional restrictions on the seasonal drawdown and reservoir level fluctuation of all three Project reservoirs. These measures will be monitored and enforced under the terms of an Operations Compliance Plan that will be filed by the JA's.

2.2.2 Fish Passage

The Fish Passage Plan details how passage will be implemented. It requires a program of testing and verification studies to track near-term implementation of downstream passage, and a separate program of long-term monitoring that will begin after permanent downstream facilities are activated. This information will be used to modify and adapt fish passage activities. It includes measures pertaining to: fish passage criteria and goals; a schedule for implementation; steps for designing and constructing downstream passage facilities; fish screen criteria; provisions for adding pumped attraction flows to the downstream passage facilities; trap and haul facilities; adult release facilities; volitional upstream passage; modification of downstream facilities; fishway maintenance; annual work plans and reports; and measures to address infeasibility of downstream passage.

Additional measures related to fish passage provide for a native fish monitoring program. This will include spawning surveys for anadromous species and studies of competition between anadromous and resident species such as bull trout. Bull trout populations will be evaluated using annual redd counts, reservoir angler surveys, and monitoring of spawning interactions between bull trout and sockeye.

2.2.3 Mitigation Projects

Mitigation projects include: a study of Lower River Gravel Study; transport and placement of large woody debris from the Project's Lake Billy Chinook to the lower Deschutes River; and habitat restoration in Trout Creek, which is a major tributary to the lower Deschutes. In addition, the JA's have agreed to acquire priority water rights in Squaw Creek by the end of 2004. If this is not feasible the JA's will implement an equivalent project in 2005, or make an additional payment of $1,000,000 to the Pelton Round Butte Fund.

2.2.4 Pelton Round Butte Fund

The Pelton Round Butte Fund (Fund) will support resource protection measures for Project-related impacts that are not otherwise addressed by specific license conditions. The Fund totals $21.5 million in 2003 dollars and will receive these monies in a series of payments between 2005 and 2020. An annual report will list withdrawals from the Fund for mitigation and enhancement projects. The Fund Implementation Plan lists projects which are suitable for Fund purposes, including land acquisition, water rights acquisition, water conservation, conservation easements, construction of fish passage facilities and removal of fish passage barriers, instream habitat improvements, riparian and wetland protection and enhancement, and off-Project recreation impacts. The Fund's Governing Board consists of the Licensees, Confederated Tribes of the Warm Springs Bureau of Natural Resources (CTWS BNR), Confederated Tribes of the Warm Springs Water Control Board (CTWS WCB), the Service, NOAA Fisheries, Bureau of Indian Affairs (BIA), U.S. Forest Service/Bureau of Land Management (USFS/BLM), Non-Governmental Organizations (NGO), ODFW, Oregon Department of Environmental Quality (ODEQ), and Oregon Water Resources Department (OWRD).

2.2.5 Terrestrial Measures

Terrestrial issues at the Project will be addressed through a comprehensive TRMP. The TRMP includes mitigation measures covering: riparian and wetland restoration; vegetation management; bald eagle management; raptor protection; threatened, endangered, and sensitive species protection; travel and access management; and wildlife monitoring. The JA's are also required to file an annual report on TRMP activities and develop and implement an adaptive management process. In addition, the JA's will take the following interim measures while the TRMP is being developed: upland vegetation management; bald eagle nesting productivity surveys; bald eagle communal roost surveys; bald eagle winter use surveys; and conduct surveys for potential avian electrocution hazards. These measures are described in more detail in the biological evaluation and Preferred Alternative.

III. STATUS OF THE SPECIES

3.1 Taxonomy

The bull trout (*Salvelinus confluentus*, family Salmonidae) is a char native to the Pacific Northwest and western Canada, first described as *Salmo spectabilis* by Girard in 1856 from a specimen collected on the lower Columbia River, and subsequently described as *Salmo confluentus* and *Salvelinus malma* (Cavender 1978). Bull trout and Dolly Varden (*Salvelinus malma*) were previously considered a single species (Cavender 1978, Bond 1992). Cavender (1978) presented morphometric, meristic, osteological, and distributional evidence to document specific distinctions between Dolly Varden and bull trout. Bull trout and Dolly Varden were formally recognized as separate species by the American Fisheries Society in 1980 (Robins *et al.* 1980). Although bull trout and Dolly Varden co-occur in several northwestern Washington river drainages, there is little evidence of introgression (Haas and McPhail 1991), and the two species appear to be maintaining distinct genomes (Leary *et al.* 1993, Williams *et al.* 1995, Kanda *et al.* 1997, Spruell and Allendorf 1997). Lastly, the bull trout and the Dolly Varden each appear to be more closely related genetically to other species of *Salvelinus* than they are to each other (Grewe *et al.* 1990, Pleyte *et al.* 1992, Crane *et al.* 1994, Phillips *et al.* 1995). For example, the bull trout is most closely related to the Japanese char (*S. leucomaenis*) whereas the Dolly Varden is most closely related to the Arctic char (*S. alpinus*).

3.2 Physical Description

The bull trout is a long slender fish with a large head and jaws relative to its body-size. Its tail fin is only slightly forked, and even less so in young fish. Bull trout coloration can be variable, but generally, the body's background color is gray infused with green. Bull trout found in lakes may be silvery grey. The body is covered with small white and/or pale yellowish spots with intermingling pink or red spots that may not be always be present. The ventral region can range from white to orange. Bull trout typically have 15-19 gill rakers, 63-66 vertebrae, and 22-35 pyloric caeca. Bull trout of large size can be differentiated from Dolly Varden with bull trout having a larger head and jaws in addition to the head being more flat. Bull trout have spotless fins with the lower fins having white anterior borders. The spotless fin characteristic of bull trout is often used by fisheries agencies to help promote angler identification of bull trout versus other fish, such as brook trout (*Salvelinus fontinalis*) (Behnke 2002).

3.3 Distribution

The historical range of the bull trout includes major river basins in the Pacific Northwest at about 41 to 60 degrees North latitude, from the southern limits in the McCloud River in northern California and the Jarbidge River in Nevada to the headwaters of the Yukon River in the Northwest Territories, Canada (Cavender 1978, Bond 1992). To the west, the bull trout's range includes Puget Sound, various coastal rivers of British Columbia, Canada, and southeast Alaska (Bond 1992). Bull trout occur in portions of the Columbia River and tributaries within the basin, including its headwaters in Montana and Canada. Bull trout also occur in the Klamath River basin of south-central Oregon. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta and Montana and in the MacKenzie River system in Alberta and British Columbia, Canada, (Cavender 1978, Brewin *et al.* 1997).

3.4 Listing History

On June 10, 1998, the Service issued a final rule listing the Columbia River and Klamath River populations of bull trout as threatened (63 FR 31647) under the authority of the ESA. This decision conferred full protection of the ESA on bull trout occurring in four northwestern States. The Jarbidge River population was listed as threatened on April 8, 1999 (64 FR 17110). The Coastal-Puget Sound and St. Mary-Belly River populations were listed as threatened on November 1, 1999 (64 FR 58910), which resulted in all bull trout in the coterminous United States being listed as threatened. The five populations discussed above are listed as distinct population segments (DPS), *i.e.*, they meet the joint policy of the Service and NOAA Fisheries regarding the recognition of distinct vertebrate populations (61 FR 4722). The Service proposed to designate critical habitat for the bull trout on November 29, 2002 (67 FR 71235). The Service issued a final rule designating critical habitat for the bull trout on October 6, 2004 (69 FR 59996).

3.5 Distinct Population Segments and Population Units

Population units of bull trout exist in which all fish share an evolutionary legacy and which are significant from an evolutionary perspective (Spruell *et al.* 1999). These population units can range from a local population to multiple populations, and theoretically should represent a DPS. Although such population units are difficult to characterize, genetic data have provided useful information on bull trout population structure. For example, genetic differences between the Klamath River and Columbia River populations of bull trout were revealed in 1993 (Leary *et al.* 1993). The boundaries of the five listed DPS's of bull trout are based largely on this 1993 information.

Since the bull trout was listed, additional genetic analyses have suggested that its populations may be organized on a finer scale than previously thought. Data have revealed genetic differences between coastal populations of bull trout, which includes the lower Columbia River and Fraser River, and inland populations in the upper Columbia River and Fraser River drainages (Williams *et al.* 1997, Taylor *et al.* 1999). There is also an apparent genetic differentiation between inland populations within the Columbia River basin. This differentiation occurs between the: (a) mid-Columbia River (John Day, Umatilla) and lower Snake River (Walla Walla, Clearwater, Grande Ronde, Imnaha rivers, etc.) populations; and the (b) upper Columbia River (Methow, Clark Fork, Flathead River, etc.) and upper Snake River (Boise River, Malheur River, Jarbidge River, etc.) populations (Spruell *et al.* 2003). Genetic data indicate that bull trout inhabiting the Deschutes River drainage of Oregon are derived from coastal populations and not from inland populations in the Columbia River basin (Leary *et al.* 1993, Williams *et al.* 1997, Spruell and Allendorf 1997, Taylor *et al.* 1999, Spruell *et al.* 2003). In general, evidence since the time of listing suggests a need to further evaluate the distinct population segment structure of bull trout DPS's.

3.6 Life History

Bull trout exhibit both resident and migratory life-history strategies (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear one to four years before migrating to either a lake (adfluvial form), river (fluvial form) (Fraley and Shepard 1989, Goetz 1989), or in certain coastal areas, to saltwater (anadromous) (Cavender 1978, McPhail and Baxter 1996, WDFW et al. 1997). Resident and migratory life-history forms may be found together but it is unknown if they represent a single population or separate populations (Rieman and McIntyre 1993). Either form may give rise to offspring exhibiting either resident or migratory behavior (Rieman and McIntyre 1993). The multiple life-history strategies found in bull trout populations represent important diversity (both spatial and genetic) that help protect these populations from environmental stochasticity.

The size and age of bull trout at maturity depends upon the life-history strategy and habitat limitations. Resident fish tend to be smaller than migratory fish at maturity and produce fewer eggs (Fraley and Shepard 1989, Goetz 1989). Resident adults usually range from 150 to 300 millimeters (6 to 12 inches) total length (TL). Migratory adults however, having lived for several years in larger rivers or lakes and feeding on other fish, grow to a much larger size and commonly reach 600 millimeters (24 inches) TL or more (Pratt 1985, Goetz 1989). The largest verified bull trout was a 14.6-kilogram (32-pound) adfluvial fish caught in Lake Pend Oreille, Idaho, in 1949 (Simpson and Wallace 1982). Size differs little between life-history forms during their first years of life in headwater streams, but diverges as migratory fish move into larger and more productive waters (Rieman and McIntyre 1993).

Ratliff (1992) reported that bull trout under 100 millimeters (4 inches) in length were generally only found in the vicinity of spawning areas, and that fish over 100 millimeters were found downstream in larger channels and reservoirs in the Metolius River Basin. Juvenile migrants in the Umatilla River were primarily 100-200 millimeters long (4 to 8 inches) in the spring and 200-300 millimeters long (8 to 12 inches) in October (Buchanan *et al.* 1997). The age at migration for juveniles is variable. Ratliff (1992) reported that most juveniles reached a size to migrate downstream at age 2, with some at ages 1 and 3 years. Pratt (1992) had similar findings for age-at-migration of juvenile bull trout from tributaries of the Flathead River. The seasonal timing of juvenile downstream migration appears similarly variable.

Bull trout normally reach sexual maturity in 4 to 7 years and may live longer than 12 years. The species is iteroparous (i.e., can spawn multiple times in their lifetime) and adults may spawn each year or in alternate years (Batt 1996). Repeat-spawning frequency and post-spawning mortality are not well documented (Leathe and Graham 1982, Fraley and Shepard 1989, Pratt 1992, Rieman and McIntyre 1996) but post-spawn survival rates are believed to be high.

Bull trout typically spawn from late August to November during periods of decreasing water temperatures (below 9 degrees Celsius/48 degrees Fahrenheit). Redds are often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989, Pratt 1992, Rieman and McIntyre 1996). Migratory bull trout frequently begin spawning migrations as early as April and have been known to move upstream as far as 250 kilometers (155 miles) to spawning grounds in Montana (Fraley and Shepard 1989, Swanberg 1997). In Idaho, bull trout moved 109 kilometers (67.5 miles) from Arrowrock Reservoir to spawning areas in the headwaters of the Boise River (Flatter 1998). In the Blackfoot River, Montana, bull trout began spring spawning migrations in response to increasing temperatures (Swanberg 1997). Depending on water temperature, egg incubation is normally 100 to 145 days (Pratt 1992), and after hatching, juveniles remain in the substrate. Time from egg deposition to emergence of fry may surpass 220 days. Fry normally emerge from early April through May, depending on water temperatures and increasing stream flows (Pratt 1992, Ratliff and Howell 1992).

Bull trout are opportunistic feeders, with food habits primarily a function of size and life-history strategy. Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro-zooplankton, and small fish (Boag 1987, Goetz 1989, Donald and Alger 1993). Adult migratory bull trout feed on various fish species (Leathe and Graham 1982, Fraley and Shepard 1989, Brown 1992, Donald and Alger 1993). In coastal areas of western Washington, bull trout feed on Pacific herring (*Clupea pallasi*), Pacific sand lance (*Ammodytes hexapterus*), and surf smelt (*Hypomesus pretiosus*) in the ocean (WDFW *et al.* 1997).

