A Plan for the Reintroduction of Anadromous Fish in the Upper Klamath Basin

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FOREWORD

The Oregon Fish and Wildlife Commission (OFWC) has adopted statewide species plans for Chinook and coho salmon, steelhead, trout, and warmwater gamefish. These plans guide the development of localized plans for species management units, and individual river basins. A fish management plan was adopted by the OFWC in 1997 for the Klamath River Basin (ODFW 1997).

Basin fish management plans serve several functions. They present a logical, systematic approach to conserving our aquatic resources; establish management priorities, and direct attention to the most critical problems affecting our fisheries so that Oregon Department of Fish and Wildlife (Department) funds and personnel can be used accordingly. They inform the public and other agencies about the Department's management programs and provide them with the opportunity to help formulate those programs.

In November, 2002, the OFWC adopted the Native Fish Conservation Policy (NFCP) (ODFW 2002) that calls for development of conservation plans for each species management unit to ensure conservation and recovery of native fish in Oregon. Intent of the NFCP is to provide a basis for managing hatcheries, fisheries, habitat, predators, competitors, and pathogens in balance with sustainable production of naturally produced native fish. The policy has three areas of emphasis. The first is defensive, to ensure avoidance of serious depletion of native fish. The second is more proactive, to restore and maintain native fish at levels providing ecological and societal benefits. The third area of emphasis ensures that, consistent with native fish conservation, opportunities for fisheries and other societal resource uses are not unnecessarily constrained. The NFCP acknowledges that basin fish management plans will provide fish management guidance until conservation plans can be completed.

Purpose of Plan Amendment

The purpose of this document is to seek Oregon Fish and Wildlife Commission approval of amendments to the Klamath River Basin Fish Management Plan. The purpose of these amendments is to authorize initiation of efforts to re-establish anadromous fish in the Oregon portion of the Klamath River Basin. Initial efforts will focus on reintroduction of Chinook salmon into Upper Klamath Lake and its tributaries as well as monitoring natural re-colonization of salmon, steelhead and lamprey into the Oregon portion of the Klamath River and its tributaries. These efforts will be outlined in a **Re-Introduction Implementation Plan,** which will be informed by the conceptual reintroduction plan developed by Huntington et al. (2006) for the Klamath, Yurok, and Karuk tribes.. An **Anadromous Fish Conservation Plan** for the Oregon portion of the Klamath River Basin will be developed at a future date when anadromous fish populations have been successfully re-established and more information needed for the plan has been collected.

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Re-introduction of anadromous fish into the upper basin will be a collaborative effort among the Department, the four Tribes (Klamath, Karuk, Hoopa Valley, and Yurok tribes) of the Klamath River Basin, California Department of Fish and Game, U.S. Fish and Wildlife Service and NOAA Fisheries. Once adopted, this plan amends the Klamath River Basin Fish Management Plan's management direction regarding anadromous fish management. This plan is intended to set fish management direction for the next five to ten years or beyond. The policies and objectives within each section define the core management program and describe the fundamental direction that will be pursued. These are implemented through specific actions, which may include (but are not limited to) monitoring, evaluation, restoring or improving habitat, developing angling regulations, and hatchery operations.

Rationale for Re-Introduction Efforts

The impetus for this re-introduction effort is the fact that the federal fishery management agencies, U.S. Fish and Wildlife Service (USFWS) and NOAA Fisheries (NOAA), have required volitional fish passage at all four mainstem Klamath River Hydroelectric Project (Project) dams owned and operated by PacifiCorp as part of the Federal Energy Regulatory Commission (FERC) relicensing process. In addition, settlement agreement negotiations have been underway in an attempt to reach an effective compromise between all stakeholders regarding future fish and water management in the Klamath River Basin. Ultimately, this settlement agreement could result in removal of all of PacifiCorp's four hydroelectric dams on mainstem Klamath River.

The Klamath River Basin Fish Management Plan (ODFW 1997) adopted by the Oregon Fish and Wildlife Commission in 1997 stated:

"ODFW generally supports the reestablishment of sustainable populations of indigenous species; however, because of existing habitat problems, loss of the native stocks, risk of disease introductions, and potential competition with remaining native redband trout, it does not appear feasible, or prudent, to attempt re-establishment of anadromous salmon or steelhead to the upper Klamath Basin in Oregon, now or in the near future.

However, ODFW will support such re-introductions if and when the biological and physical questions are addressed and show that such actions are feasible and prudent. Further, ODFW would support future studies addressing that feasibility and the habitat restoration that would be conducive to successful re-introductions."

Since initial adoption of the Klamath River Basin Fish Management Plan there have been significant social, political and habitat related changes in the basin that make attempting re-introduction of anadromous fish prudent at this time. Currently, three Federal Agencies are working on improving fish habitat and access to available fish habitat in the upper Klamath Basin. The U.S. Bureau of Reclamation, the U.S. Natural Resources Conservation Service and the U.S. Fish and Wildlife Service have invested $175.1 million dollars to date into various fish improvement projects in the Klamath River Basin. It is anticipated that these efforts to improve conditions in the Klamath Basin will

continue. Projects have included improvements of fish habitat, improved fish protection screens and adult fish ladders, and investigations into predation, water quality and disease for the benefit of the shortnose and Lost River suckers. Habitat improvements for the endangered sucker species have provided for improved conditions for all fish species including salmonids.

Fish Species for Re-Introduction Efforts

This document modifies the existing basin plan by presenting specific direction for managing spring and fall Chinook salmon, coho salmon, summer steelhead trout and Pacific lamprey in the Oregon portion of the Klamath River Basin.

Location of Re-Introduction Efforts

This plan proposes to re-introduce Chinook salmon into Upper Klamath Lake and tributaries where anadromous fish were historically present.

This plan does not propose to introduce anadromous fish into the Lost River subbasin. It is believed that the Lost River sub basin did not provide habitat for anadromous fish based on historic topography as well as its infrequent connection to Lower Klamath Lake. Lost River continues to provide habitat for redband trout, shortnose and Lost River suckers, as well as the indigenous tui chub and speckled dace.

Phased Approach to Re-Introduction Efforts

This plan proposes to initiate re-introduction of anadromous fish into the Upper Klamath Basin in a two-phased approach. A description of each phase is provided below.

In **Phase 1,** the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, U.S. Fish and Wildlife Service and NOAA Fisheries will prepare a **Re-Introduction Implementation Plan** for re-introduction of Chinook salmon into the Upper Klamath Lake and tributaries. The **Re-Introduction Implementation Plan** will:

- Serve as an administrative Appendix to the Amended Klamath River Basin Fish Management Plan
- Identify facilities and near and long term actions necessary to address key uncertainties,
- Develop specific strategies for achieving the goals of re-introduction of Chinook salmon into Upper Klamath Lake and tributaries,
- Develop monitoring and evaluation of re-introduction efforts, and other investigations as appropriate to narrow uncertainties,

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- Identify facilities and strategies to monitor and evaluate natural re-colonization of Chinook salmon, steelhead trout, coho salmon and Pacific Lamprey into the Oregon portion of Klamath River and tributaries below Upper Klamath Lake.

- Identify criteria and research protocol for determining when natural re-colonization is not occurring or is too slow and when, how and which species (salmon, steelhead trout, and/or Pacific Lamprey) the Department and the Klamath Tribes will actively re-introduce into the Oregon portion of Klamath River and tributaries downstream of Upper Klamath Lake.

- Identify and address key uncertainties necessary to complete an **Anadromous Fish Conservation Plan** which will direct **Phase 2 Management** of anadromous fish returning to the Oregon portion of the Klamath River Basin, consistent with stipulations of the Department's Native Fish Conservation Policy *(OAR 635-007-0503, ODFW 2002*).

- Be adaptable in order to incorporate knowledge gained from monitoring and evaluation during re-introduction efforts.

Key investigations that do not require fish passage through PacifiCorp's hydropower projects on mainstem Klamath River (e.g. stock selection, outmigrant behavior, and re-introduction methods) will begin immediately following completion of the Re-Introduction Implementation Plan.

Initially, in Phase 1 the **Re-Introduction Implementation Plan** will propose to introduce Chinook salmon which meet strict disease criteria into Upper Klamath Lake and tributaries. An adaptive management approach will be utilized to determine appropriate race(s) and life history of Chinook for release (spring and/or fall Chinook) with best opportunities for successful rearing, emigration to the ocean and return.

Research investigations will determine availability of stocks which meet strict disease criteria. In addition, competition and interaction with existing native stocks will be evaluated. A variety of release and rearing strategies will be utilized to optimize opportunities for success.

During Phase 1, no active intervention/movement of fish is proposed to re-establish salmon, steelhead or lamprey in the Oregon portion of Klamath River and tributaries downstream of Upper Klamath Lake.

However, if monitoring reveals that re-colonization is not occurring or is too slow, the Department and the Klamath Tribes in collaboration with downriver Tribes and Fisheries Managers may pursue active re-introduction of salmon, steelhead trout or Pacific lamprey into the Oregon portion of Klamath River and tributaries downstream of Lower Klamath Lake. Criteria and research protocol for determining when, how and which species will be actively re-introduced into these

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stream reaches will be established as part of the Re-Introduction Implementation Plan.

To the extent possible, adult salmon returning to Upper Klamath Lake and tributaries from Phase 1 re-introduction efforts will be protected from sport, commercial and tribal fisheries until an **Anadromous Fish Conservation Plan** is adopted by the OFWC, which will direct **Phase 2 Management** of anadromous fish returning to the Oregon portion of the Klamath River Basin.

Rationale for this approach includes:

- These stream reaches provide a unique and significant opportunity to observe natural re-colonization rates following removal or passage at long standing passage barriers or the implementation of passage at those barriers. Monitoring sites and research protocols will be established at Keno Dam, on mainstem Klamath River and Spencer Creek for evaluating juvenile outmigration and upstream adult returns.

- Fall Chinook salmon are relatively abundant in mainstem Klamath River immediately downstream of Iron Gate Dam and significant potential fall Chinook habitat exists in the Project area upstream of Iron Gate Dam. It is expected that fall Chinook will re-colonize upstream of the dam once fish passage is provided.

- Migratory forms of resident rainbow trout (*O. mykiss)* are relatively abundant throughout Klamath River and tributaries in Oregon and California, and are abundant in Upper Klamath Lake and tributaries. In many cases these resident trout are significantly larger than Klamath Basin summer steelhead.