3.7 Habitat Affinities

Bull trout have more specific habitat requirements than most other salmonids (Rieman and McIntyre 1993). Habitat components that influence the species' distribution and abundance include water temperature, cover, channel form and stability, valley form, spawning and rearing substrate, and availability of migratory corridors (Fraley and Shepard 1989; Goetz 1989; Hoelscher and Bjornn 1989; Sedell and Everest 1991; Howell and Buchanan 1992; Pratt 1992; Rieman and McIntyre 1993, 1995; Rich 1996; Watson and Hillman 1997). Watson and Hillman (1997) concluded that watersheds must have specific physical characteristics to provide the habitat requirements necessary for bull trout to successfully spawn and rear and that these specific characteristics are not necessarily present throughout these watersheds. Because bull trout exhibit a patchy distribution even in pristine habitats (Rieman and McIntyre 1993), individuals of this species should not be expected to simultaneously occupy all available habitats (Rieman *et al.*1997a).

Bull trout are found primarily in cold streams, although individual fish are found in larger, warmer river systems throughout the Columbia River basin (Fraley and Shepard 1989; Rieman and McIntyre 1993, 1995; Buchanan and Gregory 1997; Rieman *et al.* 1997a). Water temperature above 15 degrees Celsius (59 degrees Fahrenheit) is believed to limit bull trout distribution, a limitation that may partially explain the patchy distribution within a watershed (Fraley and Shepard 1989, Rieman and McIntyre 1995).

Spawning areas are often associated with cold-water springs, groundwater infiltration, and the streams with the coldest summer water temperatures in a given watershed (Pratt 1992, Rieman and McIntyre 1993, Rieman *et al.* 1997a, Baxter *et al.* 1999). Water temperatures during spawning generally range from 5 to 9 degrees Celsius (41 to 48 degrees Fahrenheit) (Goetz 1989). The requirement for cold water during egg incubation has generally limited the spawning distribution of bull trout to high elevations in areas where the summer climate is warm. Rieman and McIntyre (1995) found in the Boise River Basin that no juvenile bull trout were present in streams below 1,613 meters (5,000 feet). Similarly, in the Sprague River basin of south-central Oregon, Ziller (1992) found in four streams with bull trout that: "numbers of bull trout increased and numbers of other trout species decreased as elevation increased. In those streams, bull trout were only found at elevations above 1,774 meters (5,500 feet)."

Goetz (1989) suggested optimum water temperatures for rearing bull trout of about 7 to 8 degrees Celsius (44 to 46 degrees Fahrenheit) and for egg incubation of 2 to 4 degrees Celsius (35 to 39 degrees Fahrenheit). For Granite Creek, Idaho, Bonneau and Scarnecchia (1996) observed that juvenile bull trout selected the coldest water of 8 to 9 degrees Celsius (46 to 48 degrees Fahrenheit), within a temperature gradient of 8 to 15 degrees Celsius (46 to 60 degrees Fahrenheit) available in a plunge pool.

In Nevada, adult bull trout have been collected at sites with a water temperature of 17.2 degrees Celsius (63 degrees Fahrenheit) in the West Fork of the Jarbidge River (S. Werdon, *pers. comm.*, 1998) and have been observed in Dave Creek where maximum daily water temperatures were 17.1 to 17.5 degrees Celsius (62.8 to 63.6 degrees Fahrenheit) (Werdon, *in litt.* 2001). In the Little Lost River, Idaho, bull trout have been collected in water having temperatures up to 20 degrees Celsius (68 degrees Fahrenheit); however, these fish made up less than 50 percent of all salmonids when maximum summer water temperature exceeded 15 degrees Celsius (59 degrees Fahrenheit) and less than 10 percent of all salmonids when temperature exceeded 17 degrees Celsius (63 degrees Fahrenheit) (Gamett 1999).

All life-history stages of bull trout are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (Fraley and Shepard 1989, Goetz 1989, Hoelscher and Bjornn 1989, Sedell and Everest 1991, Pratt 1992, Thomas 1992, Rich 1996, Sexauer and James 1997, Watson and Hillman 1997). Jakober (1995) observed bull trout overwintering in deep beaver ponds or pools containing large woody debris in the Bitterroot River drainage, Montana, and suggested that, because of the need to avoid anchor ice in order to survive, suitable winter habitat may be more restricted than summer habitat. Maintaining bull trout habitat requires stability of stream channels and of flow (Rieman and McIntyre 1993). Juvenile and adult bull trout frequently inhabit side channels, stream margins, and pools with suitable cover (Sexauer and James 1997). These areas are sensitive to activities that directly or indirectly affect stream channel stability and alter natural flow patterns. For example, altered stream flow in the fall may disrupt bull trout during the spawning period, and channel instability may decrease survival of eggs and young juveniles in the gravel from winter through spring (Fraley and Shepard 1989, Pratt 1992, Pratt and Huston 1993).

Preferred bull trout spawning habitat consists of low-gradient stream reaches with loose, clean gravel (Fraley and Shepard 1989). In the Swan River, Montana, abundance of bull trout redds (spawning areas) was positively correlated with the extent of bounded alluvial valley reaches, which are likely areas of groundwater to surface water exchange (Baxter *et al.* 1999). Survival of bull trout embryos planted in stream areas of groundwater upwelling used by bull trout for spawning were significantly higher than embryos planted in areas of surface-water recharge not used by bull trout for spawning (Baxter and McPhail 1999). Pratt (1992) indicated that increases in fine sediment reduce egg survival and emergence.

Migratory corridors link seasonal habitats for all bull trout life-history forms. For example, in Montana, migratory bull trout make extensive migrations in the Flathead River system (Fraley and Shepard 1989), and resident bull trout in tributaries of the Bitterroot River move downstream to overwinter in tributary pools (Jakober 1995). The ability to migrate is important to the persistence of bull trout (Rieman and McIntyre 1993, M. Gilpin, *in litt.* 1997, Rieman *et al.* 1997a). Migrations facilitate gene flow among local populations when individuals from different local populations interbreed, or stray, to non-natal streams. Local bull trout populations that are extirpated by catastrophic events may also become re-established by migrants.

3.8 Population Dynamics

Although bull trout are widely distributed over a large geographic area, they exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1993). Increased habitat fragmentation reduces the amount of available habitat and increases isolation from other populations of the same species (Saunders *et al.* 1991). Burkey (1989) concluded that when species are isolated by fragmented habitats, low rates of population growth are typical in local populations and their probability of extinction is directly related to the degree of isolation and fragmentation. Without sufficient immigration, growth for local populations may be low and probability of extinction high (Burkey 1989, 1995).

Metapopulation concepts of conservation biology theory have been suggested relative to the distribution and characteristics of bull trout, although empirical evidence is relatively scant (Rieman and McIntyre 1993, Dunham and Rieman 1999, Rieman and Dunham 2000). A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994). For inland bull trout, metapopulation theory is likely most applicable at the watershed scale where habitat consists of discrete patches or collections of habitat capable of supporting local populations; local populations are for the most part independent and represent discrete reproductive units; and long-term, low-rate dispersal patterns among component populations influences the persistence of at least some of the local populations (Rieman and Dunham 2000). Ideally, multiple local populations distributed throughout a watershed provide a mechanism for spreading risk because the simultaneous loss of all local populations is unlikely. However, habitat alteration, primarily through the construction of impoundments, dams, and water diversions has fragmented habitats, eliminated migratory corridors, and in many cases isolated bull trout in the headwaters of tributaries (Rieman *et al.* 1997a, Dunham and Rieman 1999, Spruell *et al.* 1999, Rieman and Dunham 2000).

Accordingly, human-induced factors as well as natural factors affecting bull trout distribution have likely limited the expression of the metapopulation concept for bull trout to patches of habitat within the overall distribution of the species (Dunham and Rieman 1999). However, despite the theoretical fit, the relatively recent and brief time period during which bull trout investigations have taken place does not provide certainty as to whether a metapopulation dynamic is occurring (e.g., a balance between local extirpations and recolonizations) across the range of bull trout or whether the persistence of bull trout in large or closely interconnected habitat patches (Dunham and Rieman 1999) is simply reflective of a general deterministic trend towards extinction of the species where the larger or interconnected patches are relics of historically wider distribution (Rieman and Dunham 2000). Recent research (Whiteley *et al.* 2003) does, however, provide stronger genetic evidence for the presence of a metapopulation process for bull trout, at least in the Boise River basin of Idaho.

3.9 Reasons for Listing

Bull trout distribution, abundance, and habitat quality have declined rangewide (Bond 1992, Schill 1992, Thomas 1992, Ziller 1992, Rieman and McIntyre 1993, Newton and Pribyl 1994, IDFG *in litt.* 1995, McPhail and Baxter 1996). Several local extirpations have been documented, beginning in the 1950's (Rode 1990, Ratliff and Howell 1992, Donald and Alger 1993, Goetz 1994, Newton and Pribyl 1994, Berg and Priest 1995, Light *et al.* 1996, Buchanan *et al.* 1997, WDFW 1998). Bull trout were extirpated from the southernmost portion of their historic range, the McCloud River in California, around 1975 (Moyle 1976, Rode 1990). Bull trout have been functionally extirpated (*i.e.*, few individuals may occur there but do not constitute a viable population) in the Coeur d'Alene River basin in Idaho and in the Lake Chelan and Okanogan River basins in Washington (USFWS 1998).

These declines result from the combined effects of habitat degradation and fragmentation, the blockage of migratory corridors; poor water quality, angler harvest and poaching, entrainment (process by which aquatic organisms are pulled through a diversion or other device) into diversion channels and dams, and introduced nonnative species. Specific land and water management activities that depress bull trout populations and degrade habitat include dams and other diversion structures, forest management practices, livestock grazing, agriculture, agricultural diversions, road construction and maintenance, mining, and urban and rural development (Beschta *et al.* 1987; Chamberlain *et al.* 1991; Furniss *et al.* 1991; Meehan 1991; Nehlsen *et al.* 1991; Sedell and Everest 1991; Craig and Wissmar 1993; Frissell 1993; Henjum *et al.* 1994; McIntosh *et al.* 1994; Wissmar *et al.* 1994; MBTSG 1995a-e, 1996a-f; Light *et al.* 1996; USDA and USDI 1995, 1996, 1997).

3.10 Rangewide Trend

In the rules listing bull trout as threatened, the Service identified populations (*i.e.*, isolated groups of bull trout thought to lack two-way exchange of individuals), for which status, distribution, and threats to bull trout were evaluated. Because habitat fragmentation and barriers have isolated bull trout throughout their current range, a population was considered a reproductively isolated group of bull trout that spawns within a particular river or area of a river system. Overall, 187 populations were identified in the 5 distinct population segments, 7 in the Klamath River, 141 in the Columbia River, 1 in the Jarbidge River, 34 in the Coastal-Puget Sound, and 4 in the St. Mary-Belly River populations. No new populations have been identified and no populations have been lost since listing. More detailed information on the range-wide trend of the bull trout is currently being developed for the 5-year status review and is not yet available.

3.11 New Threats

Since listing, no substantial new threats have been identified.

3.12 Consulted-on Effects

Consulted-on effects are those effects that have been analyzed through section 7 consultation as reported in a biological opinion. These effects are an important component of objectively characterizing the current condition of the species. To assess consulted-on effects to bull trout, we analyzed all of the biological opinions received by the Region 1 and Region 6 Offices, from the time of listing until August 2003; this summed to 137 biological opinions. Of these, 124 biological opinions (91 percent) applied to activities affecting bull trout in the Columbia Basin DPS, 12 biological opinions (9 percent) applied to activities affecting bull trout in the Coastal-Puget Sound DPS, 7 biological opinions (5 percent) applied to activities affecting bull trout in the Klamath Basin DPS, and 1 biological opinion (<1 percent) applied to activities affecting the Jarbidge and St. Mary Belly DPS's (Note: these percentages do not add to 100, because several biological opinions applied to more than one DPS). The geographic scale of these consultations varied from individual actions (e.g., construction of a bridge or pipeline) within one basin to multiple-project actions occurring across several basins.

Our analysis showed that we consulted on a wide array of actions which had varying level of effects. Many of the actions resulted in only short-term adverse effects – some with long-term beneficial effects. Some of the actions resulted in long-term adverse effects. No actions that have undergone consultation were found to appreciably reduce the likelihood of survival and recovery of the bull trout. Furthermore no actions that have undergone consultation were anticipated to result in the loss of any populations or local populations of bull trout. A more detailed analysis of consulted-on effects to the bull trout is available in our files and is hereby incorporated by reference.

3.13 Ongoing Conservation Actions

3.13.1 Federal Conservation Actions

Federal conservation actions include: (1) the development of a draft *Bull Trout Recovery Plan*; (2) ongoing implementation of the *Interim Strategy for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California* (PACFISH; USDA and USDI 1995) and the *Interim Strategy for Managing Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana and Portions of Nevada* (INFISH; USDA 1995); (3) ongoing implementation of the Northwest Forest Plan; (4) ongoing implementation of the Northwest Power and Conservation Council Fish and Wildlife Program targeting subbasin planning; (5) ongoing implementation of the Federal Caucus Fish and Wildlife Plan; and, (6) ongoing implementation of Department of Agriculture Conservation Reserve Programs.

3.13.2 State Conservation Actions

Idaho: Conservation actions by the State of Idaho include: (1) the development of a management plan for bull trout in 1993 (Conley 1993); (2) the approval of the *State of Idaho Bull Trout Conservation Plan* (Idaho Plan) in July 1996 (Batt 1996); (3) the development of 21 problem assessments involving 59 key watersheds; (4) the implementation of conservation actions identified in the problem assessments; and, (5) the implementation of more restrictive angling regulations.

Montana: Conservation actions by the State of Montana include: (1) development of the *Montana Bull Trout Restoration Plan* issued in 2000 (MBTRT 2000), which defines strategies for ensuring the long-term persistence of bull trout in Montana; (2) formation of the Montana Bull Trout Restoration Team (MBTRT) and Montana Bull Trout Scientific Group (MBTSG) to produce a plan for maintaining, protecting, and increasing bull trout populations; (3) the development of watershed groups to initiate localized bull trout restoration efforts; (4) funding of habitat restoration projects, recovery actions, and genetic studies throughout the State; (5) the abolition of brook trout stocking programs; and, (6) implementation of stricter angling regulations have also become more restrictive than in the past.

Nevada: Conservation actions by the State of Nevada include: (1) the preparation of a *Bull Trout Species Management Plan* that recommends management alternatives to ensure that: "human activities will not jeopardize the future of bull trout in Nevada" (Johnson 1990); (2) implementation of more restrictive State angling regulations in an attempt to protect bull trout in

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the Jarbidge River in Nevada; and, (3) the abolition of a rainbow trout stocking in the Jarbidge River.

Oregon: Since 1990, the State of Oregon has taken several actions to address the conservation of bull trout, including: (1) Establishing bull trout working groups in the Klamath, Deschutes, Hood, Willamette, Odell Lake, Umatilla and Walla Walla, John Day, Malheur, and Pine Creek river basins for the purpose of developing bull trout conservation strategies; (2) establishment of more restrictive harvest regulations in 1990; (3) reduced stocking of hatchery-reared rainbow trout and brook trout into areas where bull trout occur; (4) angler outreach and education efforts are also being implemented in river basins occupied by bull trout; (5) research to further examine life history, genetics, habitat needs, and limiting factors of bull trout in Oregon; (6) reintroduction of bull trout fry from the McKenzie River watershed to the adjacent Middle Fork of the Willamette River, which is historical unoccupied, isolated habitat; (7) the Oregon Department of Environmental Quality (DEQ) established a water temperature standard such that surface water temperatures may not exceed 10 degrees Celsius (50 degrees Fahrenheit) in waters that support or are necessary to maintain the viability of bull trout in the State (Oregon 1996); and, (8) expansion of the Oregon Plan for Salmon and Watersheds (Oregon 1997) to include all at-risk wild salmonids throughout the State.

Washington: Conservation actions by the State of Washington include: (1) establishment of the Salmon Recovery Act (ESHB 2496) and Watershed Management Act (ESHB 2514) by the Washington State legislature to assist in funding and planning salmon recovery efforts; (2) abolition of a brook trout stocking in streams or lakes connected to bull trout-occupied waters; (3) changing angling regulations in Washington prohibit the harvest of bull trout, except for a few areas where stocks are considered "healthy"; (4) collecting and mapping updated information on bull trout distribution, spawning and rearing areas, and potential habitat; and, (5) adopting new emergency forest practice rules based on the "Forest and Fish Report" process. These rules address riparian areas, roads, steep slopes, and other elements of forest practices on non-Federal lands.

3.13.3 Tribal Conservation Activities

Many Tribes throughout the range of the bull trout are participating on bull trout conservation working groups or recovery teams in their geographic areas of interest. Some Tribes are also implementing projects which focus on bull trout or that address anadromous fish but benefit bull trout (e.g., habitat surveys, passage at dams and diversions, habitat improvement, and movement studies).

Tribal Conservation Efforts: In Oregon, the Confederated Tribes of the Warm Springs has implemented many conservation measures on Tribal lands that have benefited bull trout. For example, the Confederated Tribes of the Warm Springs's Comprehensive Plan is a broad document that includes Tribal ordinances, the tribe's Integrated Resource Management Plans (IRMP), and Tribal resolutions. Ordinances are Tribal laws that address issues such as water use, water quality, implementation of water quality standards, natural resource management, and range management. The IRMP's include several resource assessment processes such as Project Impact Statements and Project Assessments, Best Management Practices, and the use of measurable standards for project evaluations. Tribal resolutions address fishing and hunting seasons on Tribal lands. The Confederated Tribes of the Warm Springs has closed the mouth of the Metolius River to fishing since 1997 to provide sanctuary to adult bull trout which gather here before beginning their upstream migration to spawning streams. The Confederated Tribes of the Warm Springs also implemented a bag limit of one bull trout per day in Lake Billy Chinook.

Other conservation measures include habitat protection and restoration measures, as well as monitoring and research. The lower 10 kilometers (6 miles) of Shitike Creek are a migratory corridor for bull trout, and have been affected by channel simplification and a headworks facility. That headworks was removed as part of the Lower Shitike Creek Habitat Improvement Project which was adopted by Tribal Council as resolution #7838. The project was implemented in two phases between 1988 and 1989 to improve fish passage and increase Tribal fisheries resources in Shitike Creek. Instream habitat structures were constructed in lower Shitike Creek between 1990 and 1994 to increase channel complexity. The Confederated Tribes of the Warm Springs has also constructed numerous riparian fencing projects along the mainstem Deschutes River, Shitike Creek, and the Warm Springs River. The Confederated Tribes of the Warm Springs has made efforts to prevent removal of large wood from the Metolius River and has replaced culverts in Bunchgrass Creek to facilitate upstream fish passage.

The Confederated Tribes of the Warm Springs has been actively involved in bull trout monitoring, research, and conservation efforts since 1998. This work has been focused mostly on the Warm Springs River, Shitike Creek, and the Whitewater River, which are on Tribal land and have bull trout populations. Tribal biologists have also performed research on bull trout in the mainstem Deschutes River. The Confederated Tribes of the Warm Springs has collected data on juvenile bull trout abundance, and has radio-tagged adult bull trout to track their seasonal migration (Brun 1999, Brun and Dodson 2000, 2001, 20002). They plan to continue these activities in the future. The Bonneville Power Administration has provided funding to the Confederated Tribes of the Warm Springs to determine bull trout life history, genetics, and abundance in the lower Deschutes River. Tribal biologists were participants in the Recovery Unit Team for the Service's Bull Trout Draft Recovery Plan.

3.14 Conservation Needs

Conservation needs reflect those biological and physical requirements of a species for its long-term survival and recovery. Based on the best available scientific information (Rieman and McIntyre 1993, MBTSG 1998, Hard 1995, Healey and Prince 1995, Rieman and Allendorf 2001), the conservation needs of the bull trout are to: (1) Maintain and restore multiple, interconnected populations in diverse habitats across the range of each DPS; (2) Preserve the diversity of life-history strategies (e.g., resident and migratory forms, emigration age, spawning frequency, local habitat adaptations); (3) Maintain genetic and phenotypic diversity across the range of each DPS; and, (4) Protect populations from catastrophic fires across the range of each DPS. Each of these needs is described below in more detail.

3.14.1 Maintain and Restore Multiple, Interconnected Populations in Diverse Habitats Across the Range of Each DPS

Multiple local populations distributed and interconnected throughout a watershed provide a mechanism for spreading risk from stochastic events (Rieman and McIntyre 1993, Hard 1995, Healey and Prince 1995, Spruell *et al.* 1999, Rieman and Allendorf 2001). Current patterns in bull trout distribution and other empirical evidence, when interpreted in view of emerging conservation theory, indicate that further declines and local extinctions are likely (Rieman *et al.* 1997a, Dunham and Rieman 1999, Rieman and Allendorf 2001, Spruell *et al.* 2003). Based in part on guidance from Rieman and McIntyre (1993), bull trout core areas with fewer than five local populations are at increased risk of extirpation; core areas with between 5 to 10 local populations are at intermediate risk of extirpation; and core areas which have more than 10 interconnected local populations are at diminished risk of extirpation.

Maintaining and restoring connectivity between existing populations of bull trout is important for the persistence of the species (Rieman and McIntyre 1993). Migration and occasional spawning between populations increases genetic variability and strengthens population variability (Rieman and McIntyre 1993). Migratory corridors allow individuals access to unoccupied but suitable habitats, foraging areas, and refuges from disturbances (Saunders *et al.* 1991).

Because bull trout in the coterminous United States are distributed over a wide geographic area consisting of various environmental conditions, and because they exhibit considerable genetic differentiation among populations, the occurrence of local adaptation is expected to be extensive. Some readily observable examples of differentiation between populations include external morphology and behavior (e.g., size and coloration of individuals; timing of spawning and migratory forays). Conserving many populations across the range of the species is crucial to adequately protect genetic and phenotypic diversity of bull trout (Leary *et al.* 1993, Rieman and McIntyre 1993, Hard 1995, Healey and Prince 1995, Spruell *et al.* 1999, Taylor *et al.*1999, Rieman and Allendorf 2001). Changes in habitats and prevailing environmental conditions are increasingly likely to result in extinction of bull trout if genetic and phenotypic diversity is lost.

3.14.2 Preserve the Diversity of Life-History Strategies

The bull trout has multiple life history strategies, including migratory forms, throughout its range (Rieman and McIntyre 1993). Migratory forms appear to develop when habitat conditions allow movement between spawning and rearing streams and larger rivers or lakes where foraging opportunities may be enhanced (Frissell 1997). For example, multiple life history forms (e.g., resident and fluvial) and multiple migration patterns have been noted in the Grande Ronde River (Baxter 2002). Parts of this river system have retained habitat conditions that allow free movement between spawning and rearing areas and the mainstem of the Snake River. Such multiple life history strategies help to maintain the stability and persistence of bull trout populations to environmental changes. Benefits to migratory bull trout include greater growth in the more productive waters of larger streams and lakes, greater fecundity resulting in increased reproductive potential, and dispersing the population across space and time so that spawning streams may be recolonized should local populations suffer a catastrophic loss (Frissell 1997, Rieman and McIntyre 1993, MBTSG 1998).

3.14.3 Maintain the Genetic Diversity and Evolutionary Potential of Bull Trout Populations

When the long-term persistence of a species, taxon, or phylogenetic lineage is considered, it is necessary to consider the amount of genetic variation necessary to uphold evolutionary potential which is needed for that taxon to adapt to a changing environment. Effective population size provides a standardized measure of the amount of genetic variation that is likely to be transmitted between generations within a population. Effective population size is a theoretical concept that allows one to predict potential future losses of genetic variation within a population due to small population size and genetic drift. Individuals within populations with very small effective population sizes are also subject to inbreeding depression because most individuals within small populations share one or more immediate ancestors (parents, grandparents, etc.) after only a few generations and will be closely related.

The effective population size parameter (N_e) incorporates relevant demographic information that determines the evolutionary consequences of members in a population contributing to future generations (Wright 1931). When prioritizing populations for conservation, N_e is an important parameter because it is inversely related to the rate of loss of genetic diversity and the rate of increase in inbreeding in a population that is finite, but otherwise randomly mating (Waples 2002). Within a population, the census number of sexually mature adults per generation (N) and N_e are the same when the following conditions are met: constant and large population size, variance in reproductive success is binomial (number of progeny per parent follows a Poisson distribution), and sex ratio is equal. Because most populations do not conform to these conditions, the N_e to N ratio is usually below 1.0 (Frankham 1995), and the N_e to N ratio is thought to be between 0.15 and 0.27 in bull trout populations based on computer modeling (Rieman and Allendorf 2001).

A N_e of 50 or more is recommended to avoid the immediate effects of inbreeding and should be considered a minimum requirement for the short-term conservation of populations (Franklin 1980, Soulé 1987). Increased homozygosity of deleterious recessive alleles is thought to be the main mechanism by which inbreeding depression decreases the fitness of individuals within local populations (Allendorf and Ryman 2002). Deleterious recessive alleles are introduced into the genome via random mutations, and natural selection is slow to purge them because they are usually found in the heterozygous form where they are not detrimental. When populations become small, heterozygosity decreases at the rate of $1/(2 N_e)$ per generation which in turn causes an increase in the frequency of homozygosity of the deleterious recessive alleles. Hedrick and Kalinowski (2000) provide a review of studies demonstrating inbreeding depression in wild populations. Effective population sizes of 500 to 5000 have been recommended for the retention of evolutionary potential (Franklin and Frankham 1998, Lynch and Lande 1998). Populations of this size are able to retain additive genetic variation for fitness related traits gained via mutation (Franklin 1980).

Bull trout specific benchmarks have been developed concerning the minimum N_e necessary to maintain genetic variation important for short-term fitness and long-term evolutionary potential. These benchmarks are based on the results of a generalized, age-structured, simulation model, VORTEX (Miller and Lacy 1999), used to relate effective population size to the number of adult bull trout spawning annually under a range of life histories and environmental conditions (Rieman and Allendorf 2001). In this study, the authors estimated N_e for bull trout to be between 0.5 and 1.0 times the mean number of adults spawning annually. Rieman and Allendorf (2001) concluded that an average of 100 (i.e., 100 x 0.5 = 50) adults spawning each year would be required to minimize risks of inbreeding in a population and 1,000 adults (i.e., 1,000 x 0.5 = 500) is necessary to maintain genetic variation important for long-term evolutionary potential. This latter value of 1,000 spawners may also be reached with a collection of local populations among which gene flow occurs.