- Genetic analyses indicates a close evolutionary linkage between populations of steelhead trout downstream of Iron Gate Dam and current resident forms in Klamath River and tributaries upstream of Iron Gate Dam, as well as in tributaries to Upper Klamath Lake (Buchanan et al. 1994, Currens 1997, Pearse 2007). Research on resident rainbow trout and steelhead trout downstream of Iron Gate Dam indicates that it is relatively common for returning steelhead trout to be the progeny of resident adults, and the reverse (resident trout progeny of steelhead trout parents) is common as well (Chesney 2003). With this evolutionary resiliency it is expected that steelhead trout will re-colonize upstream of the dam once fish passage is provided.

- Coho salmon are in low abundance in the Lower Klamath River and tributaries and are listed as Threatened under the federal Endangered Species Act. In addition, their historic upper distribution in the Klamath River above Iron Gate Dam is unclear at this time. At present, recovery efforts will focus on securing coho salmon populations where they exist today, before actively intervening and moving them upstream of Iron Gate Dam.

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- Pacific lamprey are relatively abundant in mainstem Klamath River immediately downstream of Iron Gate Dam. In addition, significant potential lamprey habitat exists in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries. Pacific lamprey are thought to have historic distributions sympatric with anadromous salmonids. Loss of Pacific lamprey in the Oregon portion likely occurred when anadromous salmon and steelhead trout were extirpated by the first impassable hydroelectric dam, Copco 1. Due to this close habitat linkage and the lack of homing affinity to natal streams for spawning, it is expected that Pacific lamprey will quickly recolonize habitats in the Oregon portion of Klamath River and tributaries once fish passage is restored past PacifiCorp's four mainstem hydroelectric dams.

A major assumption in Phase 1 is that acceptable upstream and downstream fish passage is provided throughout the Klamath River corridor, either through passage facilities at PacifiCorp's hydroelectric dams which meet state and federal standards, or through dam removal.

Phase 2 Management will be initiated once an **Anadromous Fish Conservation Plan** is adopted by the OFWC, which will establish escapement levels of returning anadromous fish in Oregon, as well as provide policy direction to guide management of established anadromous fish populations in the Oregon portion of the Klamath River Basin. Ultimately, policy direction in the **Anadromous Fish Conservation Plan** will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin that will fulfill requirements of the Pacific Fisheries Management Council.

The **Anadromous Fish Conservation Plan** for the Oregon portion of the Klamath River Basin will be written consistent with the stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).

Oregon Fish and Wildlife Commission Action

This Plan Amendment will be presented to the Oregon Fish and Wildlife Commission (OFWC) for approval. Following a 60 day comment period, in which further public review may take place, the Plan Amendment will be finalized to reflect the OFWC decisions, and be adopted as Oregon Administrative Rules (OARs). **Adoption of this plan amendment by the OFWC will result in specific endorsement of Phase 1 (through adoption of OAR's integral to this Plan Amendment) as well as agreement to re-visit how to manage future anadromous fish returning to the Oregon portion of the Klamath River Basin in an OFWC adopted Anadromous Fish Conservation Plan.**

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GENERAL CONSTRAINTS

Legal Considerations

As with subbasin fish management plans, plan amendments must also conform to other established constraints, such as federal acts (e.g., Wilderness, Endangered Species), state statutes, administrative rules, memoranda of understanding, and other policies.

The Department interacts with federal, state, local agencies and tribal governments while dealing with fish habitat issues. Although the U.S. Bureau of Land Management and the U.S. Forest Service are the major public land managers in the planning area, several other federal, state, and tribal entities have jurisdiction over activities that affect fish habitat. These include the U.S. Fish and Wildlife Service (USFWS), U.S. Department of the Interior's Bureau of Reclamation (USBOR), National Oceanic and Atmospheric Administration (NOAA), Oregon State Police (OSP), Natural Resource Conservation Service (NRCS), U.S. Army Corps of Engineers (COE), Oregon Department of State Lands (DSL), Oregon Department of Environmental Quality (ODEQ), Oregon Department of Water Resources (ODWR), Oregon Parks and Recreation Department (OPRD), the Oregon Department of Geology and Mineral Industries (DOGAMI), and the Klamath Tribes.

State regulatory actions that affect habitat

The OWRD regulates water use throughout the state. ODEQ has developed state water quality standards that are in compliance with federal water quality standards. ODEQ administrative rules (Chapter 340, Division 41) address water quality standards for individual basins. OPRD, in cooperation with the federal land managers, implements the Wild and Scenic Rivers Act (BLM 1990, NPS 1994) on portions of the mainstem Klamath River.

The Oregon Forest Practices Act (ORS 527.610 to 527.730) was adopted in 1972 (ODF 1972). Commercial timber operations on state and private lands are regulated by the act, which is administered by the Oregon Department of Forestry. Forest management activities on U.S. Forest Service and Bureau of Land Management lands are designed to comply with Forest Practices Act rules and state water quality standards.

The DSL oversees the Oregon Removal-Fill Law (DSL 2008). A permit is required for the removal or filling of 50 cubic yards or more of material in natural waterways. A permit is required for the removal or filling of any amount of material in designated essential salmonid habitat.

The Department goals and policies for commercial and sport fishing regulations, fish management, and the Native Fish Conservation Policy and Fish Hatchery Management Policy (ODFW 2003) are adopted as Oregon Administrative Rules (OAR). These policies along with the Oregon Plan for Salmon and Watersheds (Nicholas 1998) provide

guidance on the development of fisheries management options for water bodies throughout the state.

The Oregon Riparian Tax Incentive Program of 1981 (ODFW 2006) provides a tax exemption to land owners for riparian lands included in a management plan developed by the land owner and Department personnel. The Oregon Watershed Enhancement Board gives both private individuals and organizations an opportunity to become involved in watershed rehabilitation projects.

Wild and Scenic Waterway Issues

The Oregon section of the Klamath River from the JC Boyle Powerhouse to the Oregon-California Stateline was designated as a "scenic waterway" by the Secretary of the Interior as a state administered component of the National Wild and Scenic Rivers System in 1994 pursuant to Section 2(a) (ii) of the Wild and Scenic Rivers Act (NPS 1994). The scenic waterway includes the river and its shoreline and all tributaries within a quarter mile of its banks. The program protects the free-flowing character of designated rivers for fish, wildlife, and recreation. The program is designed to protect and enhance scenic, aesthetic, natural, recreation, scientific, and fish and wildlife qualities along scenic waterways. New development or changes in existing uses proposed within a scenic waterway are reviewed before they may take place.

Tribal Authority to cooperatively manage Fish and Wildlife in the Upper Klamath Basin

The Klamath Tribes (TKT) and the Department were directed through a federal court decision (Charles E. Kimball et al., v. John D. Callahan) to work together to accomplish the needs of Department and TKT constituents.

Water Rights

The Upper Klamath River Basin is un-adjudicated in regards to water rights from the State of Oregon. The process for adjudicating water rights was initiated in 1975 and continues today. Water rights will be enforceable following issuance of the Adjudicator's Final Order and Determination, which is expected sometime in 2011. After this phase, all rulings made by the Adjudicator will be reviewed in the Klamath County Circuit Court (likely to take 2-5 years), and then appeals will move up through State courts and US Supreme Court.

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INTRODUCTION

This document proposes to amend the Klamath River Basin Fish Management Plan to revise Department management direction regarding anadromous fish management. Specifically, this amendment provides strategies for re-introduction of anadromous fish into the Oregon portion of the Klamath River Basin. The geographic scope of this plan includes the Klamath River and tributaries in Oregon, excluding Lost River. In addition this plan covers Upper Klamath Lake and tributaries where anadromous fish were historically present. This includes, but is not limited to the Williamson, Wood and Sprague rivers. A map of part of the Klamath Basin in California and Oregon, showing locations of Project facilities (shaded boxes) depicts major streams potentially accessible to anadromous fishes if passage is provided in black (Figure 1; we note that Sycan River is inappropriately omitted).

Background

The Klamath River Basin (Basin) in southern Oregon and northern California once supported large runs of spring-run and fall-run Chinook salmon *(Oncorhynchus tshawytscha)*, coho salmon (*Oncorhynchus kisutch*), Pacific lamprey *(Entosphenus tridentatus)*, steelhead *(Oncorhynchus mykiss)*, eulachon *(Thaleicthys pacificus)*, and green sturgeon *(Acipenser medirostris)*. The Basin is also home to a variety of resident native fishes important commercially and culturally to the region, including bull trout *(Salvelinus confluentus)*, redband trout *(Oncorhynchus mykiss newberrii)*, and several sucker species.

These anadromous and resident fish species have sustained several Tribes for thousands of years. Klamath River salmon are found in the marine waters along California, Oregon, and Washington, and provide coastal and Klamath River communities with commercial and recreational fishing opportunities and fishing-based tourism.

Degraded ecological conditions and reduced habitat in the Basin, among other reasons, have contributed to the listing of coho salmon, Lost River sucker *(Deltistes luxatus)*, shortnose sucker *(Chasmistes brevirostris)*, and bull trout under the U.S. Endangered Species Act.

Over the past century, anadromous fish populations have declined to levels well below historical abundance, and many species continue to decline. Nehlsen et al. (1991) listed spring-run Chinook in the Lower Klamath River Basin as subject to a high risk of extinction, and fall-run Chinook and summer steelhead as being under moderate risk of extinction. Coho salmon in the Klamath River Basin were listed in 1997 as threatened under the Endangered Species Act (NMFS 2002), and were also listed as threatened under the California Endangered Species Act in 2004. Anadromous lamprey appear to have also declined in abundance to low levels (Larson and Belchik 1998). These long-term declines have been caused by the cumulative effects of a variety of activities, including the construction of dams blocking access to a large portion of the Basin,

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agricultural development, timber harvesting, mining, and historical over-harvesting by commercial and recreational fisheries (USFWS 1991).

Anadromous fish were extirpated from the Upper Klamath Basin in 1917 as a result of development of the Klamath Hydroelectric facilities (Fortune et al. 1966, Lane and Lane Associates 1981, Hamilton et al. 2005). Currently, anadromous fish cannot pass upstream beyond Iron Gate Dam (RM 190), the lowermost dam of the Klamath Hydroelectric Project.

The Klamath Hydroelectric Project which currently blocks anadromous fish from the upper basin consists of four mainstem Klamath River hydroelectric dams. Iron Gate, Copco 1, and Copco 2 dams are located in the State of California. JC Boyle dam is located in Oregon and was built with a fish ladder. This dam was later equipped with fish protection screens. Both the retrofitted fish screens and fish ladder are functional but do not meet Oregon fish passage standards as required under **OAR 635-412-0005.**

Settlement agreement negotiations between the various stakeholders have been underway in an attempt to reach an effective compromise regarding future fish and water management in the Klamath River Basin. This possible settlement agreement could result in removal of all of PacifiCorp's hydroelectric dams on mainstem Klamath River.

Management Uncertainties

A list of uncertainties follows but is by no means exhaustive, and significant progress on several of the listed uncertainties has already been made. For example, Huntington and Dunsmoor (2006b) rated existing Chinook salmon stocks in the Klamath Basin and identified several stocks as reasonable candidates for initial reintroduction efforts. As fishery investigations move forward, additional questions are sure to arise. Through investigations into these unknowns and the process of adaptive management, a successful re-introduction program will allow the re-establishment of the anadromous fish extirpated from the Upper Klamath Basin as a result of operation of PacifiCorp's hydroelectric facilities on mainstem Klamath River.

Examples of uncertainties that need further investigations are:

- What is the appropriate stock(s) of Chinook salmon to be released into Upper Klamath Lake and tributaries (i.e. Klamath Basin stocks vs. out of basin stocks such as Rogue River)?
- What is the availability of spring vs. fall races of Klamath Basin Chinook salmon for re-introduction efforts?
- Are Chinook salmon stocks available for re-introduction efforts disease free (so as not to impact existing resident fish present), and resistant to diseases locally present in Upper Klamath Lake and tributaries such as *Ceratomyxa shasta*?
- What is the current distribution and abundance of fish diseases in Upper Klamath Lake and tributaries and how will these diseases affect survival of re-introduced anadromous fish?

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- What is the appropriate size, time and location of release to ensure optimum survival of Chinook salmon in Upper Klamath Lake and/or tributaries?
- What are the appropriate existing fish hatcheries for use in initial re-introduction efforts? What new hatcheries/acclimation facilities are needed.
- To what extent will predation by or competition with non-native warmwater fish species present in Upper Klamath Lake and tributaries effect survival of re-introduced Chinook salmon?
- How do we monitor interactions between resident fish currently present in Upper Klamath River and tributaries and newly re-introduced anadromous fish?
- What are the appropriate criteria for determining if natural re-colonization of salmon, steelhead trout and Pacific Lamprey into Oregon portion of Klamath River and tributaries is not occurring or is too slow? If recolonization is not occurring or is too slow, which species should have the highest priority for active re-introduction efforts in these stream reaches?
- How do we protect anadromous fish re-introduced into the Oregon portion of the Klamath River Basin from downstream sport, commercial and tribal fisheries in order for them to become established and self perpetuating? Should all outmigrants be marked?
- For anadromous species re-introduced into Oregon portion of the Klamath River Basin, what are the specific escapement numbers necessary to meet long term conservation, sport, commercial and tribal fisheries goals to be finalized in the **Anadromous Fish Conservation Plan**?
- What are the appropriate locations and sampling protocol for monitoring re-colonization of anadromous fish into the Oregon portion of the Klamath River Basin?
- Assuming PacifiCorp's hydroelectric facilities on mainstem Klamath River remain in the river for some period of time, what interim facility and operational changes are necessary to protect re-introduced anadromous fish until dams are removed or more permanent fish passage is provided consistent with state and federal standards?
- What kinds of habitat improvements would best facilitate success of reintroduction efforts during Phase I (e.g. gravel additions to the mainstem Klamath River)?
- Will native redband trout from the Upper Basin re-exhibit anadromy once passage is restored to the ocean?

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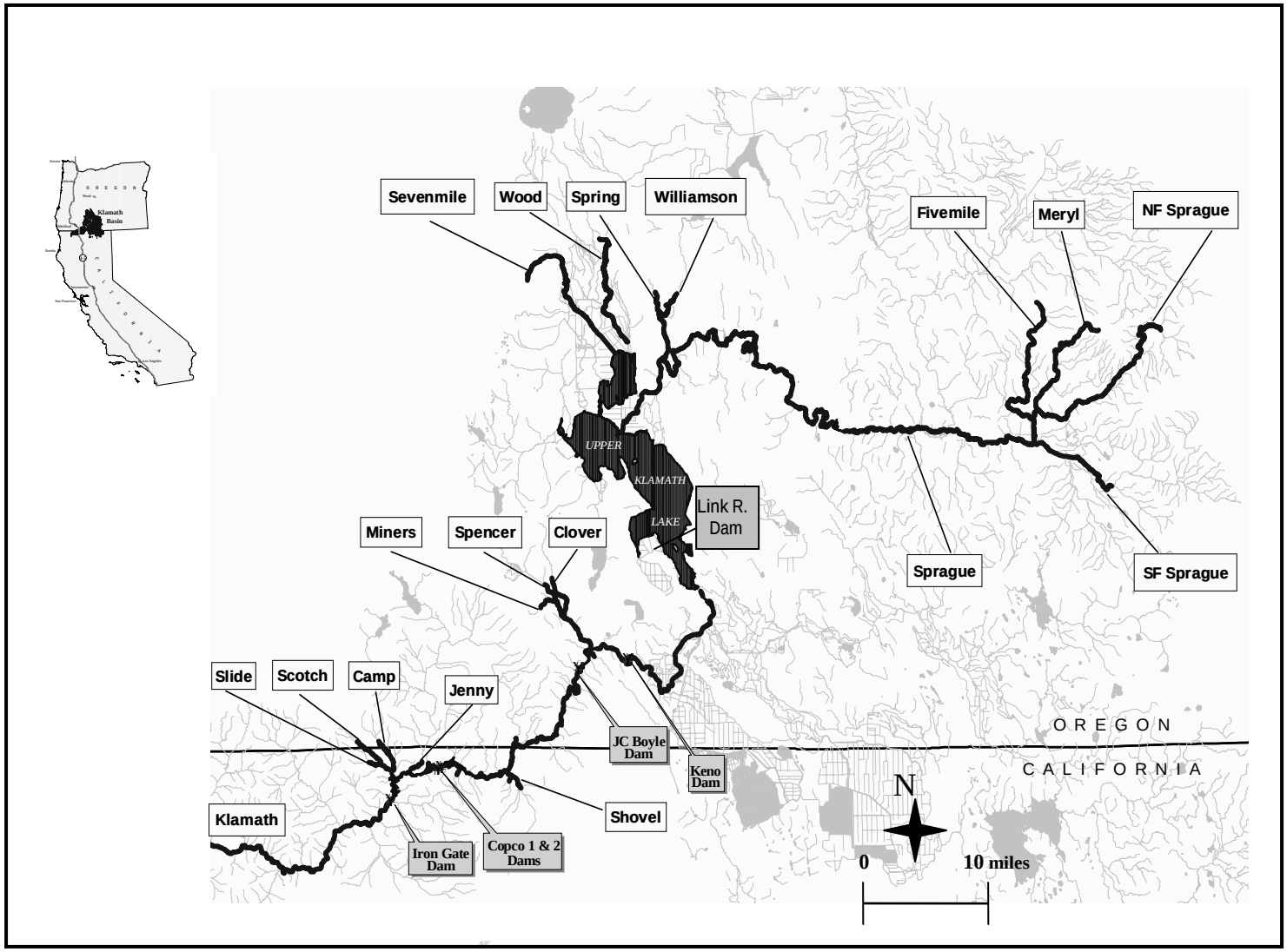

Figure 1. Map of part of the Klamath Basin, California-Oregon, showing locations of hydroelectric project facilities (shaded boxes). Major streams potentially accessible by anadromous fishes if passage is provided are shown in black. (Hamilton et al. 2005)

PHASE 1

Note: The following information is listed under each anadromous species covered in this plan in an attempt to at least partially address stipulations required in the Department's *Native Fish Conservation Policy (OAR 635-007-0503,* ODFW 2002*).* In most cases the required information is unknown or at best incomplete since anadromous fish have been extirpated from the Oregon portion of the Klamath River Basin for nearly 100 years.

Chinook Salmon (*Oncorhynchus tshawytscha*)

Spring and fall races of Chinook salmon were historically present in Upper Klamath Lake and tributaries. Both stocks are currently extirpated in the basin upstream of Iron Gate Dam. Currently, Spring Chinook salmon populations in the Lower Klamath River Basin are in very low abundance, with distribution restricted to a handful of lower river tributaries. Fall Chinook salmon in the Lower Klamath River are more abundant, with fish reaching Iron Gate Dam each year.

Spring Chinook salmon were believed to be the dominate fish in the upper basin prior to European settlement. Fall Chinook salmon were the remaining dominant Chinook salmon at the time of development of PacifiCorp's hydro electric facilities on mainstem Klamath River in the early 1900's (Snyder 1931). During development of the **Re-Introduction Implementation Plan**, both races of Chinook salmon will be reviewed for re-introduction efforts.

Natural re-colonization of Chinook salmon into Klamath River and tributaries in Oregon will be monitored after fish passage facilities are installed at Klamath Project dams or after dams are removed. The purpose of this monitoring will be to:

- Document natural re-colonization rates into habitat not accessible for nearly 100 years,
- Monitor efficacy of fish passage facilities at PacifiCorp's hydroelectric dams (in the case dams stay in place) and,
- Determine if natural re-colonization rates meet public expectations when compared to criteria listed in the **Re-Introduction Implementation Plan**.
- Trigger more active reintroduction efforts if natural re-colonization is proceeding too slowly.

<u>Species management unit</u>

The 2005 Native Fish Status Report (ODFW 2005a, 2005b) identified both races of Chinook salmon above Iron Gate dam as extirpated. Historically, a Species Management Unit (SMU) for Klamath River Spring Chinook consisted of the entire Klamath River Basin. However, no fish passage was provided at the Iron Gate Dam, so no Chinook salmon currently exist above the hydroelectric facility.

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Klamath River populations of Chinook salmon that currently exist below Iron Gate dam in California have been identified by the Department as part of the Southern Oregon and Northern California Coast Chinook (SONCC) salmon gene conservation group. Gene conservation groups were identified through allozyme analysis.

Management policies and objectives identified within this plan will be consistent with key elements outlined for SMU's and their respective conservation plans identified in the Native Fish Conservation Policy (OAR 635-007-0504 and OAR 635-007-0505, ODFW 2002).

Desired biological status

The intent of this plan is to re-introduce and re-establish Chinook salmon populations to historic spawning and rearing areas in the Oregon portion of the Klamath River Basin. The goal for reintroduction is to develop sustainable population(s) of naturally produced native Chinook salmon with all life history stages represented.

As part of the **Re-Introduction Implementation Plan**, a stock recruitment model will be developed for Chinook salmon utilizing the Oregon portion of Klamath River, Upper Klamath Lake and tributaries to determine specific escapement numbers necessary to meet conservation and other management goals to be finalized in the **Anadromous Fish Conservation Plan**.

Current status

Chinook salmon have been extinct in the Oregon portion of Klamath River Basin since the early 1900's due to the lack of fish passage at Iron Gate Dam.