The combination of resident forms completing their entire life cycle within a stream and the homing behavior of the migratory forms returning to the streams where they hatched to spawn promotes reproductive isolation among local bull trout populations. This reproductive isolation creates the opportunity for genetic differentiation and local adaptations to occur. Nevertheless, within a core area local populations are usually connected through low rates of migration. This connection of local populations, linked by migration, is termed a metapopulation (Hanski and Gilpin 1997). Within a metapopulation, evolution primarily occurs at the local population level (i.e., it is the main demographic and genetic unit of concern). However, when longer time frames are considered (e.g., 10 plus generations), metapopulations become important. For example, metapopulations allow for the reintroduction of lost alleles and recolonization of extinct local breeding populations. Migration and gene flow among local populations ensures that the alleles within a metapopulation will be present in most local breeding populations and can be acted upon by natural selection (Allendorf 1983).

3.14.4 Maintain Phenotypic Diversity

Healy and Prince (1995) reported that, because phenotypic diversity is a consequence of the genotype interacting with the habitat, the conservation of phenotypic diversity is achieved through conservation of the sub-population within its habitat. They further note that adaptive variation among salmonids has been observed to occur under relatively short time-frames (e.g., changes in genetic composition of salmonids raised in hatcheries; rapid emergence of divergent phenotypes for salmonids introduced to new environments). Healy and Prince (1995) conclude that while the loss of a few sub-populations within an ecosystem might have only a small effect on overall genetic diversity, the effect on phenotypic diversity and, potentially, overall population viability could be substantial. This concept of preserving variation in phenotypic traits that is determined by both genetic and environmental (i.e., local habitat) factors has also been identified by Hard (1995) as an important component in maintaining intraspecific adaptability (i.e., phenotypic plasticity) and ecological diversity within a genotype. He argues that adaptive processes are not entirely encompassed by the interpretation of molecular genetic data; in other words, phenotypic and genetic variation in adaptive traits may exist without detectable variation at the molecular genetic level, particularly for neutral genetic markers. Therefore, the effective conservation of genetic diversity necessarily involves consideration of the conservation of biological units smaller than taxonomic species (or DPS's). Reflecting this theme, the maintenance of local sub-populations has been specifically emphasized as a mechanism for the conservation of bull trout (Rieman and McIntyre 1993, Taylor *et al* 1999).

3.14.5 Protect Bull Trout from Catastrophic Fires

The bull trout evolved under historic fire regimes in which disturbance to streams from forest fires resulted in a mosaic of diverse habitats. However, forest management and fire suppression over the past century have increased homogeneity of terrestrial and aquatic habitats, increasing the likelihood of large, intense forest fires in some areas. Because the most severe effects of fire on native fish populations can be expected where populations have become fragmented by human activities or natural events, an effective strategy to ensure persistence of native fishes against the effects of large fires may be to restore aquatic habitat structure and life history complexity of populations in areas susceptible to large fires (Gresswell 1999).

Rieman and Clayton (1997) discussed relations among the effects of fire and timber harvest, aquatic habitats, and sensitive species. They noted that spatial diversity and complexity of aquatic habitats strongly influence the effects of large disturbances on salmonids. For example, Rieman *et al.* (1997b) studied bull trout and redband trout responses to large, intense fires that burned three watersheds in the Boise National Forest in Idaho. Although the fires were the most intense on record, there was a mix of severely burned to unburned areas left after the fires. Fish were apparently eliminated in some stream reaches, whereas others contained relatively high densities of fish. Within a few years after the fires and after areas within the watersheds experienced debris flows, fish had become reestablished in many reaches, and densities increased. In some instances, fish densities were higher than those present before the fires or in streams that were not burned (Rieman *et al.* 1997b). These responses were attributed to spatial habitat diversity that supplied refuge areas for fish during the fires, and the ability of bull trout and the redband trout to move among stream reaches. For bull trout, the presence of migratory fish within the system was also important (Rieman and Clayton 1997, Rieman *et al.*1997b).

In terms of conserving bull trout, the appropriate strategy to reduce the risk of fires on bull trout habitat is to emphasize the restoration of watershed processes that create and maintain habitat diversity, provide bull trout access to habitats, and protect or restore migratory life-history forms of bull trout. Both passive (e.g., encouraging natural riparian vegetation and floodplain processes to function appropriately) and active (e.g., reducing road density, removing barriers to fish movement, and improving habitat complexity) actions offer the best approaches to protect bull trout from the effects of large fires.

IV. ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area which have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

The action area is defined at 50 CFR 402 to mean: "...all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." For the purposes of this consultation, the Service has identified the action area as including the impounded portions of the Deschutes, Crooked, and Metolius Rivers, including Lake Billy Chinook, Lake Simtustus, and the Regulation Reservoir. In addition the action area includes the Crooked River and its tributaries upstream from Lake Billy Chinook to Bowman Dam, the Deschutes River and its tributaries upstream from Lake Billy Chinook upstream to Big Falls, and the Metolius River and its tributaries upstream from Lake Billy Chinook. The action area also includes the Deschutes River downstream of the Project to its confluence with the Columbia

River. Terrestrial lands in the action area include lands within the Project boundary, and the approximately 4,249 hectares (10,500 acres) of uplands, wetlands, and riparian area acquired by the Project.

The Deschutes River flows north through north central Oregon on the eastern side of the Cascade mountain range. This intermontane region includes some of the driest areas of the Pacific Northwest, generally receiving less than 40 centimeters (15.7 inches) of precipitation annually. Vegetation in this region is of the shrub-steppe province, reflecting the xeric climate and harsh temperature extremes. The Deschutes River drains an area of approximately 29,936 square kilometers (10,400 square miles) and travels approximately 405 kilometers (251 miles) from its headwaters to its confluence with the Columbia River near the Dalles, Oregon, approximately 338 kilometers (203 miles) upstream of the Pacific Ocean. The Deschutes River is one of the most hydrologicly stable rivers of its size in the nation, which is attributable to the proportionally large contribution of groundwater springs to its streamflow (Henshaw et al. 1914). These springs are created by the porous volcanic rocks and debris present in the western portion of the Deschutes River basin. The Bull Trout Draft Recovery Plan tasks include restoring fish passage, maintaining instream flows downstream of the Project, and meeting state water quality standards.

The Crooked River drains an area of approximately 11,137 square kilometers (4,300 square miles) comprised of about 50 percent U.S. Forest Service and Bureau of Land Management lands and 50 percent private lands. Land uses include grazing as a primary activity, as well as forest products, recreation, and irrigated agriculture. Foraging adult bull trout were historically present in the Crooked River upstream to Prineville, Oregon, and bull trout were captured in the area immediately upstream of Opal Springs Dam through the 1980's (Buchanan et al. 1997, ODFW 1982). Under existing conditions the Crooked River may only be suitable for bull trout downstream of the Highway 97 bridge during most of the year. This is due to the large springs which rejuvenate the river. The Bull Trout Draft Recovery Plan tasks include restoring passage, connectivity, and riparian vegetation.

The Metolius River drains an area of approximately 816 square kilometers (315 square miles) comprised of 98 percent Tribal and U.S. Forest Service lands; 28 percent of these lands are designated wilderness. The remaining 2 percent is private property. Timber management and recreation are the primary activities. There are three remaining bull trout populations in the Metolius basin. The Blue Lake/Link Creek/Suttle Lake population has apparently been extirpated since 1961, probably due to overharvest (Buchanan et al. 1997) and competition from introduced brook and brown trout (Ratliff and Howell 1992). The Bull Trout Draft Recovery Plan tasks include restoring wood into the Metolius River and surveying areas suitable for recolonization.

The Pelton Round Butte Project occupies a 77 kilometers (46 mile) section of the Deschutes, Crooked, and Metolius River canyons. Its most downstream development is located on the Deschutes River about 167 kilometers (100 miles) upstream of the confluence of the Deschutes River with the Columbia River. The Project is located near Madras in Jefferson, Marion, and Wasco counties, Oregon, in the Deschutes River basin. The Project consists of three developments; Round Butte Dam, Pelton Dam, and the Reregulation Dam. Each development includes a dam, powerhouse, and reservoir. The Project is described in more detail in the biological evaluation, Settlement Agreement, and Project License Applications.

4.1 Status of the Species in the Action Area

Bull trout in the Deschutes River Basin are considered to represent five of the 141 populations occurring in the Columbia River DPS. The Pelton Round Butte Project is the feature separating the three bull trout populations in the Metolius River basin from the two lower Deschutes River bull trout populations in the Warm Springs River and Shitike Creek. Although the Odell Lake bull trout population occurs in the Deschutes basin, it has been isolated from the Deschutes River for thousands of years by a lava flow.

4.1.1 Historic Distribution in the Deschutes River Basin

Bull trout were historically found throughout most of the Deschutes River basin, with separate spawning populations occurring where cold-water habitats permitted successful reproduction. Adfluvial populations were present in the upper Deschutes River basin's Crescent Lake, as well as the middle Deschutes River basin's Blue Lake/Suttle Lake/Link Creek in the upper Metolius River. Bull trout populations in upper Deschutes River, which is upstream of Big Falls at river mile 132, were extirpated by the late 1950's (Ratliff and Howell 1992a, Buchanan et al. 1997). Based on cold water habitat conditions, other upper Deschutes River spawning populations likely occurred in Snow Creek, Quinn River, Browns Creek, Fall River, and Tumalo Creek. In the middle Deschutes River basin bull trout are no longer present in upper Squaw Creek, or in the Metolius River basin's Blue Lake-Suttle Lake-Link Creek. Habitat changes to upper Squaw Creek occurred very early after the arrival of European-americans and historic documentation of the presence of bull trout is circumstantial. In Suttle Lake, the last bull trout was observed in 1961 (Buchanan et al. 1997). Downstream of the Deschutes River's Big Falls, separate spawning bull trout populations were likely historically located in the Metolius River system, Shitike Creek, and the Warm Springs River system (Buchanan et al. 1997).

4.1.2 Present Distribution in the Deschutes Basin

There are currently five bull trout populations in the Deschutes River basin. Three are in the middle Deschutes River's Metolius River basin. Two are in the lower Deschutes River basin in the Warm Springs River and Shitike Creek; both streams are on the Confederated Tribes of the Warm Springs Reservation.

Metolius River System: In the Metolius River Basin, spawning and age-0 bull trout are found in the Whitewater River, Jefferson Creek, Candle Creek, the Canyon Creek system, Jack Creek, Heising Spring, and the mainstem Metolius River from Heising Spring downstream. From these habitats, yearling and older bull trout disperse throughout accessible waters of the Metolius River and Lake Billy Chinook system. In recent years juvenile bull trout have been observed in Lake Creek, which drains from Suttle Lake; however, bull trout have not been seen in Suttle Lake. Juvenile bull trout from the spawning and rearing habitats in the Metolius move downstream into Lake Billy Chinook. From there they may disperse upstream into the middle Deschutes River up to the natural barrier at Big Falls, and the Crooked River up to the dam at Opal Springs (Ratliff et al. 1996). Juvenile and subadult bull trout have also been observed in lower Squaw Creek.

Bull trout migrate down the Metolius River to rear in Lake Billy Chinook and return to the Metolius River to spawn when mature (Buchanan et al. 1997, Thiesfeld et al. 1996, USDI 1998c). Maturing bull trout migrate upstream from Lake Billy Chinook into the Metolius River as early as late May and as late as July (Thiesfeld et al. 1996). Adults may hold around the mouths of their respective spawning tributary for several weeks during late summer before moving upstream to spawn. Spawning can occur from late July through October, but typically from mid-August through September with a peak in early September (Thiesfeld et al. 1996, Ratliff et al. 1996). The process of migrating into the spawning tributaries, spawning, and returning back to the Metolius River typically takes about two weeks. Alternate year spawning has been reported elsewhere, but in the Metolius River annual spawning appears to be typical (Ratliff et al. 1996, Thiesfeld et al. 1996). A relatively high incidence of repeat spawning was observed in tagging studies with the Metolius River population (Ratliff et al. 1996).

Project Reservoirs: Lake Billy Chinook, the reservoir behind Round Butte Dam, is an important habitat for adfluvial bull trout from the Metolius River. Rearing juveniles, subadults, and post-spawning adults all utilize the reservoir as a major feeding and rearing area where they feed on abundant kokanee (*Oncorhynchus nerka*). Tagging and recapture studies have found a rapid growth rate of 1.4 centimeters (0.55 inch) per month for bull trout rearing in Lake Billy Chinook. This compares to 0.6 centimeter (0.23 inch) per month increase for bull trout in the Metolius River during the same period (Ratliff et al. 1996).

Some bull trout survive turbine or spillway passage through the Round Butte Dam and into Lake Simtustus where they rear (Ratliff and Schulz 1999). Upon maturation, these fish attempt to migrate upstream back to the Metolius River system, but are unable to because of the current lack of fish passage. However, these maturing adults are captured in the Round Butte Dam temporary upstream fish trap and in recent years have been utilized for disease studies as part of the Fish Passage Plan (Engelking 1999). These adult bull trout have been held and sampled for disease incidence, and have also been spawned to provide young bull trout for bioassays and disease challenges (Engelking 1999, Bartholomew 1999).

Lower Deschutes River and Tributaries: In the lower Deschutes River basin downstream of the Project, spawning bull trout populations occur in the Confederated Tribes of the Warm Springs Reservation's Shitike Creek and in the Warm Springs River system. These are both tributaries draining from the Cascade Mountains that carry significant perennial flow. From these two spawning and initial rearing areas, yearling and older bull trout distribute downstream into the mainstem lower Deschutes River. Bull trout from these two populations can be found in low densities from approximately Sherar's Falls at river mile 44 up to the Pelton Reregulation Dam at river mile 100. Upon maturation, bull trout in the mainstem lower Deschutes River retrace their earlier migration and move upstream into the upper portion of either Shitike Creek or the Warm Springs River system to spawn.

4.1.3 Deschutes River Basin Bull Trout Studies

The Deschutes Basin Bull Trout Working Group initiated a diet study of bull trout in Lake Billy

Chinook and the Metolius River to determine the prey consumed by various sizes of bull trout. This information was incorporated into a bioenergetics model to estimate prey utilization (Beauchamp and Van Tassell 1999). Small and mid-sized bull trout less than 450 millimeters long (17 inches) primarily consumed invertebrates during all seasons, but kokanee and other bull trout were important during winter and spring. Larger bull trout greater than 450 millimeters long (17 inches) also consumed invertebrates, but preyed on fish in large numbers during fall, winter, and spring. Kokanee were the most important prey species for larger bull trout in Lake Billy Chinook.

Thiesfeld et al. (1999) found a positive correlation between bull trout condition factor (a measure of robustness) and kokanee abundance in Lake Billy Chinook during 1990-1998. Beauchamp and Van Tassell (1999) noted that under the current prey availability and environmental conditions, cannibalism, particularly by immature bull trout from 300 to 450 millimeters long (12 to 17 inches), might be important in regulating the population dynamics of bull trout in the Metolius River-Lake Billy Chinook system. Lewis's (2003) study of juvenile bull trout reached a similar conclusion. Bull trout appear to use changes in cannibalism rates as a mechanism that regulates their population in response to changes in prey abundance (Beauchamp and Van Tassell 1999). When food in the form of prey species is abundant, cannibalism rates are low. When other sources of food are low cannibalism increases, which in turn reduces the predation pressure on the original prey species.

4.1.4 Abundance of Bull Trout in the Deschutes River Basin

The middle Deschutes River, which includes the Metolius River and Lake Billy Chinook, has three bull trout populations. Information on the abundance of this population is described below. The lower Deschutes River has two populations. The cold-water spawning and rearing habitats for these populations is located in upper Shitike Creek and the upper Warm Springs River system on the Confederated Tribes of the Warm Springs Reservation (Brun 1999, Brun 2000). Information on these populations gathered by the Tribe's biologists is given below.

Metolius-Lake Billy Chinook System: The Metolius/Lake Billy Chinook Bull Trout Working Group was formed during the mid-1980's to coordinate the gathering of information on the abundance and life history of bull trout in this system. Spawning areas were located during 1985, and the first comprehensive redd count was conducted in 1986. During the past 19 years, the increased abundance of these populations has been well documented. Redd counts have increased from only 27 in 1986 to 948 in year 2003 (Wise 2003). This increase has been attributed to a large reduction in harvest due to a series of more restrictive angling regulations and intense angler education efforts (Stuart et al. 1997, Ratliff et al. 1997).

Other measures of abundance include tag and recapture population estimates, catch-per-unit-effort in the directed fishery, estimates of juvenile bull trout recruited to Lake Billy Chinook, and an estimate of the number of bull trout eaten by other bull trout from the food habits study. The total spawning population was estimated in 1993 and 1994 by determining the ratio of tagged to untagged adults entering tributary traps after a sample was tagged each year leaving Lake Billy Chinook. These estimates were 818 adults in 1993 and 1,895 adults in 1994 (Ratliff et al. 1996). The catch-per-unit-effort for the March bull trout fishery has generally increased from 0.036 fish per hour in 1990 up to 0.192 fish per hour in 2000 (Ratliff et al. 1996).

The numbers of age 1+ and older juvenile bull trout were estimated in the late winter and spring 1999 using a downstream migrant screw trap at the mouth of the Metolius River. From January 11 through June 7, an estimated 5,253 juvenile bull trout ages 1+ through 3+ migrated down the Metolius River into Lake Billy Chinook (Madden and Lewis 1999). Many age 0 bull trout fry were also captured, but were too small to mark to determine trap efficiency. If the 1999 recruitment estimates were extrapolated according to patterns observed among all four years trapping has been conducted, the estimate could plausibly approach 10,000 to 15,000 ages 1+ through 3+ juvenile bull trout entering Lake Billy Chinook (Madden and Lewis 1999).

Beauchamp and Van Tassell (1999) back calculated age-specific abundances for combined age 1+ and 2+ bull trout in Lake Billy Chinook base on 1993 and 1994 spawner surveys and estimated about 11,000 and 26,000 bull trout, respectively. They showed that bull trout are numerous enough in Lake Billy Chinook that cannibalism is a significant mortality factor. Using analysis of stomach contents and a bioenergetics model parameterized for lake trout, they estimated that 5,273 age-0 and 1 bull trout were eaten per 1,000 age 3-7 bull trout in Lake Billy Chinook during winter through autumn 1997-1998.

Lower Deschutes River: Bull trout are found in the lower Deschutes River upstream and downstream of Sherars Falls. In 1998, Oregon Department of Fish and Wildlife and the Tribes estimated the population of bull trout in a 1.8 kilometer (3 mile) river reach of the Deschutes near North Junction at seven fish per 0.6 kilometer (1 mile) greater than 20 centimeters (8 inches) long. Anglers have recently reported higher incidental hooking of bull trout in the Deschutes River, which may indicate that the population is increasing (Pribyl, S. *pers. comm.* 2001). However, it may also simply indicate that more anglers are able to distinguish bull trout from other species such as brook trout. Subadult and adult fish are seasonally present in the lower Deschutes River (Newton and Pribyl 1994). There are some historic accounts of bull trout being caught near the mouth of the Deschutes River in the 1930's (Ratliff and Fies 1989), and in Kloan in the 1950's (Buchanan et al.1997) at about river mile 7. One or two adult bull trout are caught in the Pelton fish trap each year. The trap is located at the base of the Reregulation Dam at river mile 100. In 24 years of operation of a steeppass trap at Sherars Falls, one bull trout was recently captured in 2001. In addition, two bull trout were captured in the Tribal dipnet fishery at Sherar's Falls during 2001 (Pribyl, S. *pers. comm.* 2001).

Shitike Creek and the Warm Springs River: Until recently little was known about bull trout in the Warm Springs River and Shitike Creek. Efforts by biologists from the Tribes have shown that these two populations have fairly abundant numbers (Brun 1999, Brun 2000, Brun and Dodson 2001, Brun and Dodson 2002). The Shitike Creek and Warm Springs River have averaged about 232 and 202 spawners respectively between 1998 and 2001. In Shitike Creek the numbers of redds and juveniles appears to be stable. In the Warm Springs River, 100 redds were counted in 1998, while 84 and 78 redds were counted in 1999 and 2000, respectively (Brun and Dodson 2000). Redd counts have averaged 101 redds in Shitike Creek, and 88 redds in the Warm Springs River from 1998 to 2001 (Brun and Dodson 2001). Juvenile bull trout densities in a 3.6 kilometer (2.2 miles) reach of the Warm Springs River were calculated at 0.005 per square meter (0.054 per square foot), while a density of 0.025 juvenile bull trout per square meter (0.27 per square foot) was calculated for the 1.1 kilometer (0.7 miles) surveyed in Shitike Creek (Brun 1999).

In Shitike Creek, spawning was observed from August 20 through early November when water temperature averaged 6.1 degrees Celsius (43 degrees Fahrenheit) between river mile 18 to 27; this was the mean 7-day average from thermographs. In the Warm Springs River, temperatures averaged 6.6 degrees Celsius (44 degrees Fahrenheit) between river mile 31 to 35 during the late-August to early November spawning period (Brun 1999). Juveniles in Shitike Creek moved downstream during both the spring and fall months. The majority were trapped during May and early June, while the remainder were captured during September. The mean fork-length of fish captured in Shitike Creek in the spring was 131 millimeters (5.2 inches), while fall migrants averaged 214 millimeters (8.4 inches). Age two ((120 to140 millimeters (4.7 to 5.5 inches)) fish accounted for 83 percent of spring catch, and the remaining were assumed to be age three ((160 to 200 millimeters (6.2 to 7.8 inches)). One age four fish (399 millimeters (15.7 inches)) was also captured. No juvenile fish were captured in the Warm Springs River Humphrey trap (Brun 1999).

Tribal biologists have also studied adult migrations. In one recent study (Brun and Dodson 2000) radio-tagged adults began their migration in mid-May. They initially made short runs up and down stream into spawning streams. Later, one specimen moved upstream some 73 kilometers (44 miles) in Shitike Creek to reach spawning areas, and then moved quickly downstream after spawning. Other tagged fish showed similar behavior. Additional maturing adult bull trout were radio-tagged in the lower Deschutes River and tracked as they ascended both of these streams to headwater spawning areas. Both the Warm Springs River and Shitike Creek have populations of brook trout (*Salvelinus fontinalis*). Competition with this introduced species is a concern, especially in the Warm Springs River system. Mill Creek is a significant tributary to the Warm Springs River. Though Mill Creek historically had bull trout, recent surveys found only brook trout juveniles (Brun 2000).

4.2 Baseline Effects of the Existing Project License to Bull Trout

The effects of the existing Project license on bull trout are listed in table 6-1 of the biological evaluation. Effects include: lack of fish passage; injury and mortality due to entrainment at the Project's unscreened turbine intakes; reduced bull trout prey base due to kokanee entrainment; and, water quality effects from altered temperature, dissolved oxygen (DO), and nutrient regimes in the Project's reservoirs and in the lower Deschutes River. In addition, a 10(a)(1)(A) scientific collection permit has been issued to PGE at the Project. That permit was issued by the Service on May 2, 2001, and expires on May 1, 2005.

4.2.1 Fish Passage

Completion of the Project's Round Butte Dam in 1964 and the subsequent abandonment of Project fish passage in 1968 isolated the three Metolius River populations from the Shitike Creek and the Warm Springs River populations. Artificial barriers, such as dams, can block or substantially delay upstream migration of adults to spawning areas (USDI 1998c). Barriers also isolate populations and prevent genetic exchange that may contribute to the genetic diversity within the population and allow the support of depressed populations and the refounding of extinct populations (Rieman and McIntire 1993).

The construction of Round Butte Dam created Lake Billy Chinook, which added more adfluvial rearing habitat in this system (Ratliff and Howell 1992). Adfluvial fish typically grow to larger sizes than fluvial migrants, and as a result can be more fecund (Goetz 1989). However, there is evidence that fluvial bull trout in the Metolius River basin were quite large. For example, some of the bull trout passed upstream to the Metolius River basin just post-Project construction were very large with estimated weights over 18 kilograms (39 pounds) (Ratliff et al. 1996).

4.2.2 Entrainment at the Project's Round Butte Dam

Downstream migration at the Project's dams occurs only when juveniles and adult fish pass through the turbines or pass over spillways during high flows. Since spill is an extremely rare event, migration rarely could occur through this mechanism. Mortality during turbine passage can be caused by rapid depressurization or from injury from contact with the turbine blades.

Round Butte Dam has the greatest pressure change during turbine passage due to the difference between depth of the intake, which is 72 meters (240 feet) down at full pool, and the depth of the discharge at 15 meters (50 feet) (PGE 1999). As a result, Round Butte dam may have the highest associated fish mortality (Ratliff and Schulz 1999). There is evidence that smaller fish, such as fry with less developed air bladders, are more likely to survive the depressurization associated with turbine passage (Ratliff and Schulz 1999). This is illustrated when a good fishery for kokanee occurs, in some years, in Lake Simtustus where there is no documented spawning or large hatchery contributions (Ratliff and Schulz 1999). However, all fish entrained through the turbines likely experience some degree of harm.

Species other than kokanee, including bull trout, apparently exit Lake Billy Chinook through the turbines less often (Ratliff and Schulz 1999). Between December 1995 and August 1999, a total of 4,364 kokanee, four bull trout, one threespine stickleback (*Gasterosteus aculeatus*), and two large scale suckers (*Catostomus macrocheilus*) were observed in the gatewells at the powerhouse at Round Butte Dam (Ratliff and Schulz 1999). A screw trap fished in the Round Butte Dam tailrace during 1999 yielded a capture of 4,677 kokanee, one brown trout, and one bull trout.

Using the screw trap catch at two locations compared to the gatewell counts, and expanding with assumptions on observed fish numbers, an estimated 135,868 yearling and older kokanee exited the reservoir during the 1998/1999 year (Ratliff and Schulz 1999). This represents approximately 10 percent of the July, 1999, estimate of the population of yearling and older kokanee in Lake Billy Chinook (Kern et al. 1999). If it is assumed that the ratio of bull trout numbers to kokanee numbers of roughly two bull trout to 4,300 kokanee passing through the turbines in 1998/1999 remained constant, then an estimate of approximately 63 bull trout may have passed through the turbine during the 1998/1999 year. Approximately 20 to 40 maturing adult bull trout attempt to migrate upstream each year from Lake Simtustus and enter the Round Butte Dam temporary upstream fish trap (Ratliff and Schulz 1999).

4.2.3 Water Quality

Temperature: The State's salmon and trout rearing and migration seven-day average maximum standard of 18 degrees Celsius (64.4 degrees Fahrenheit) applies to Lake Billy Chinook. During the years of Project studies temperatures in the Lake exceed 10 degrees Celsius (50 degrees Fahrenheit) at all depths from June through October. Water temperature above 15 degrees Celsius (59 degrees Fahrenheit) is believed to limit bull trout distribution (Fraley and Shepard 1989, Rieman and McIntyre 1995). However, water quality data shows that even during the June to October period when overall water temperatures are highest, there are still large areas of the reservoir's deeper waters that do not exceed 15 degrees Celsius (59 degrees Fahrenheit) (JA 2001, volume 1 of 3, page E-II-44). In addition, data on bull trout distribution and use of the Lake suggests that bull trout are not adversely affected by water temperature.