A status review for chinook populations in the Klamath River was completed in 1998 (Myers et al. 1998) Two ESUs occur for chinook salmon in the Klamath River. These are the Southern Oregon Northern California Coasts (SONCC) ESU and the Upper Klamath and Trinity Rivers ESU. NMFS determined that SONCC chinook had a high likelihood of becoming extinct in the foreseeable future. The Upper Klamath and Trinity Rivers ESU were determined not to be at significant risk of extinction however, there was considerable concern for spring chinook (Myers et al. 1998). In 1999 NMFS further reviewed SONCC chinook and found that listing was not warranted for the SONCC ESU (NMFS 1999). There is currently no special ESA status assigned to Klamath River Chinook salmon at the state or federal level.

Primary factors for disparity between desired and current status

Several factors account for the disparity between desired and current status for distribution and abundance of Chinook salmon in the Klamath River watershed including impassable dams, habitat deficiencies, and fish disease impacts in the lower Klamath River downstream of Iron Gate Dam.

PacifiCorp's four hydroelectric dams on the mainstem Klamath River create complete migration barriers to resident and anadromous fish at Iron Gate Dam at Rm 190. Three of these hydroelectric dams were built with no fish passage facilities.

Short and long-term management strategies

A major assumption in this plan is that acceptable upstream and downstream fish passage is provided throughout the Klamath River corridor, either through passage facilities at PacifiCorp's hydroelectric dams which meet state and federal standards, or through dam removal.

Hatchery supplementation will be used to assist in meeting sustainability goals in Upper Klamath Lake and tributaries until naturally produced self-sustaining population(s) of Chinook salmon are established. Hatchery production and supplementation efforts associated with reintroduction of Chinook salmon will be developed consistent with Hatchery Management Policy and guidelines (OAR 635-007-0542, ODFW 2003).

Specific stock(s) of Chinook salmon used for reintroduction is contingent on availability of eggs, fry, smolts or adult salmon, and monitoring of stock performance results. Stock development will utilize an adaptive strategy loop to assess management actions and take corrective actions to meet objectives.

The **Re-Introduction Implementation Plan** will identify near-term and long-term actions necessary to address key uncertainties and develop specific strategies for achieving the goals of re-introduction.

The **Re-Introduction Implementation Plan** will identify and address key uncertainties necessary to complete an **Anadromous Fish Conservation Plan** for the Oregon portion of Klamath River, Upper Klamath Lake and tributaries, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).

As part of the **Re-Introduction Implementation Plan**, a stock recruitment model will be developed for Chinook salmon utilizing Upper Klamath Lake and tributaries to determine specific escapement numbers necessary to meet conservation and other management goals to be finalized in the **Anadromous Fish Conservation Plan**.

Necessary monitoring, evaluation, and research to gauge success of corrective strategies

Research, monitoring and evaluation protocols associated with release of Chinook salmon into Upper Klamath Lake and tributaries will be described in the **Re-Introduction Implementation Plan** to be drafted collaboratively among the Department, the four Tribes of the Klamath River Basin, California Fish and Game, USFWS and NOAA Fisheries. In addition, this Plan will also identify hatchery, monitoring and evaluation facilities necessary to implement re-introduction activities.

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Monitoring upstream and downstream fish passage at the three PacifiCorp's hydroelectric dams in California is outside the purview of this plan. However, as part of the **Re-introduction Implementation Plan** the Department, the four Tribes of the Klamath River Basin, California Fish and Game, USFWS and NOAA Fisheries will develop a monitoring and evaluation plan. They will also identify necessary facilities to document natural re-colonization of Chinook salmon into the Oregon portion of Klamath River and tributaries in coordination with monitoring activities on the California portion of the Klamath River.

As part of the **Re-introduction Implementation Plan,** the Department, the four Tribes of the Klamath River Basin, California Fish and Game, USFWS and NOAA Fisheries will develop criteria and research protocol for determining when natural re-colonization of Chinook salmon is not occurring or is too slow. These criteria and research protocols will also be used to determine if, when, and how the Department and the Klamath Tribes will actively re-introduce Chinook salmon into the Oregon portion of Klamath River and tributaries.

Process to modify corrective strategies

As part of the **Re-Introduction Implementation Plan** an adaptive management approach will be used to identify and implement corrective strategies followed by assessment of effectiveness of those strategies. In some instances corrective strategies may be refined to improve performance. In other instances those strategies will be abandoned in favor of more effective techniques. This plan should avoid codifying all but the most proven management strategies to maintain future options. This plan sets overall programmatic goals and objectives that allow management flexibility. Specific lower level Project and research plans tiered to this plan will be used to assess management options and recommend specific actions consistent with the proposed management direction.

Criteria indicating significant deterioration in status, triggering plan modification

Since Chinook salmon are currently extirpated from the Oregon portion of the Klamath River Basin, re-introduction efforts will be directed through a **Re-Introduction Implementation Plan**. This implementation plan will be an administrative Appendix to the Amended Klamath River Basin Fish Management Plan. This plan will be adaptive, including triggers for when re-introduction efforts need to be modified.

It is anticipated that successful anadromous fish reintroduction into Upper Klamath Lake and tributaries will likely require many generations for each species affected. Monitoring of existing Chinook salmon populations in California with respect to distribution, abundance, fish health, and genetics will be used to detect and assess any direct impacts of re-introduction efforts on those populations.

Once self sustaining population(s) of Chinook salmon are established in Upper Klamath Lake and tributaries, an **Anadromous Fish Conservation Plan** for Chinook salmon in

Oregon portion of Klamath River, Upper Klamath Lake and tributaries shall be prepared for Oregon Fish and Wildlife Commission approval, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002). Once completed, the Klamath River Basin Fish Management Plan will be amended to be consistent with this Conservation Plan.

The **Anadromous Fish Conservation Plan** will provide policy direction to guide management of established anadromous fish populations in the Oregon portion of the Klamath River Basin. This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin that will fulfill requirements of the Pacific Fisheries Management Council.

Annual and long-term reporting

Annual and long term reporting on progress of re-introduction efforts will be subsequently prepared as part of the **Re-Introduction Implementation Plan** and the **Anadromous Fish Conservation Plan** reporting requirements.

Other agencies, tribes, stakeholders, cooperating entities, private landowners, and hydropower owner/operators will be responsible for monitoring and reporting of their activities voluntarily or through license and permit requirements if applicable.

Potential impacts to other native species

Re-introduction of Chinook salmon into Upper Klamath Lake and tributaries has the potential to affect other native species through introduction of new and more virulent pathogens, competition for spawning and rearing habitat, and predation. However, risk of introducing virulent pathogens from above Iron Gate Dam is low (pgs. 60-61 in Decision by Judge McKenna in EP Act Hearing, Docket 2006-NMFS-0001).

Historical documented Chinook salmon spawning and rearing areas include the Sprague River (including North and South Forks), Wood River, Fort Creek, Spring Creek, and Williamson River (Hamilton et al. 2005). Other streams (such as Annie Creek, Cherry Creek, Sun Creek, Crane Creek, Short Creek, Long Creek, Crooked Creek, Larkin Creek, Sevenmile Creek, Whisky Creek, and the lower Sycan River) had suitable habitat and could have supported small populations of spring and/or fall chinook (Huntington and Dunsmoor 2006a). Redband trout are the principal native gamefish present in the upper basin that may be affected by spawning and rearing Chinook salmon. Competition between Chinook salmon and redband trout for spawning and rearing areas may occur in Upper Klamath Lake and tributaries. However, studies in the Yakima basin showed little effect from competition of juvenile resident rainbow trout and juvenile spring chinook (McMichael and Pearsons 1998).

Spawn timing for spring Chinook salmon is estimated to occur approximately between the months of August and September. Several redband trout stocks exist within the Klamath River Basin. Spawn timing of these stocks varies by location in tributaries to

Upper Klamath Lake. Redband trout stocks residing in spring fed waters of Spring Creek have been shown to spawn in all months except August. Despite this protracted spawning period, the majority of the spawning takes place between the months of December thru May. Competition for spawning sites in August and September is likely to have little effect on total redband trout production; however the effect is unknown at this time. Competition between rearing redband trout and Chinook salmonis also unknown but not assumed to be a major limiting factor since both species historically co-evolved together.

There is the potential for fish health risks associated with re-introducing new and more virulent pathogens along with the re-introduced Chinook salmon into Upper Klamath Lake and tributaries.

Infectious Hematopoietic necrosis (IHN) is not yet considered a significant fish health issue in the Klamath River Basin. However, biologists working in the lower Klamath River basin have annually reported high mortalities of Chinook salmon as a result of *Ceratomyxa shasta* (*C. shasta)* infections (Foott et al. 2003).

C. shasta has its greatest impact on juvenile Chinook salmon populations. Much of this impact goes unreported because the juveniles die during outmigration or early ocean residence. In the Klamath River basin, *C. shasta* is present throughout mainstem Klamath River from its mouth up to and including Klamath and Agency Lakes. *C. Shasta* is also present in the lower portion of Williamson and Sprague Rivers (Buchanan et al.1989, Hemmingsen et al. 1988).

Many Klamath River tributaries, including the Trinity, Salmon, Scott and Shasta Rivers, do not appear to support *C. shasta*; however, similar to its distribution in the Columbia River basin (Bartholomew et al. 1989), abundance of the parasite appears to be variable throughout the system. Since *C. shasta* is endemic to much of Upper Klamath Lake as well as the Williamson and Sprague rivers, it will be critical to the success of the **Re-Introduction Implementation Plan** that appropriate Chinook salmon stock(s) resistant to the parasite be used in re-introduction efforts.

Chinook salmon (juveniles or adults) are not known to be piscivorous in freshwater. However, resident redband trout are well documented to be highly piscivorous in Upper Klamath Lake. As such, redband trout will likely benefit from the addition of juvenile Chinook salmon as an additional prey source in Upper Klamath Lake and tributaries. In addition, productivity from chinook carcasses and spawning will likely benefit redband trout, especially in streams dominated by groundwater input.

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Management Direction

Chinook Salmon

Upper Klamath Lake and Tributaries

Goal 1 Restore naturally reproducing self sustaining populations of Chinook salmon into suitable habitat in Upper Klamath Lake and tributaries.