Downstream of the Project temperatures in the lower Deschutes River are about 2 degrees Celsius (3.2 degrees Fahrenheit) cooler in the spring, and about 2 degrees Celsius (3.2 degrees Fahrenheit) warmer in the fall and early winter months (Huntington et al. 1999). However, flows released from the Project do not exceed 15 degrees Celsius (59 degrees Fahrenheit) at any time during the year (JA 2001, volume 1 of 3, page 135 of JA's 401 Application). This is due to the 72 meter (240 foot) depth of the Project's water withdrawal from Lake Billy Chinook.

Dissolved Oxygen: Oregon state standards for DO require 11.0 mg/l or 95 percent saturation for reaches with salmonid spawning, and 8.0 mg/l or 90 percent saturation for reaches with principally cold-water aquatic life. The State's salmonid criteria of 8.0 mg/l applies to areas of Lake Billy Chinook where bull trout occur. Reservoir DO varies with season and depth, but is above 8.0 mg/l in the 15 meter (50 feet) deep epilimnion all year (JA 2001,Volume 1 of 3, p. E-II-44). Most DO measurements down to 75 meters (246 feet) exceeded 8.0 mg/l. Water deeper than this is below the Project's power intake, and can have DO levels less than 4.0 mg/l. Thus, water in Lake Billy Chinook meets the bull trout's requirements for cold, clean water.

Downstream of the Project, DO levels are below the State's 11.0 mg/l standard during the mid-summer to early fall months (Eilers et al. 2000). However, DO levels still meet the 8.0 mg/l standard applicable to bull trout (JA 2001,Volume 1 of 3, p. E-II-44). Thus, Project flow releases meet the bull trout's requirements for well oxygenated water.

V. EFFECTS OF THE PROPOSED ACTION

The following is the Service's analysis of the effects of the proposed action on bull trout. Effects of the action include any direct and indirect effects as well as interrelated and interdependent effects (50 CFR 402.02). Direct effects to listed species occur simultaneously with, or immediately after, implementation of the proposed action. Indirect effects are induced by the action but occur later in time. The proposed action also includes provisions for avoidance or mitigation of effects, and provisions to reduce, avoid, or minimize effects to listed species.

5.1 Direct and Indirect Effects

The proposed action will have direct and indirect effects to bull trout. Some of these effects are positive and in comparison to the existing license will offer greater protection to bull trout. However, there are also some potentially negative effects. Both the positive and negative effects, as well as the measures that will be taken to avoid or minimize negative effects, are discussed below. Additional details are provided in the biological evaluation and the Settlement Agreement.

5.1.1 Fish Passage

Under the proposed action upstream and downstream passage facilities will be constructed at the Project, in combination with the proposed SWW. Upstream migrating adults will be captured at the Reregulation Dam's Pelton Trap and transported upstream for release into Lake Billy Chinook through an Adult Release Facility (JA 2004). This will require some handling of bull trout as they are transferred from the trap to fish transport trucks, taken upstream, and released. There may also be some delay in upstream movement as bull trout and other species are detained in the trap's holding pond before being transported upstream. However, these passage facilities will also benefit bull trout by providing upstream passage around the Project dams, reconnecting Deschutes River basin bull trout populations, and restoring genetic diversity. Fish passage will also allow anadromous species such as sockeye, steelhead, and spring Chinook to be reintroduced upstream of the dams and into their historic habitats. These species were part of the bull trout's historic prey base.

Downstream migrating adult and juvenile bull trout will be collected at the Round Butte Dam fish passage facility, and transported downstream of the Reregulation Dam for release in the lower Deschutes River. The facility's surface intake will have a NOAA Fisheries smolt-criteria fish screen with a hydraulic capacity of 3,000 cfs. The survival goal for the temporary downstream passage facility is 93 percent, while the goal for the permanent downstream passage facility is 98 percent. The deep intake will have an exclusion screen that will meet all NOAA Fisheries smolt-criteria except for sweeping velocity and contact time. This will not impact bull trout, because the adult and subadult bull trout that will be in the area of the deep withdrawal are much larger and have much faster swimming speeds than more vulnerable fry or smolt life stages. Both the surface and deep intakes will be tested to ensure they meet hydraulic criteria. The facilities will also be monitored under the proposed program of Testing and Verification studies to ensure that they meet the fish passage criteria and goals. Other of the proposed license articles require the JA's to develop plans for measures or modifications needed to achieve the fish passage criteria. Bull trout could be affected by the downstream passage collection, sorting, transport, and release activities. However, few if any juvenile or fry life stage bull trout will be in the vicinity of the deep intake. Since the facility will be constructed to meet NOAA Fisheries fish passage smolt criteria, it is unlikely that the adult and subadult bull trout that use the downstream passage facility will be injured. These actions will also benefit bull trout by reconnecting the lower and middle Deschutes River bull trout populations that were separated by the Project's construction in the late 1950's. Reconnection of bull trout populations is an important goal of the Bull Trout Draft Recovery Plan (USFWS 2002).

There are additional impacts that could occur as a result of fish passage, including: construction impacts; inter-specific competition; introduction of disease; and affects to the bull trout's prey base. The proposed action also includes measures to avoid or minimize these effects. First, construction of the fish passage facilities could result in erosion, sedimentation, discharges of fuel and equipment lubricants, or construction materials such as concrete or grout. Research has shown that exposure to contaminants reduces reproductive capacity, growth rates, and resistance to disease, and may lead to lower survival for salmon (Arkoosh et al. 1998). Though little or no information exists on the effects of contaminants on bull trout, this species is known to inhabit and depend on high quality habitat in clean, cold water, and thus is likely susceptible to effects from contaminants. These impacts will be reduced or avoided by the Settlement Agreement and Commission's requirements for filing detailed construction and erosion management plans. These plans will require rigorous on-site monitoring, reporting to the Service, Commission, and other agencies, and provisions for enforcement of any violations. In addition, the proposed action requires the JA's to monitor water quality according to the Water Quality Management and Monitoring Plan filed with the Oregon Department of Environmental Quality (ODEQ 2002) and the Confederated Tribes of the Warm Springs Water Control Board (Tribes 2002) as part of the JA's section 401 Clean Water Act certificates. Second, there may be competition between bull trout and reintroduced anadromous species for spawning and rearing habitats in the Metolius River basin. To address this effect, the proposed action includes studies of competition between bull trout and other species to assess any impacts to bull trout. Third, reintroduced species may carry diseases such as whirling disease and Infectious Hematopoietic Necrosis Virus (IHNV) type II from the lower Deschutes River; upstream movement of both fish and these diseases are currently blocked by the dams. The proposed action requires a comprehensive program of fish health management to address disease concerns. Finally, facilitating the annual outmigration of anadromous smolts may reduce the prey base that Metolius River basin adult bull trout currently rely on as forage. The proposed action requires continucd surveys of bull trout spawning, rearing, and condition to assess the impacts of the action on Metolius River bull trout populations.

The results of all the studies discussed above will be filed with the Service and other members of the Settlement Agreement's Fish Committee, which is required by Exhibit A, proposed license article number one. The development and implementation of study plans, reports, facility designs, and operating and implementation plans will be done in coordination with the Fish Committee. The Fish Committee consists of the Service, NOAA Fisheries, USFS/BLM, BIA, CTWS BNR, CTWS WCB, ODFW, ODEQ, and an NGO representative. The Service, NOAA Fisheries, ODFW, and CTWS BNR make up the Committee's "Fish Agencies". The proposed license articles require consultation with the Fish Committee, and approval by the Fish Agencies, for various measures. The consultation, approval, and dispute resolution provisions of the proposed license articles provide the Service additional opportunity to ensure that measures affecting bull trout are fully reviewed and modified if necessary. These provisions are discussed in detail in the Settlement Agreement filing (JA 2004b).

Data collected by PGE showed that an estimated 63 bull trout passed downstream into Lake Simtustus through the Round Butte Dam's turbines in 1998/1999 (Ratliff and Shulz 1999). Approximately 20 to 40 of these fish attempt to migrate upstream from Lake Simtustus each year and enter the upstream fish trap at the base of Round Butte Dam. Measures required by the proposed action will minimize and avoid effects to bull trout. These measures include operating the existing Pelton Skimmer to collect outmigrants, and installing a guidance net system to minimize entrainment at Pelton Dam. The overall benefit to the bull trout of the proposed action exceeds the possible adverse effects. This is because of the low number of bull trout that we anticipate will be entrained at Pelton Dam. In addition, studies (PGE 2003a) have shown that bull trout rearing in Lake Simtustus are in better physical condition that bull trout in Lake Billy Chinook; this is probably due to the large amount of forage available in Lake Simtustus, relative to the small number of bull trout there.

5.1.2 Entrainment

The proposed action will eliminate bull trout entrainment into the Round Butte Dam's turbines by constructing downstream fish passage facilities; these are discussed above. Under current conditions this entrainment results in injury or mortality to bull trout. Bull trout which survive entrainment are isolated in Lake Simtustus, and cannot return to the Metolius River basin to spawn. To reach spawning areas in the lower Deschutes River's tributaries, they must survive entrainment through two additional Project turbines. The proposed action will eliminate entrainment at Round Butte Dam and its associated injury, mortality, and losses to the Metolius River basin bull trout populations.

The turbine intakes at the Project's Pelton Dam and Reregulation Dam will not be screened. Thus, bull trout could still be entrained at these dams. However, we anticipate that few of the bull trout in Lake Simtustus will pass through the Pelton Dam or Reregulation Dam's turbines. This is because of the downstream passage facilities that will be provided at the Pelton Dam. Studies by PGE of radio-tagged bull trout (2003a) found that bull trout preferred the upstream portion of Lake Simtustus, which has cooler water temperatures. In addition, PGE was unable to locate any tagged bull trout in the Reregulation Reservoir downstream of Pelton Dam.

5.1.3 Lake Simtustus Rearing Habitats and Fish Passage

Provisions of the proposed action provide for the selective transport of some Lake Billy Chinook fish species captured at the Round Butte Dam's downstream fish passage facility. From August 1 to January 31 each year, the Project's Fish Committee may request that captured downstream migrants, including bull trout, be moved into Lake Simtustus for rearing. It is not known how many bull trout may seek to emigrate during this period, or how many of these migrants may be moved to Lake Simsutus, instead of being released into the lower Deschutes River. This decision will be based on information such as the total number of bull trout captured, rearing success of Lake Simtustus bull trout, and other data (Commission 2004, JA 2004b).

The Pelton Dam skimmer will be reactivated to provide downstream passage for those species seeking to emigrate from Lake Simtustus, and a guidance net system will be installed to minimize turbine entrainment. The Round Butte Dam's east-side upstream fish trap will be upgraded to provide a capture and transport system for adult migrants. These upstream and downstream passage facilities may have some of the same effects that were previously discussed in section 5.1.1 on Fish Passage. This includes handling, contact with passage facilities, and migration delay. However, providing access to and movement from Lake Simtustus will benefit bull trout by increasing the quantity of rearing habitat available to adults and subadults. It will also provide a mechanism to return bull trout in Lake Simtustus upstream over Round Butte Dam to the Metolius River for spawning, or downstream to the lower Deschutes River.

5.1.4 Water Quality

The JA's will minimize the Project's water temperature and DO effects by constructing a SWW tower in the Round Butte Dam forebay. The SWW will allow the JA's to draw water from warmer surface layers during the spring months, and from colder deep waters during the fall. This will restore lower Deschutes River water temperatures to pre-Project conditions. Changing the depth and pattern of water withdrawal from Lake Billy Chinook will also allow the JA's to pass more oxygenated surface waters downstream. Water temperatures and DO in the Project reservoirs, and in the Project's discharge to the lower Deschutes River, are already suitable for bull trout. However, the proposed action's effects on DO, water temperature, and other aspects of water quality will also be beneficial to bull trout.

Construction and operation of the SWW is expected to alter Lake Billy Chinook's hydrodynamics and create a more oxygenated hypolimnion. The SWW is also expected to have beneficial effects to Lake Billy Chinook's ecological function (Khangaonkar et al. 1999). These effects include creating a reservoir with generally colder water temperatures, and which favors primary production of diatoms and green algae over blue-green algae. Until the facility is in operation it will not be known what impacts, if any, will occur to the reservoir's primary production, the zooplankton which kokanee rely on as a food source. These kokanee are an important part of the bull trout forage base. However, since the existing reservoir conditions already support bull trout and the expected effects of SWW operation will increase the reservoir's suitability for bull trout, the proposed action minimizes potential adverse impacts to the species.

The construction impacts of the SWW and associated fish passage facilities were discussed in section 5.1.1 on Fish Passage. In addition, the proposed action requires the JA's to monitor water quality according to the Water Quality Management and Monitoring Plan filed with the Oregon Department of Environmental Quality (ODEQ 2002) and the Confederated Tribes of the Warm Springs Water Control Board (Tribes 2002) as part of the JA's section 401 Clean Water Act certificates. These construction impact measures avoid and minimize impacts to bull trout.

5.1.5 Instream Flows

The proposed action will implement more protective minimum instream flows downstream of the Project by requiring higher target minimum flow releases. Instream flows are described in detail in proposed license article number 12 (JA 2004b). In addition, the JA's will be required to hold flows to within plus or minus 10 percent of measured Project inflow under most conditions. Contingency plans allow the JA's to release up to 200 cfs over inflow between September 16 and November 15 of each year if Project inflows are less than 3,000 cfs. The flow provisions include a refill allowance, under which the JA's may retain up to 150 cfs of inflow in order refill Lake Billy Chinook each spring. The JA's must also file a plan to track indicators of long-term low flow conditions in the lower Deschutes River. The Settlement Agreement provides for additional restrictions on the seasonal drawdown and fluctuation limits for all three Project reservoirs.

All these measures will be monitored and enforced under the terms of an Operations Compliance

Plan that will be filed by the JA's within six months of license issuance. These instream flows will reduce Project impacts to lower Deschutes River habitats used by bull trout by allowing the Project to release more water into the lower Deschutes River. In addition, bull trout in the lower Deschutes River are primarily adults and subadults, which do not rely on the more flow-sensitive habitats along the river margins. The proposed instream flow provisions minimize instream flow impacts to bull trout in the lower Deschutes River.

5.1.6 Ramping Rates

Under the proposed action the JA's will operate the Project using the following ramping rates: 0.05 ft/hr and 0.2 ft/day from May 15 to October 15, and 0.1 ft/hr and 0.4 ft/day from October 16 to May 14. These are slightly more restrictive rates than those used under the existing license and will reduce Project impacts to lower Deschutes River habitats used by bull trout. As discussed above, bull trout in the lower Deschutes River do not depend on the more flow sensitive stream margins. Each 0.10 ft, or 1.2 inches, of stage change represents about 250 cfs of flow. Together with the requirement to restrict lower River flow changes to within plus or minus 10 percent of measured Project inflow under most conditions, these measures minimize ramping rate effects to bull trout in the lower Deschutes River.

5.1.7 Reservoir Levels

The proposed action restricts the annual drawdown of Lake Billy Chinook to six meters (20 feet), and Lake Simtustus' drawdown to about two meters (seven feet). These measures will be monitored and enforced under the terms of an Operations Compliance Plan that will be filed by the JA's within six months of license issuance. This will help protect both Lake's important subadult and adult bull trout foraging habitats. Since Lake Billy Chinook is over 60 meters (200 feet) deep, the six meter (20 feet) annual drawdown does not adversely affect bull trout. This analysis is supported by the successful use of Lake Billy Chinook by bull trout for several decades, despite occasional drawdowns of six meters (20 feet) or more. As discussed in this biological opinion's section on water quality, the annual drawdown does not adversely affect water quality. Thus, the proposed action's measures minimize the adverse effects of reservoir level fluctuations to bull trout.

5.1.8 Pelton Round Butte Fund

The Pelton Round Butte Fund will support resource protection measures for Project-related impacts that are not otherwise addressed by specific license conditions. The Fund will receive a series of payments between 2005 and 2020 that will total $21.5 million in 2003 dollars. These monies will be spent on mitigation and enhancement projects for fish, wildlife, and their habitats. Though these projects have not yet been identified, it is likely that many will directly or indirectly benefit bull trout. We expect that any short-term adverse impacts will be limited in duration. Project's which require discretionary Federal actions and which may affect federally listed species, including bull trout, will receive ESA section 7 consultation with the Service or NOAA Fisheries, as appropriate. The existing guidelines for Pelton Fund expenditures, together with the opportunity for additional consultation on proposed projects, minimize potential adverse impacts to bull trout.

5.1.9 Mitigation Projects

The proposed action provides for several mitigation projects, including the Lower River Gravel Study, Large Wood Placement, Trout Creek Habitat Restoration, and Squaw Creek Water Rights Acquisition. The study of Lower River Gravel Study includes the test placement of up to 229 cubic meters (300 cubic yards) of spawning gravel. The gravel study will not have any positive or negative effects to bull trout. This is because the 229 cubic meters (300 cubic yards) volume of test spawning gravel will not significantly alter the lower Deschutes River's geomorphology or channel structure. Also, bull trout do not spawn in the lower Deschutes due to historically unsuitable water temperatures. A second project requires the JA's to transport and place large woody debris from the Project's Lake Billy Chinook to the lower Deschutes River. Large wood placement may benefit bull trout by creating cover for foraging subadults and adults. Wood placement may have some short-term negative effects such as increased turbidity and channel disturbance. However, the large size and flow volume of the lower Deschutes River, together with the absence of suitable spawning conditions, minimize the adverse effects of large wood placement. A third project requires habitat restoration in Trout Creek, which is a major tributary to the lower Deschutes River, and in which bull trout have been reported (Buchanan et al. 1997). Trout Creek habitat restoration may benefit bull trout by increasing the creek's suitability as foraging habitat, and by increasing the forage base for bull trout in Trout Creek and the mainstem Deschutes River. Finally, the JA's have agreed to acquire priority water rights in Squaw Creek by the end of 2004. If this is not feasible the JA's will implement an equivalent project in 2005, or make an additional payment of $1,000,000 to the Pelton Round Butte Fund. Bull trout have been reported in the lower reaches of Squaw Creek (USFWS 2002). The proposed Squaw Creek project could benefit bull trout by increasing stream flows and thus making the creek more suitable for foraging bull trout. The mitigation and avoidance measures taken as part of the proposed mitigation projects minimize their adverse effects to bull trout.

5.1.10 Testing and Verification Studies, Long-Term Monitoring, and Work Plans

The proposed action's proposed license articles require a program of Testing and Verification studies to track near-term implementation of downstream passage, and a separate program of Long-Term Monitoring of Downstream Passage Facilities. This information will be used to modify and adapt fish passage activities. This extensive program of monitoring will ensure that measures taken to protect natural resources, including bull trout, are fully implemented and modified as needed. Actions taken under both the Testing and Verification Studies and Long-Term Monitoring programs may affect bull trout.

The Testing and Verification Studies program will go into effect after temporary fish passage facilities are constructed in 2008, and will last until about 2015. These studies will include actions such as: evaluating fish passage facilities using marked and tagged fish, including bull trout; monitoring of reintroduced anadromous species in Project tributary habitats, including habitats used by bull trout; operating smolt traps in Project tributaries; and, studying predation by various species, including bull trout, using fish marked with radio-tags, PIT tags, and sampling stomach contents using gastric lavage. These studies are described in more detail in Appendix III of the Settlement Agreement's Fish Passage Plan (JA 2004b).

The Long-Term Monitoring program will go into effect when measures of success for permanent passage facilities are achieved, as determined by the Testing and Verification Studies program. This will probably be about 2015; the duration of the studies will depend on the studies results, but will probably continue at some reduced level of intensity for the duration of the new license's fish passage program. Studies will include action such as: spawning surveys, including habitats used by bull trout; redd counts, including habitats used by bull trout; studies of predation by various species, including bull trout, using gastric lavage; evaluating competition between reintroduced anadromous and resident species, using population and redd count studies in bull trout habitats; monitoring tributary habitat quantity, effectiveness, and riparian condition; and monitoring upstream and downstream fish passage efficacy for various species, including bull trout, through observation of physical condition of passed fish. These studies are described in more detail in Appendix IV of the Settlement Agreement's Fish Passage Plan (JA 2004b).

The Testing and Verification, and the Long-Term Monitoring program's proposed study methodologies are commonly used. The JA's are currently performing studies using these methods, and are operating under a 10(a)(1)(A) permit issued to PGE and ODFW. That permit was issued by the Service on May 2, 2001, and expires on May 1, 2005. Bull trout can be injured by activities such as radio-tagging, PIT tagging, and gastric lavage. Handling bull trout during removal from smolt traps, and subsequent data collection activities such as anesthesia, weighing, measuring, and marking can cause injury or death. However, the sampling procedures are designed to minimize stress and potential injury to bull trout. These include use of approved methods for gastric lavage, fish handling, and tagging (USFWS 2001). The JA's have extensive experience in working with bull trout, and have reported minimal adverse effects to bull trout (2003a, 2003b). These measures taken by the JA's will minimize adverse impacts to bull trout collected and handled during the proposed studies.

The proposed redd count surveys, spawning surveys, and habitat studies can harass bull trout as observers move along stream margins and in the stream channel. Snorkel surveys for bull trout and other species can also harass bull trout. Avoidance response by bull trout can result in unnecessary energy expenditures and adverse physiological response. However, the JA's have conducted and assisted in these types of surveys for nineteen years. Observer and snorkeling techniques have been developed and implemented which successfully minimize adverse impacts to bull trout, and allow needed studies on bull trout and other species to proceed. These techniques will avoid and minimize impacts to bull trout.

5.2 Effects of Interrelated and Interdependent Actions

Interdependent actions have no independent utility apart from the proposed action, while interrelated actions are part of a larger action and depend on the larger action for their justification (50 CFR 402.2). The biological evaluation identified two interrelated/ interdependent effects to bull trout. These are the Round Butte Hatchery Management Plan and the Fish Health Management Plan.

5.2.1 Round Butte Hatchery

Round Butte Hatchery operations are conducted by the ODFW under the Round Butte Hatchery Operating Agreement. The hatchery captures stock for spawning using the Pelton Trap at the base of the Reregulation Dam. However, under the new Project license the primary purpose of the Trap will be for fish passage. Thus, the effects of Pelton Trap operations are discussed under Fish Passage. By annually releasing 162,000 steelhead and 240,000 spring Chinook smolts into the lower Deschutes River hatchery operations may increase inter-specific competition between juvenile or subadult bull trout and hatchery fish. However, these smolts may also provide additional forage for subadult and adult bull trout. The proposed license articles require the JA's to file a final monitoring plan for the operation and maintenance of the Pelton Trap and other facilities.

5.2.2 Fish Health Management Plan

The Fish Health Management Plan currently being drafted by the ODFW will manage disease risk, which is a result of the decision to implement fish passage. Whirling disease, IHNV type II, furnunculosis, and Erythrocytic Body Syndrome virus (EIBS) could be introduced upstream of the dams. Other diseases such as bacterial kidney disease (BKD) and ceratomyxosis are already present upstream and downstream of the Project dams, but may be increased in severity upstream of the Project by anadromous reintroduction. Several years of disease studies were conducted during Project relicensing; these are discussed by Engleking (1999). These studies showed that bull trout are resistant to IHNV and whirling disease. Bull trout susceptibility to BKD, furnunculosis, and EIBS, ceratomyxosis is unknown.

5.3 Cumulative Effects

Cumulative effects are defined in the implementing regulations of section 7 of the Act as those effects of future State, Tribal, or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.2). The effects of future Federal actions will be considered during the consultations required for those actions and therefore, are not considered cumulative to the proposed action. This analysis addresses only the potential effects of future State, Tribal, and private actions. The biological evaluation identified four cumulative effects. These are: non-Federal timber harvest; recreation; urban and rural development; and water supply.

5.3.1 Non-Federal Timber Harvest

Future timber harvests may affect bull trout habitat by increasing stream temperatures, turbidity, and decreasing large woody debris recruitment. It is unlikely that non-Federal timber harvests will threaten the persistence of the bull trout. This is because most Deschutes River basin bull trout habitat, particularly sensitive spawning and rearing habitats, are located on Tribal or Federal lands. Non-Federal harvests occur along the Deschutes River mainstem, or on tributaries that do not have bull trout populations.

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5.3.2 Recreation

Recreational activities include angling, boating, hiking, and other activities. It is unlikely that recreational activities will threaten the persistence of the bull trout. This is because angling regulations significantly restrict or completely prohibit bull trout harvest throughout the Deschutes River basin. Other activities such as boating and hiking do not significantly affect the habitat attributes essential to bull trout reproduction, rearing, or migration.

5.3.3 Urban and Rural Development

Development can contribute to riparian habitat fragmentation, water quality degradation from non-point sources, road construction, and other effects. It is unlikely that urban and rural development will threaten the persistence of the bull trout. This is because most Deschutes River basin bull trout habitat, particularly sensitive spawning and rearing habitats, are located on Tribal or Federal lands. Urban and rural development primarily occur along the Deschutes River basin mainstem, or on tributaries that do not have bull trout populations.

5.3.4 Water Supply and Water Use

Water use in the Deschutes River basin may increase, particularly from urban development and increased population growth. It is unlikely that increased water use will threaten the persistence of the bull trout. This is because most Deschutes River basin bull trout habitat, particularly sensitive spawning and rearing habitats, are located on Tribal or Federal lands. Water use and development on Tribal lands are closely monitored by the Tribes and managed in accordance with the Tribe's Intergrated Resources Management Plan, Best Management Practices, Water Quality ordinances, and other management plans. On Federal lands, the USFS and BLM do not provide for further development, which eliminates the potential for increased water use.

VI. CONCLUSION

6.1 Bull Trout

The Service has reviwed the current status of the bull trout, the environmental baseline for the action area, the status of the species in the action area, the effects of the proposed action, and the cumulative effects. It is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the bull trout. We base this determination on the following considerations:

1. The proposed action will not result in a decrease in the abundance or distribution of the Columbia River Basin DPS of the bull trout.

2. Deschutes River basin bull trout populations upstream and downstream of the Project will be reconnected by implementation of fish passage at the Project. Reconnecting separated populations is a significant goal of the Service's Bull Trout Draft Recovery Plan (USFWS 2002).

3. The distribution of bull trout will either remain stable or slightly expand due to the increased quality of tributary habitat. Increases in the quality of habitat in the Metolius, Deschutes, and Crooked River tributaries to Lake Billy Chinook will result from the mitigation projects that have already been planned, and from the projects implemented in the future by the Pelton Round Butte Mitigation Fund.