Policies

Policy 1 *A **Re-Introduction Implementation Plan** shall be prepared for re-introduction of Chinook salmon into Upper Klamath Lake and tributaries.*

Policy 2 *The **Re-Introduction Implementation Plan** shall identify near-term and long-term actions necessary to address key uncertainties and develop specific strategies for achieving the goals of re-introduction.*

Policy 3 *The **Re-Introduction Implementation Plan** shall identify and address key uncertainties necessary to complete an **Anadromous Fish Conservation Plan** for the Oregon portion of Klamath River, Upper Klamath Lake and tributaries, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-050, ODFW 2002).*

Policy 4 *As part of the **Re-Introduction Implementation Plan**, a stock recruitment model will be developed for Chinook salmon utilizing Upper Klamath Lake and tributaries to determine specific escapement numbers necessary to meet conservation and other management goals to be finalized in the **Anadromous Fish Conservation Plan**.*

Policy 5 *Release of Chinook salmon into Upper Klamath Lake and tributaries shall not occur until the **Re-Introduction Implementation Plan** is completed.*

Policy 6 *An **Anadromous Fish Conservation Plan** for Chinook salmon in Upper Klamath Lake and tributaries, consistent with the stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002) shall be prepared for Oregon Fish and Wildlife Commission approval, once self sustaining population(s) of Chinook salmon are established in Upper Klamath Lake and tributaries.*

Policy 7 *The **Anadromous Fish Conservation Plan** prepared for Oregon Fish and Wildlife Commission approval shall provide policy direction to guide management of established anadromous fish populations in the Oregon portion of the Klamath Basin. This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River*

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Basin that will fulfill requirements of the Pacific Fisheries Management Council.

Policy 8 *Klamath Basin stocks of Chinook salmon have priority over out of basin stocks of Chinook salmon for re-introduction into Upper Klamath Lake and tributaries.*

Policy 9 *Hatchery production and supplementation efforts associated with reintroduction of Chinook salmon into Upper Klamath Lake and tributaries will be developed consistent with Hatchery Management Policy and guidelines (OAR 635-007-0542, ODFW 2003)*

Policy 10 *As part of active efforts to re-establish runs of anadromous fish, only pathogen free eggs or juvenile Chinook salmon will be released into Upper Klamath Lake and tributaries.*

Policy 11 *Once adult Chinook salmon are volitionally returning to Keno Dam, they will be seasonally trapped and moved upstream as needed.*

Objective 1 Determine the most appropriate stock(s) of Chinook salmon to re-introduce into Upper Klamath Lake and tributaries.

Assumptions and Rationale

1. Upper Klamath Lake and tributaries historically supported natural populations of spring and fall Chinook salmon, and stocks are available below Iron Gate Dam that are suitable candidates for initial re-introduction efforts (Huntington and Dunsmoor 2006b).

2. Appropriate stocks of disease free Chinook salmon are available for re-introduction into Upper Klamath Lake and tributaries.

3. Stock(s) of Chinook salmon used in re-introduction efforts will be chosen consistent with priorities listed in Policy 8 above.

4. The **Re-Introduction Implementation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries, and will be implemented by the Department and the Klamath Tribes.

Actions

Action 1.1 As part of the **Re-Introduction Implementation Plan**, determine the appropriate stock(s) to re-introduce into Upper Klamath Lake and tributaries consistent with stock priority direction in Policy 8.

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Action 1.2 As part of the **Re-Introduction Implementation Plan** conduct research to determine appropriate stock(s) of Chinook salmon which are likely to perform the best ecologically, meet strict disease criteria, and are compatible with native fish stocks currently existing in Upper Klamath Lake and tributaries. This work will support reintroduction strategies designed to maximize utility of fish that complete life cycles while developing well adapted Upper Basin stocks.

Action 1.3 Once appropriate stock(s) are chosen for re-introduction efforts, determine techniques for transferring appropriate disease free stocks into holding facilities chosen for re-introduction efforts.

Objective 2. Restore self sustaining populations of Chinook salmon in Upper Klamath Lake and tributaries.

Assumptions and Rationale

1. Upper Klamath Lake and tributaries historically supported natural populations of spring and fall chinook.

2. Desired levels of genetic diversity, adaptability, and abundance of native spring and fall chinook will be adequately protected by maintaining conservation levels of naturally produced spring and fall chinook in Upper Klamath Lake and tributaries.

3. Eggs or fish will be available from hatchery, naturally spawning, or wild donor stocks for use in reintroduction.

4. Estimated production capacity for Klamath River Basin tributaries above Upper Klamath Lake is 21,245 adult Chinook assuming no mortality at dams or in migration through reservoirs and Upper Klamath Lake, with much of this capacity above the lake (Huntington 2004).

5. Resistance to *Ceratomyxa shasta* will be a primary consideration for any stock of Chinook salmon used in re-introduction efforts in Upper Klamath Lake and tributaries.

6. The **Re-Introduction Implementation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries, and will be implemented by the Department and the Klamath Tribes.

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Actions

Action 2.1 As part of the **Re-Introduction Implementation Plan**, develop research, monitoring and evaluation protocols associated with release of Chinook salmon into Upper Klamath Lake and tributaries.

Action 2.2 As part of the **Re-Introduction Implementation Plan**, identify hatchery, monitoring and evaluation facilities necessary to implement re-introduction activities.

Action 2.3 Implement the **Re-Introduction Implementation Plan**, including release of Chinook salmon into Upper Klamath Lake and tributaries.

Action 2.4 Monitor and evaluate results of re-introduction efforts.

Action 2.5 Using adaptive management, modify re-introduction efforts as indicated through monitoring and evaluation to better insure success.

Action 2.6 As part of the **Re-Introduction Implementation Plan**, identify appropriate population performance thresholds, such as juvenile or adult seeding levels, that will define when re-introduction of Chinook salmon into Upper Klamath Lake and tributaries has been successful.

Objective 3 Protect and improve Chinook salmon habitat in Upper Klamath Lake and tributaries.

Assumptions and Rationale

1. Upstream and downstream fish passage is provided throughout the Klamath River corridor consistent with state and federal standards at PacifiCorp's hydroelectric dams, or through dam removal.

2. Chinook salmon habitat in and above Upper Klamath Lake has been impacted by water and land use activities.

3. The **Re-Introduction Implementation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries, and will be implemented by the Department and the Klamath Tribes.

Actions

Action 3.1 Develop and implement a habitat monitoring and improvement plan for Upper Klamath Lake and tributaries as part of the **Re-Introduction Implementation Plan**.

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Objective 4 Integrate self sustaining populations of Chinook salmon returning to the Oregon portion of the Klamath River Basin into tribal, sport and commercial fisheries through development of an **Anadromous Fish Conservation Plan**.

Assumptions and Rationale

1. Self sustaining populations of Chinook salmon are returning to Upper Klamath Lake and tributaries.

2. Population performance thresholds defining successful re-introduction of Chinook salmon into Upper Klamath Lake and tributaries as listed in the **Re-Introduction Implementation Plan** (Action 2.6 above) have been met.

3. The **Anadromous Fish Conservation Plan** shall be written consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).

4. Information necessary to address stipulations in the Department's Native Fish Conservation Policy will have previously been determined through Phase 1 management actions.

5. The **Anadromous Fish Conservation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries.

Actions

Action 4.1 Prepare an **Anadromous Fish Conservation Plan** for Chinook salmon in Oregon portion of Klamath River, Upper Klamath Lake and tributaries, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002). This plan will ultimately be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin that will fulfill requirements of the Pacific Fisheries Management Council.

Chinook Salmon *(continued)*

Oregon Portion of Klamath River and tributaries below Upper Klamath Lake

Goal 1 Restore self-sustaining populations of naturally produced Chinook salmon in the Oregon portion of Klamath River and tributaries below Upper Klamath Lake.

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Policies

Policy 1 *Chinook salmon shall be monitored for natural re-colonization into the Oregon portion of Klamath River and its tributaries below Upper Klamath Lake.*

Policy 2 *A **Re-Introduction Implementation Plan** shall be prepared which identifies facilities and evaluation activities to monitor natural re-colonization of Chinook salmon into the Oregon portion of Klamath River and tributaries below Upper Klamath Lake.*

Policy 3 *Chinook salmon in the Oregon portion of Klamath River and tributaries below Upper Klamath Lake shall be managed for natural production consistent with the Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).*

Policy 4 *No Chinook salmon shall be released into the Oregon portion* of *Klamath River and tributaries below Upper Klamath Lake, unless re-colonization is not occurring or is too slow as described through criteria directed under the **Re-introduction Implementation Plan.***

Policy 5 *An **Anadromous Fish Conservation Plan** for Chinook salmon in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002) shall be prepared for Oregon Fish and Wildlife Commission approval, once self sustaining population(s) of Chinook salmon are established in the Oregon portion of Klamath River and tributaries.*

Policy 6 *The **Anadromous Fish Conservation Plan** prepared for Oregon Fish and Wildlife Commission approval shall provide policy direction to guide management of established Chinook salmon populations in the Oregon portion of the Klamath Basin. This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin that will fulfill requirements of the Pacific Fisheries Management Council.*

Objective 1 Monitor natural re-colonization of Chinook salmon into the Oregon portion of Klamath River and tributaries below Upper Klamath Lake.

Assumptions and Rationale

1. Suitable habitat exists for fall Chinook salmon in the Oregon portion of Klamath River, including Spencer Creek.

2. Upstream and downstream fish passage is provided throughout the Klamath River

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corridor consistent with state and federal standards at PacifiCorp's hydroelectric dams, or through dam removal.

3. Fall Chinook salmon are present in mainstem Klamath River immediately downstream of Iron Gate Dam and will re-colonize upstream reaches once fish passage is restored past PacifiCorp's four mainstem hydroelectric dams.

4. Spring Chinook salmon are in very low abundance in the Klamath River and tributaries downstream of Iron Gate Dam. Their low abundance will likely preclude rapid natural re-colonization of the Oregon portion of Klamath River and tributaries below Upper Klamath Lake.

5. The **Re-Introduction Implementation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries, and will be implemented by the Department and the Klamath Tribes.

Actions

Action 1.1 As part of the **Re-introduction Implementation Plan**, develop a monitoring and evaluation plan to document natural re-colonization of Chinook salmon into the Oregon portion of Klamath River and tributaries below Upper Klamath Lake in coordination with monitoring activities on the California portion of the Klamath River.

Action 1.2 Develop upstream and downstream fish monitoring facilities for Chinook salmon in Spencer Creek and at Keno and Link River dams.

Action 1.3 Develop upstream and downstream fish monitoring facilities for Chinook salmon at J.C. Boyle Dam in Oregon in coordination with monitoring facilities at dams on the California portion of the Klamath River.

Action 1.4 As part of the **Re-introduction Implementation Plan** develop criteria and research protocols for determining when natural re-colonization of Chinook salmon is not occurring or is too slow. These criteria and research protocols will also be used to determine if, when, and how the Department and the Klamath Tribes will actively re-introduce Chinook salmon into Oregon portion of Klamath River and tributaries below Upper Klamath Lake.