4. The numbers of bull trout will either remain stable or slightly expand due to the increased availability of foraging and rearing habitats. The bull trout population in the action area has been increasing over the last 19 years. Bull trout reproduction appears to be secure based on the increasing population size, and the proposed action's lack of effect to spawning areas.

5. The kokanee forage-base in Lake Billy Chinook that is used by subadults and adults from the three Metolius River basin bull trout populations should not be adversely affected by the proposed action.

6. Several conservation measures in the proposed action are intended to potentially reduce the present level of take and contribute to bull trout recovery. These include implementing upstream and downstream fish passage, eliminating turbine entrainment, increasing rearing habitat for subadult and adult bull trout, minimizing Project effects on lower Deschutes River flows and ramping rates, implementing habitat restoration projects that benefit bull trout, and performing scientific studies to ensure that mitigation measures achieve their intended benefits to the bull trout.

6.2 Bull Trout Critical Habitat

The Service proposed critical habitat for the bull trout on June 10, 1998. The Commission's June 18 2004, letter initiating formal consultation declined to conference on proposed critical habitat. The Service issued its final bull trout critical habitat rule on October 6, 2004. The final rule designated several areas of the lower Deschutes River as critical habitat. Reinitiation of consultation is required if it is determined that the Project may affect designated critical habitat.

VII. INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking provided under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Commission so that they become binding conditions of any grant or permit issued to the JA's for the exemption in section 7(o)(2) to apply. The Commission has a continuing duty to regulate the activity covered by this incidental take statement. If the Commission: 1) fails to assume and implement the terms and conditions or; 2) fails to require the JA's to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of the section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Commission must report the progress of the action and its impact on the species the Service as specified in the incidental take statement (50 CFR 402.14(i)(3)).

7.1 Amount or Extent of Take of Bull Trout

Incidental take from the proposed action is expected to occur in the form of harm, harassment, and mortality to bull trout. This will result from: fish passage program activities; Testing and Verification and Long-Term Monitoring studies; mitigation projects; Fish Health Management activities; Round Butte Hatchery operations; and Entrainment. These activities are discussed below. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

The Metolius River basin bull trout populations include over 2,000 spawning adults (Wise 2003). Data collected by PGE have shown that over 6,000 fry and juvenile bull trout may annually emigrate downstream using the Metolius River (Lewis 2003). Due to the continued success in managing the Metolius River's bull trout, these numbers may well increase. As a result of this success, there are a large number of bull trout of all life stages that may be affected by the proposed action. The overall effect of the proposed action will be beneficial. The proposed fisheries studies and monitoring activities require collection and handling of bull trout. Incidental take to bull trout from these activities is expected to be primarily in the form of harassment, with minimal harm and mortality as discussed below.

7.1.1 Fish Passage

Upstream Passage: The Service considers all bull trout captured in the upstream traps to be harassed as defined by the ESA. Based on our analysis of the proposed facilities, as well as PGE's experience handling and transporting captured bull trout, the Service expects that annually five percent or less of captured bull trout will receive injuries during capture, handling, transportation, and release. The Service expects that one percent or less will be killed.

Adult and subadult bull trout migrating upstream from the lower Deschutes River will be captured at the Reregulation Dam's Pelton Trap, while those from Lake Simtustus will be captured at the Round Butte Dam's upstream trap. Data collected from the Pelton Trap (Schulz E., *pers. comm.*, 2004) showed that from two to ten bull trout entered the trap each year. Captures occurred between February and November, but peaked in June, July, and August. This corresponds to the period of upstream migration for spawning Deschutes River basin bull trout. At the Round Butte Dam trap, capture data showed that from six to twenty-five bull trout from Lake Simtustus entered the trap between July and September of 2003 (PGE 2003b). However, many of these fish were probably recaptures, since captured fish were returned to Lake Simtustus. Movement peaked in July and August, suggesting that these were fish attempting to migrate upstream to spawn. The number of bull trout captured at both upstream traps is expected to increase during the 50 year period of the proposed action. This is due to the anticipated intermingling of bull trout from populations upstream and downstream of the Project, and their reestablishment of historic movement patterns.

Downstream Passage: The Service considers all bull trout captured in the downstream traps at the Round Butte and Pelton Dams, or that pass through the unscreened turbine intakes at the Pelton and Reregulation Dams, to be harassed as defined by the ESA. Based on our analysis of the proposed facilities, as well as PGE's experience handling and transporting captured bull trout, the Service expects that annually eight percent or less of captured bull trout or bull trout passing through the Project turbines will receive injuries during capture, handling, transportation, and release, or during passage through turbine intakes. The Service expects that four percent or less will be killed. Injury and mortality rates for downstream passage are higher than those for upstream passage. This is due to the more extensive handling and contact with passage facilities required for downstream passage. In addition, cannibalism is expected to be higher due to the presence of large and small bull trout during collection and transportation activities. We anticipate that few of the bull trout in Lake Simtustus will pass through the Pelton Dam or Reregulation Dam's turbines. This is because of the downstream passage facilities that will be provided at the Pelton Dam. In addition, studies by PGE of radio-tagged bull trout (2003a) found that bull trout preferred the upstream portion of Lake Simtustus, which has cooler water temperatures. In addition, PGE biologists were unable to locate any of the radio-tagged bull trout in the Reregulation Reservoir downstream of Pelton Dam.

Adult and subadult bull trout from the three Metolius River basin bull trout populations will be passed downstream using the proposed fish passage facilities at Round Butte Dam and Pelton Dam. A study by PGE (Ratliff and Schulz 1999) found that approximately 63 bull trout attempted to migrate downstream through the Round Butte Dam from Lake Billy Chinook 1998/1999. There are no downstream migration data for movement from Lake Simtustus or the Reregulation Dam. The total number of downstream migrating bull trout is expected to increase significantly as bull trout reestablish historic patterns of migration using the downstream fish passage facilities.

7.1.2 Testing and Verification/Long-Term Monitoring

The Service considers all bull trout captured or encountered during studies of bull trout, other resident species, or anadromous species to be harassed as defined under the ESA. Based on our analysis of the proposed methodologies, as well as PGE's experience in conducting studies using these methods in habitat occupied by bull trout, the Service expects that annually 300 or less adult and subadult bull trout will be harassed. The Service expects that 20 or less adult and subadult bull trout will receive injuries by the proposed studies, while ten or less will be killed. We believe that annually 15,000 or less juvenile or fry bull trout will be harassed by the proposed studies, which are described. This number is the result of annual reproduction by over 2,000 adult bull trout (Wise 2003), and the increased number of fry and juvenile which emigrate from the Metolius River basin due to density dependent effects such as increased intra-specific competition (Lewis 2003). In addition, the studies may require the use of additional screw-traps to collect the various study data. The Service expects that 300 or less juvenile and fry bull trout will be harmed by the proposed studies, while 150 or less will be killed.

Adult, subadult, juvenile, and fry life-stage bull trout will be taken by the proposed Testing and Verification, and Long-Term Monitoring studies. Adults and subadults will be captured and handled for studies involving gastric lavage, radio-tagging, and PIT tagging. The final study designs and the number of fish needed for these studies have not yet been identified. Juvenile and fry bull trout will be captured and handled using screw-traps in the mainstem Metolius River. Data collected by PGE during previous Metolius River basin screw-trap operations (Lewis 2003) found that bull trout capture rates varied from 0.75 to 17.1 fish per day. He estimated that total immigration numbers of age 1, 2, and 3 bull trout ranged from a high of 6,534 in 1999, to a low of 1,251 in the year 2000. The final study designs for the Testing and Verification/Long-Term Monitoring studies have not been determined. In addition, studies of other resident species, or reintroduced steelhead, spring Chinook, and sockeye will involve activities such as snorkeling which will occur in bull trout habitats.

7.1.3 Mitigation Projects

The proposed mitigation projects will require instream work in occupied bull trout habitats. Activities include placement of large wood in the mainstem Deschutes River, and channel reconfiguration in sections of the lower Deschutes River's Trout Creek. The Service expects that annually no bull trout of any life stags will be harmed, harassed, or killed by these activities. This is due to the low density of bull trout in the project areas, and the ability of the bull trout in the project areas to avoid the disturbances.

7.1.4 Fish Health Management

Diseases that are the subject of the Fish Health Management program such as whirling disease and IHN type II have the potential to be introduced upstream of the Round Butte Dam as a result of the proposed action. Several years of disease tests have shown that bull trout are very resistant to these diseases (Engleking 1999). The proposed Fish Health Management programs activities have not yet been finalized. The Service expects that a subsample of fish captured for fish passage will also receive additional handling during Fish Health Management activities. At this time it is not known how many bull trout will be tested. Based on the existing information regarding fish health, the presence of some of these diseases upstream of the Project, and bull trout resistance to disease, no take in addition to disease testing is anticipated.

7.1.5 Round Butte Hatchery Operations

The Round Butte Hatchery will release juvenile steelhead and spring Chinook into the lower Deschutes River. This may result in increased inter-specific competition between lower Deschutes River juvenile bull trout and hatchery fish. However, since most of the bull trout in the lower Deschutes River are adults and subadults, no incidental take is anticipated.

7.1.6 Entrainment

Entrainment at Round Butte Dam will be eliminated; however, the turbine intakes at the Project's Pelton Dam and Reregulation Dam will not screened. However, we anticipate that few of the bull trout in Lake Simtustus will pass through the Pelton Dam or Reregulation Dam's turbines. This is because of the downstream passage facilities that will be provided at the Pelton Dam under the proposed action. Studies by PGE of radio-tagged bull trout (2003a) found that bull trout preferred the upstream portion of Lake Simtustus, which has cooler water temperatures. In addition, PGE researchers were unable to locate any tagged bull trout in the Reregulation Reservoir downstream of Pelton Dam. This suggests that few if any bull trout emigrated through the Pelton Dam's turbine intake.

7.2 Effect of Anticipated Take

As analyzed and described in this biological opinion, the Service has determined that this extent of anticipated take is not likely to jeopardize the continued existence of the Columbia River DPS of bull trout. Bull trout avoidance and minimization measures are discussed in the Commission's biological evaluation (Commission 2004) and the Updated Preferred Alternative (JA 2004a). The most up-to-date and detailed discussion of these measures is presented in the Settlement Agreement (JA 2004b). These measures avoid or reduce the proposed action's effects to the bull trout.

7.3 Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of incidental take of bull trout. The Commission must require the JA's to:

1. Implement all protection, mitigation, and enhancement measures identified in the July 13, 2004, Settlement Agreement and its attachments which avoid or minimize effects to the bull trout.

2. Use the best available science to adaptively manage Project operation, maintenance, and construction activities to avoid or minimize effects to the bull trout during the period of the new Project license.

7.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Commission must comply with the following terms and conditions which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

7.4.1 Terms and Conditions for Bull Trout

1. To implement reasonable and prudent measure 1:

   1.1 The Commission must require the JA's to construct and operate the Project facilities identified in the July 13, 2004, Settlement Agreement, implement the Fish Passage Plan, adhere to the Fish Passage Schedule, implement the Testing and Verification studies, Long-Term Monitoring, Annual Work Plans and Reports, Native Fish Monitoring Program, and other measures identified in the July 13, 2004, Settlement Agreement.

2. To implement reasonable and prudent measure 2:

   2.2 The Commission must require the JA's to establish the Fish Committee required by the July 13, 2004, Settlement Agreement, and to adhere to the consultation and dispute resolution provisions of the Settlement Agreement.

   2.3 To implement reasonable and prudent measure 2, the Commission must require the JA's to comply with all Project construction activity best management practices, including measures to prevent concrete products from entering Project waters, measures to control erosion and sedimentation, and measures to control pollutants of any kind.

7.4.2 Reporting Requirements

If a dead, injured, or sick endangered or threatened species specimen is located, initial notification must be made to the nearest Service Law Enforcement Office, located at 9025 SW Hillman Court, Suite 3134, Wilsonville, OR 97070; phone: 503-682-6131. Care should be taken in handling sick or injured specimens to ensure effective treatment or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered and threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

The Commission must require that the JA's file the reports needed to determine if the amount or extent of take is approached or exceeded, and that the reporting assures that the Service knows when take is approached or exceeded. The Commission must also provide for monitoring and actual number of individuals taken. The Settlement Agreement's proposed license article number 32 "Annual Work Plans and Reports" requires these actions. The Commission shall require the JA's to fully implement the requirements of this license article.

7.5 Review Requirement

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. These measures should decrease the level of take of bull trout to the degree possible, given the circumstances surrounding the proposed action. With implementation of these measures, the Service believes that some bull trout may be incidentally taken as quantified above. If, during the course of the action, this minimized level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

VIII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service has no conservation recommendations to make at this time.

IX. REINITIATION - CLOSING STATEMENT

This concludes formal and informal consultation on the proposed action for the Project. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where Federal agency involvement or control over an action has been authorized by law and if: (1) the amount or extent of incidental take is exceeded; (2) if new information reveals effects of this action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion; (3) if the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this biological opinion; or (4) if a new species is listed or new critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If consultation is reinitiated for any of the above reasons, the Commission shall not make any irreversible or irretrievable commitment of resources which have the effect of foreclosing the formulation of reasonable and prudent alternatives. If questions arise concerning the contents of this biological opinion, please contact Peter Lickwar or Nancy Gilbert at (541) 383-7146.

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