Action 1.5 As part of the **Re-Introduction Implementation Plan**, identify appropriate population performance thresholds, such as juvenile or adult seeding levels, that will define when natural re-colonization of Chinook salmon has been successful into the Oregon portion of Klamath River and tributaries below Upper Klamath Lake.

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Objective 2 Protect and improve Chinook salmon habitats in the Oregon portion of the Klamath River and its tributaries below Upper Klamath Lake.

Assumptions and Rationale

1. Upstream and downstream fish passage is provided throughout the Klamath River corridor consistent with state and federal standards at PacifiCorp's four mainstem hydroelectric dams, or through dam removal.

2. Chinook salmon habitat in the Oregon portion of mainstem Klamath River downstream of J.C. Boyle Dam has been impacted by hydropower operations.

3. The **Re-Introduction Implementation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries, and will be implemented by the Department and the Klamath Tribes.

Actions

Action 2.1 Develop and implement a habitat monitoring and improvement plan for the Oregon portion of Klamath River and tributaries below Upper Klamath Lake as part of the **Re-Introduction Implementation Plan**.

Objective 3 Integrate self sustaining populations of Chinook salmon returning to the Oregon portion of the Klamath River Basin into tribal, sport and commercial fisheries through development of an **Anadromous Fish Conservation Plan**.

Assumptions and Rationale

1. Self sustaining populations of Chinook salmon are returning to Upper Klamath Lake and tributaries.

2. Population performance thresholds defining successful re-introduction of Chinook salmon into the Oregon portion of Klamath River and tributaries as listed in the **Re-Introduction Implementation Plan** (Action 1.5 above) have been met.

3. The **Anadromous Fish Conservation Plan** shall be written consistent with the stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).

4. Information necessary to address stipulations in the Department's Native Fish Conservation Policy will have previously been determined through Phase 1 management actions.

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5. The **Anadromous Fish Conservation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries

Actions

Action 3.1 Prepare an **Anadromous Fish Conservation Plan** for Chinook salmon in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002). This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin that will fulfill requirements of the Pacific Fisheries Management Council.

Steelhead Trout (*Oncorhynchus mykiss*)

Natural re-colonization of steelhead trout into the Klamath River and tributaries in Oregon will be monitored after fish passage facilities are installed at Klamath Project dams or when dams are removed. The purpose of this monitoring will be to:

- Document natural re-colonization rates into habitat not accessible for nearly 100 years (in the case of dam removal),
- Monitor efficacy of fish passage facilities at PacifiCorp's four mainstem hydroelectric dams (in the case dams stay in place) or,
- Determine if natural re-colonization rates meet public expectations when compared to criteria listed in the **Re-Introduction Implementation Plan**.

Species Management Unit

The Department has defined two Species Management Units (SMUs) for summer steelhead in the Klamath River Basin. The Klamath River Steelhead SMU identifies steelhead populations below Iron Gate Dam. These fish are defined as Klamath Mountain Province (KMP) Steelhead (ODFW 2005a).

The Klamath Lake SMU identifies steelhead populations in the Oregon portion of Klamath River and tributaries. The Klamath Lake SMU is currently extinct (Native Fish Status Report 2005). Once self sustaining population(s) of steelhead trout are established in the Oregon portion of Klamath River and tributaries, management policies and objectives identified within the **Anadromous Fish Conservation Plan** will be drafted to be consistent with key elements outlined in the NFCP (OAR 635-007-0504 and OAR 635-007-0505, ODFW 2002).

Desired Biological Status

The intent of this plan is to re-establish sustainable, naturally producing summer steelhead trout populations into historic spawning and rearing areas in the Oregon portion of the Klamath River Basin. As part of the **Re-Introduction Implementation Plan**, a

stock recruitment model will be developed for steelhead trout. This plan will utilize the Oregon portion of Klamath River, Upper Klamath Lake and tributaries to determine specific escapement numbers necessary to meet conservation and other management goals to be finalized in the **Anadromous Fish Conservation Plan**.

Current Status

Summer steelhead trout have been extirpated from most of the Oregon portion of Klamath River basin since the early 1900's due to the lack of fish passage at Iron Gate Dam. Limited numbers of juvenile steelhead trout are still present in Oregon tributaries entering mainstem Klamath River downstream of Iron Gate Dam.

Steelhead trout in Klamath River Basin were reviewed for listing under the federal Endangered Species Act (ESA) by the National Marine Fisheries Service on December 19, 1997 and they found that listing was not warranted for the SONCC ESU (NMFS 1997a). There is currently no special ESA status assigned to Klamath River steelhead trout at the state or federal level.

Steelhead trout are found throughout the lower mainstem Klamath River and most tributaries. Currently only the non-anadromous forms of *Oncorhynchus mykiss* exist in the Oregon portion of the Klamath River Basin upstream of Iron Gate Dam. Limited numbers of juvenile steelhead trout are still present in Oregon tributaries entering mainstem Klamath River downstream of Iron Gate Dam. It is believed that once fish passage is provided into the Oregon portion of the Klamath River Basin upstream of Iron Gate Dam, steelhead trout will rapidly re-establish themselves in the upper Klamath basin.

Primary factors for disparity between desired and current status

Several factors account for the disparity between desired and current status for distribution and abundance of summer steelhead trout in the Klamath River watershed. These factors include impassible dams, habitat deficiencies, and fish disease impacts in the Lower Klamath River downstream of Iron Gate Dam.

PacifiCorp's lower three hydroelectric dams on mainstem Klamath River lack fish passage facilities, creating complete migration barriers to resident and anadromous fish at Iron Gate Dam at Rm190.

Short and long-term management strategies

A major assumption in this plan is that acceptable upstream and downstream fish passage is provided throughout the Klamath River corridor, either through passage facilities at PacifiCorp's four mainstem hydroelectric dams which meet state and federal standards, or through dam removal.

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The **Re-Introduction Implementation Plan** will identify near-term and long-term actions necessary to address key uncertainties and develop specific strategies for achieving the goals of re-introduction.

The **Re-Introduction Implementation Plan** will identify and address key uncertainties necessary to complete an **Anadromous Fish Conservation Plan** for the Oregon portion of Klamath River, Upper Klamath Lake and tributaries, consistent with the stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).

As part of the **Re-Introduction Implementation Plan**, a stock recruitment model will be developed for steelhead trout utilizing the Oregon portion of Klamath River, Upper Klamath Lake and tributaries to determine specific escapement numbers necessary to meet conservation and other management goals to be finalized in the **Anadromous Fish Conservation Plan**.

Necessary monitoring, evaluation, and research to gauge success of corrective strategies

Monitoring upstream and downstream fish passage at the three PacifiCorp's hydroelectric dams in California is outside the purview of this plan. However, as part of the **Re-Introduction Implementation Plan,** the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries will develop a monitoring and evaluation plan. They will also identify necessary facilities to document natural re-colonization of steelhead trout into the Oregon portion of Klamath River and tributaries in coordination with monitoring activities on the California portion of the Klamath River.

As part of the **Re-Introduction Implementation Plan** the Department and the Klamath Tribes in collaboration with other Fish Managers will develop criteria and research protocol for determining when natural re-colonization of steelhead trout is not occurring or is too slow. These criteria and research protocols will also be used to determine if, when, and how the Department and the Klamath Tribes will actively re-introduce steelhead trout into the Oregon portion of Klamath River and tributaries.

Process to modify corrective strategies

As part of the **Re-Introduction Implementation Plan,** an adaptive management approach will be used to identify and implement corrective strategies followed by assessment of effectiveness of those strategies. In some instances corrective strategies may be refined to improve performance. In other instances those strategies will be abandoned in favor of more effective techniques. This plan should avoid codifying all but the most proven management strategies to maintain future options. This plan sets overall programmatic goals and objectives that allow management flexibility. Specific lower level Project and research plans tiered to this plan will be used to assess management options and recommend specific actions consistent with the proposed management direction.

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Criteria indicating significant deterioration in status, triggering plan modification

Since steelhead trout are currently extirpated from most of the Oregon portion of the Klamath River Basin, re-introduction efforts will be directed through a **Re-Introduction Implementation Plan.** This implementation plan will be an administrative Appendix to the Amended Klamath River Basin Fish Management Plan. This plan will be adaptive in nature, including triggers for when re-introduction efforts need to be modified.

It is anticipated that successful anadromous fish reintroduction into the Oregon portion of Klamath River and tributaries will likely require many generations for each species affected. Monitoring of existing steelhead trout populations in California with respect to distribution, abundance, fish health, and genetics will be used to detect and assess any direct impacts of re-introduction efforts on those populations.

Once self sustaining population(s) of steelhead trout are established in the Oregon portion of Klamath River and tributaries, an **Anadromous Fish Conservation Plan** for steelhead trout and other anadromous fish in the Oregon portion of Klamath River and tributaries shall be prepared for Oregon Fish and Wildlife Commission approval, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002). Once completed, the Klamath River Basin Fish Management Plan will be amended to be consistent with this Conservation Plan.

The **Anadromous Fish Conservation Plan** will provide policy direction to guide management of established anadromous fish populations in the Oregon portion of the Klamath River Basin. This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin that will fulfill requirements of the Pacific Fisheries Management Council.

Annual and long-term reporting

Annual and long term reporting on progress of re-introduction efforts will be subsequently prepared as part of the Re-Introduction Implementation Plan and the **Anadromous Fish Conservation Plan** reporting requirements.

Other agencies, tribes, stakeholders, cooperating entities, private landowners, and hydropower owner/operators will be responsible for monitoring and reporting of their activities voluntarily or through license and permit requirements if applicable.

Potential impacts to other native species

Impacts to other indigenous species from natural re-colonization of steelhead trout into the Oregon portion of the Klamath River Basin are unknown at this time. Investigations into native fish interactions will be initiated as part of the **Re-Introduction Implementation Plan**. Competition between steelhead trout and currently present indigenous species such as resident redband trout are also unknown but not assumed to be a major limiting factor since these species historically co-evolved together. Indeed, the

populations now viewed as "resident" redband trout show strong genetic relationships to steelhead trout in the Klamath River below Iron Gate Dam, and may re-express anadromy upon re-establishment of effective passage through the Klamath Hydroelectric Project.

Management Direction

Oregon portion of Klamath River, Upper Klamath Lake and tributaries

Goal 1 Restore self-sustaining populations of naturally produced steelhead trout in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.

Policies

Policy 1 *Steelhead trout shall be monitored for natural re-colonization into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.*

Policy 2 *A **Re-Introduction Implementation Plan** shall be prepared which identifies facilities and evaluation activities to monitor natural re-colonization of steelhead trout into the Oregon portion of the Klamath River, Upper Klamath Lake and tributaries.*

Policy 3 *Steelhead trout in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries shall be managed for natural production consistent with the Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).*

Policy 4 *No steelhead trout shall be released into the Oregon portion of the Klamath River and tributaries, unless re-colonization is not occurring or is too slow as described through criteria directed under the **Re-Introduction Implementation Plan.***

Policy 5 *An **Anadromous Fish Conservation Plan** for steelhead trout in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002) shall be prepared for Oregon Fish and Wildlife Commission approval, once self sustaining population(s) of steelhead trout are established in the Oregon portion of Klamath River and tributaries.*

Policy 6 *The **Anadromous Fish Conservation Plan** prepared for Oregon Fish and Wildlife Commission approval shall provide policy direction to guide management of established steelhead trout populations in the Oregon portion of the Klamath Basin. This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin.*

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Objective 1 Monitor natural re-colonization of steelhead trout into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.

Assumptions and Rationale:

1. Suitable habitat exists for steelhead trout in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.

2. Upstream and downstream fish passage is provided throughout the Klamath River corridor consistent with state and federal standards at PacifiCorp's four mainstem hydroelectric dams, or through dam removal.

3. Steelhead trout are present in mainstem Klamath River immediately downstream of Iron Gate Dam and will re-colonize upstream reaches once fish passage is restored past PacifiCorp's four mainstem hydroelectric dams.

4. The **Re-Introduction Implementation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries, and will be implemented by the Department and the Klamath Tribes.

Actions

Action 1.1 As part of the **Re-Introduction Implementation Plan**, develop a monitoring and evaluation plan to document natural re-colonization of steelhead trout into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries in coordination with monitoring activities on the California portion of the Klamath River.

Action 1.2 Develop upstream and downstream fish monitoring facilities for steelhead trout in Spencer Creek and at Keno and Link River dams.

Action 1.3 In the event that dams are not removed, develop upstream and downstream fish monitoring facilities for steelhead trout at J.C. Boyle Dam in Oregon in coordination with monitoring facilities at dams on the California portion of the Klamath River.

Action 1.4 Investigate interactions between steelhead trout and resident trout populations in Spencer Creek as part of monitoring natural re-colonization of steelhead in this stream.

Action 1.5 As part of the **Re-Introduction Implementation Plan** develop criteria and research protocols for determining when natural re-colonization of steelhead trout is not occurring or is too slow. These criteria and research protocols will also be used to determine if, when, and how the Department

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and the Klamath Tribes will actively re-introduce steelhead trout into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.

Action 1.6 As part of the **Re-Introduction Implementation Plan**, identify the appropriate population performance thresholds, such as juvenile or adult seeding levels, that will define when natural re-colonization of steelhead trout into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries has been successful.

Objective 2 Protect and improve steelhead trout habitat in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.

Assumptions and Rationale

1. Upstream and downstream fish passage is provided throughout the Klamath River corridor consistent with state and federal standards at PacifiCorp's four mainstem hydroelectric dams, or through dam removal.

2. Steelhead trout habitat in the Oregon portion of mainstem Klamath River downstream of J.C. Boyle Dam has been impacted by hydropower operations.

3. The **Re-Introduction Implementation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries, and will be implemented by the Department and the Klamath Tribes.

Actions

Action 2.1 Develop and implement a habitat monitoring and improvement plan for the Oregon portion of Klamath River and tributaries as part of the **Re-Introduction Implementation Plan**.

Objective 3 Integrate self sustaining populations of steelhead trout returning to the Oregon portion of the Klamath River Basin into tribal and sport fisheries through development of an ***Anadromous Fish Conservation Plan***.

Assumptions and Rationale

1. Self sustaining populations of steelhead trout are returning to the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.

2. Population performance thresholds defining successful re-introduction of steelhead trout into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries as listed in the **Re-Introduction Implementation Plan** (Action 1.6 above) have been met.

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3. The **Anadromous Fish Conservation Plan** shall be written consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).

4. Information necessary to address stipulations in the Department's Native Fish Conservation Policy will have previously been determined through Phase 1 management actions.

5. The **Anadromous Fish Conservation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries

Actions

Action 3.1 Prepare an **Anadromous Fish Conservation Plan** for steelhead trout in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002). This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin.

Coho Salmon (Oncorhynchus kisutch)

Natural re-colonization of coho salmon into Klamath River and tributaries in Oregon will be monitored after fish passage facilities are installed at Klamath Project dams or when dams are removed. The purpose of this monitoring will be to:

- Document natural re-colonization rates into habitat not accessible for nearly 100 years,
- Monitor efficacy of fish passage facilities at PacifiCorp's four mainstem hydroelectric dams (in the case dams stay in place) and,
- Determine if natural re-colonization rates meet public expectations when compared to criteria listed in the **Re-Introduction Implementation Plan**.

Coho salmon in the Klamath River Basin are part of the Southern Oregon Northern California Coasts (SONCC) ESU and are currently listed as Threatened under the Endangered Species Act (ESA). A Recovery Plan for SONCC Coho is currently being developed jointly by Oregon, California and NOAA Fisheries. There will need to be consistency between the recovery plan and the **Re-Introduction Implementation Plan** to be developed under these amendments to the Klamath River Basin Fish Management Plan. In Phase 2 of the re-introduction effort, the development of the **Anadromous Fish Conservation Plan** that directs conservation management of re-established coho salmon in the Oregon Portion of the Klamath River and tributaries will need to be consistent with the SONCC Recovery Plan, or the Recovery Plan will need to be amended to include these coho populations. As the recovery plan is developed, it will become clearer how the re-introduction/re-colonization efforts for coho in Oregon will be addressed in a plan that outlines conservation management strategies.

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Species Management Unit

Coho salmon in the Klamath River Basin are part of the Southern Oregon Northern California Coasts (SONCC) SMU. Coho are currently listed as Threatened under the federal Endangered Species Act in the states of Oregon and California. Coho salmon of the upper Klamath Basin are considered extirpated according to the Native Fish Status Report (ODFW 2005a and b).

Desired biological status

The desired condition for the Upper Klamath River population is to maintain naturally produced sustainable populations of coho salmon in existing and historic range to meet conservation needs for the species and sustain tribal cultural and subsistence needs. As part of the **Re-Introduction Implementation Plan**, a stock recruitment model will be developed for coho salmon utilizing the Oregon portion of Klamath River and tributaries to determine specific escapement numbers necessary to meet conservation and other management goals to be finalized in the **Anadromous Fish Conservation Plan**.

Current status

Coho salmon in the Klamath River Basin were petitioned for listing under the Endangered Species Act in 1993, and the NMFS finished the status review of SONCC coho in 1995. The NMFS status review delayed listing of SONCC coho to collect more information (Weitkamp et al. 1995). Coho Salmon status was further reviewed in 1997 (NMFS 1997b) by the West Coast Salmon Biological Review Team. Based on their status review, coho salmon were determined to likely become endangered if current policies and management remained static. Coho salmon were listed as threatened in 1997. A new status review was completed in 2005 which determined that coho salmon remain a threatened species (Good et al. 2005).

Coho salmon have been extirpated from the Oregon portion of the Klamath River basin since the early 1900's due to the lack of fish passage at Iron Gate Dam.

Primary factors for disparity between desired and current status

Several factors account for the disparity between desired and current status for distribution and abundance of coho salmon in the Oregon portion of the Klamath River watershed. These factors include habitat degradation, pollution, streamflow modification, predation, and artificial barriers.

The Klamath Hydroelectric Project creates a complete migration barrier to resident and anadromous fish at Iron Gate Dam (RM 190). The dam was built with no fish passage facilities.

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Short and long-term management strategies

Short-term management strategies will focus on providing safe, timely and effective fish passage at Project dams, protecting and improving habitat in Spencer Creek, and adjustment of harvest regulations to protect juvenile and adult coho salmon if needed. Due to the current low population abundance, restoration efforts should focus on securing populations within existing range. Long-term management should focus on limiting factors effecting survival of juvenile fish in Spencer Creek and the Klamath River.

Necessary monitoring, evaluation, and research to gauge success of corrective strategies

Monitoring upstream and downstream fish passage at the three PacifiCorp's hydroelectric dams in California is outside the purview of this plan. However, as part of the **Re-Introduction Implementation Plan,** the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries will develop a monitoring and evaluation plan. They will also identify necessary facilities to document natural re-colonization of coho salmon into the Oregon portion of Klamath River and tributaries in coordination with monitoring activities on the California portion of the Klamath River.

As part of the **Re-Introduction Implementation Plan**, and consistent with the federal Recovery Plan for SONCC Coho, the Department the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries will develop criteria and research protocols for determining when natural re-colonization of coho salmon is not occurring or is too slow. These criteria and research protocols will also be used to determine if, when, and how the Department and the Klamath Tribes will actively re-introduce coho salmon into the Oregon portion of Klamath River and tributaries.

Process to modify corrective strategies

As part of the **Re-Introduction Implementation Plan**, and consistent with the federal Recovery Plan for SONCC Coho, an adaptive management approach will be used to identify and implement corrective strategies followed by assessment of effectiveness of those strategies. In some instances, corrective strategies may be refined to improve performance. In other instances those strategies will be abandoned in favor of more effective techniques. This plan should avoid codifying all but the most proven management strategies to maintain future options. This plan sets overall programmatic goals and objectives that allow management flexibility. Specific lower level Project and research plans tiered to this plan will be used to assess management options and recommend specific actions consistent with the proposed management direction.

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Criteria indicating significant deterioration in status, triggering plan modification

Since coho salmon are currently extirpated from the Oregon portion of the Klamath River Basin, re-introduction efforts will be directed through a **Re-Introduction Implementation Plan.** This implementation plan will be an administrative Appendix to the Amended Klamath River Basin Fish Management Plan. This plan will be adaptive in nature, including triggers for when re-introduction efforts need to be modified. The **Re-Introduction Implementation Plan** will also be consistent with the federal Recovery Plan for SONCC Coho currently being developed by California, Oregon and NOAA.

It is anticipated that successful anadromous fish reintroduction into the Oregon portion of Klamath River and tributaries will likely require many generations for each species affected. Monitoring of existing coho salmon populations in California with respect to distribution, abundance, fish health, and genetics will be used to detect and assess any direct impacts of Phase 1 re-introduction efforts on those populations.

Once self sustaining population(s) of coho salmon are established in the Oregon portion of Klamath River and tributaries, an **Anadromous Fish Conservation Plan** for coho salmon in the Oregon portion of Klamath River and tributaries may be prepared for Oregon Fish and Wildlife Commission approval, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002). The Recovery Plan for SONCC Coho may also serve as a conservation or management plan. If this is the case, the recovery plan will be consistent with the NFCP and information from the **Re-Introduction Implementation Plan** will be incorporated into amendments to the recovery plan.

The **Anadromous Fish Conservation Plan,** or Recovery Plan for SONCC Coho will provide policy direction to guide management of established coho populations in the Oregon portion of Klamath River Basin. This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin that will fulfill requirements of the Pacific Fisheries Management Council.

Annual and long-term reporting

Annual and long term reporting on progress of re-introduction efforts will be subsequently prepared as part of the **Re-Introduction Implementation Plan** and the **Anadromous Fish Conservation Plan** or Recovery Plan for SONCC Coho reporting requirements.

Other agencies, tribes, stakeholders, cooperating entities, private landowners, and hydropower owner/operators will be responsible for monitoring and reporting of their activities voluntarily or through license and permit requirements if applicable.

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Potential impacts to other native species

Impacts to other indigenous species from natural re-colonization of coho salmon into the Oregon portion of the Klamath River Basin are unknown at this time. Investigations into native fish interactions will be initiated as part of the **Re-Introduction Implementation Plan**. Competition between coho salmon and currently present indigenous species such as redband trout is also unknown but not assumed to be a major limiting factor since these species historically co-evolved together.

Management Direction

Oregon portion of Klamath River and tributaries

Goal 1 Restore self-sustaining populations of naturally produced coho salmon in the Oregon portion of Klamath River and tributaries.

Policy 1 *Coho salmon shall be monitored for natural re-colonization into the Oregon portion of Klamath River and tributaries.*

Policy 2 *A **Re-Introduction Implementation Plan** shall be prepared which identifies facilities and evaluation activities to monitor natural re-colonization of coho salmon into the Oregon portion of Klamath River and tributaries.*

Policy 3. *Coho salmon in the Oregon portion of the Klamath River and tributaries shall be managed for natural production consistent with the Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).*

Policy 4 *No coho salmon shall be released into the Oregon portion of Klamath River and tributaries, unless re-colonization is not occurring or is too slow as described through criteria directed under the **Re-Introduction Implementation Plan.***

Policy 5 *An **Anadromous Fish Conservation Plan** for coho salmon in the Oregon portion of Klamath River and tributaries, or amendments to the Recovery Plan for SONCC Coho, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002) shall be prepared for Oregon Fish and Wildlife Commission approval, once self sustaining population(s) of coho salmon are established in the Oregon portion of Klamath River and tributaries.*

Policy 6 *The **Anadromous Fish Conservation Plan,** or amendments to the Recovery Plan for SONCC Coho**,** prepared for Oregon Fish and Wildlife Commission approval shall provide policy direction to guide management of established coho salmon populations in the Oregon portion of the*

Klamath Basin. This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin that will fulfill requirements of the Pacific Fisheries Management Council

Objective 1 Monitor natural re-colonization of coho salmon into the Oregon portion of Klamath River and tributaries.

Assumptions and Rationale:

1. Suitable habitat exists in the Oregon portion of Klamath River and tributaries for coho salmon.

2. Historically, coho salmon have not been documented upstream of Upper Klamath Lake.

3. Upstream and downstream fish passage is provided throughout the Klamath River corridor consistent with state and federal standards at PacifiCorp's four mainstem hydroelectric dams, or through dam removal.

4. Coho salmon are currently at low population levels in the Lower Klamath River downstream of Iron Gate Dam. This may hinder natural re-colonization of upstream reaches once fish passage is restored past PacifiCorp's four mainstem hydroelectric dams.

5. The **Re-Introduction Implementation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries, and will be implemented by the Department and the Klamath Tribes.

Actions

Action 1.1 As part of the **Re-Introduction Implementation Plan**, develop a monitoring and evaluation plan to document natural re-colonization of coho salmon into the Oregon portion of Klamath River and tributaries in coordination with monitoring activities on the California portion of the Klamath River.

Action 1.2 As part of the **Re-Introduction Implementation Plan**, develop upstream and downstream fish monitoring facilities for coho salmon in Spencer Creek and at Keno Dam.

Action 1.3 As part of the **Re-Introduction Implementation Plan**, develop upstream and downstream fish monitoring facilities for coho salmon at J.C. Boyle Dam in Oregon in coordination with monitoring facilities at dams on the California portion of the Klamath River.

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Action 1.4 As part of the **Re-Introduction Implementation Plan**, develop criteria and research protocol for determining when natural re-colonization of coho salmon is not occurring or is too slow. These criteria and research protocols will also be used to determine if, when, and how the Department and the Klamath Tribes will actively re-introduce coho salmon into the Oregon portion of Klamath River.

Action 1.5 As part of the **Re-Introduction Implementation Plan**, identify appropriate population performance thresholds, such as juvenile or adult seeding levels, that will define when natural re-colonization of coho salmon into the Oregon portion of Klamath River and tributaries has been successful.

Objective 2 Protect and improve coho salmon habitat in the Oregon portion of Klamath River and tributaries.

Assumptions and Rationale

1. Upstream and downstream fish passage is provided throughout the Klamath River corridor consistent with state and federal standards at PacifiCorp's four mainstem hydroelectric dams, or through dam removal.

2. Coho salmon habitat in the Oregon portion of mainstem Klamath River downstream of J.C. Boyle Dam has been impacted by hydropower operations.

3. The **Re-Introduction Implementation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries.

Actions

Action 2.1 Develop and implement a habitat monitoring and improvement plan for the Oregon portion of the Klamath River and tributaries as part of the **Re-Introduction Implementation Plan**.

Objective 3 Integrate self sustaining populations of coho salmon returning to the Oregon portion of Klamath River Basin into tribal, sport and commercial fisheries through development of an **Anadromous Fish Conservation Plan**, or amendments to the Recovery Plan for SONCC Coho.

Assumptions and Rationale

1. Self sustaining populations of coho salmon are returning to the Oregon portion of the Klamath River Basin.

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2. Population performance thresholds defining successful re-introduction of coho salmon into the Oregon portion of Klamath River and tributaries as listed in the **Re-Introduction Implementation Plan** (Action 1.5 above) have been met.

3. The **Anadromous Fish Conservation Plan**, or amendments to the Recovery Plan for SONCC Coho, shall be written consistent with the stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).

4. Information necessary to address stipulations in the Department's Native Fish Conservation Policy will have previously been determined through Phase 1 management actions.

5. The **Anadromous Fish Conservation Plan**, or amendments to the Recovery Plan for SONCC Coho, will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries.

Actions

Action 3.1 Prepare an **Anadromous Fish Conservation Plan** or amendments to the Recovery Plan for SONCC Coho, for coho salmon in the Oregon portion of Klamath River and tributaries, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002). This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin that will fulfill requirements of the Pacific Fisheries Management Council Oregon portion of the Klamath River Basin.

Pacific Lamprey (*Entosphenus tridentatus)*

Pacific Lamprey are indigenous to the Klamath River Basin and are currently found from Iron Gate Dam downstream to the mouth as well as in the Scott, Shasta, Salmon rivers and the Trinity River from Lewiston Dam downstream to the confluence with the Klamath River.

The record for the upstream extent of distribution of the Pacific Lamprey in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries is not clear. Throughout the range of the Pacific Lamprey, distribution is closely tied to habitat that Chinook salmon select for spawning and rearing purposes. Historically, Chinook salmon existed upstream of Upper Klamath Lake prior to having passage eliminated by the development of the Klamath Hydroelectric Project. Pacific Lamprey populations have not persisted over time when they have not been allowed to exhibit an anadromous life history. No evidence exists regarding lamprey having a strong fidelity to natal streams. This trait

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allows for the Pacific Lamprey to readily colonize new habitats, which may result in the rapid re-colonization of this species into the Upper Klamath Basin.

A relatively large species of lamprey of questionable taxonomic status currently lives in Upper Klamath Lake. It has been previously referred as a landlocked Pacific Lamprey (Bond 1973). Kan (1975) distinguishes the Klamath Lake form morphologically from the Pacific lamprey. In addition, Lorion et al. (2000) found that the mitochondrial DNA is much different in lamprey in Klamath Lake when compared to Pacific Lamprey. At this point in time it is unknown if the Pacific Lamprey co- existed with the lamprey in the Klamath Lake, or if there was geographic separation from the upper basin and lower basin lamprey stocks

Natural re-colonization of Pacific Lamprey into Klamath River and tributaries in Oregon will be monitored after fish passage facilities are installed at Klamath Project dams or when dams are removed. The purpose of this monitoring will be to:

- Document natural re-colonization rates into habitat not accessible for nearly 100 years,
- Monitor efficacy of fish passage facilities at PacifiCorp's four mainstem hydroelectric dams (in the case dams stay in place) and,
- Determine if natural re-colonization rates meet public expectations when compared to criteria listed in the **Re-Introduction Implementation Plan**.

Species Management Unit

No SMU for pacific lamprey in the Klamath River has yet been defined as directed by the NFCP (ODFW 2002).

Desired biological status

The desired condition for the Klamath River population is to maintain naturally produced, sustainable populations of Pacific Lamprey in existing and historic range to meet conservation needs for the species and sustain tribal cultural and subsistence needs. Additional data should be developed to assist with defining a numerically based desired biological status. As part of the **Re-Introduction Implementation Plan**, a stock recruitment model will be developed for Pacific Lamprey utilizing the Oregon portion of Klamath River and tributaries to determine specific escapement numbers necessary to meet conservation and other management goals to be finalized in the Phase 2 Conservation Plan.

Current status

Pacific Lamprey is currently not present in the Oregon portion of Klamath River and tributaries.

Pacific Lamprey currently has no formal ESA status, but it is a species of conservation concern for the US Fish and Wildlife Service. An abbreviated review of the Pacific

Lamprey's conservation status was carried out by the USFWS as part of their 90 –day Petition Finding (USFWS 2004). However, no formal conservation review has been carried out. In 2007, the USFWS established a Pacific Lamprey Conservation Initiative to facilitate communication and coordination relative to the conservation of Pacific Lampreys throughout their range. The goal of the initiative is to develop a Pacific Lamprey Conservation Plan that will lead to restored Pacific lamprey populations and improvement of their habitat.

Ammocoetes (larvae) and juveniles are captured annually in the Klamath River below Iron Gate Dam from March thru May. Adult Pacific Lamprey enter the Klamath River in February, based on limited harvest by Yurok tribal fishers. Spawning occurs between Mid - April thru August. Adults die after spawning. Eggs hatch within 2-3 weeks. The ammocoetes burrow into the substrate downstream from the nest and may spend up to six years rearing in the stream substrate.

Numbers of adult lamprey in the Klamath River basin have declined based on Karuk tribal fisher accounts (T. Soto, Personal Communication 2007). Pacific lamprey ascend the Klamath River up to Iron Gate Dam. Lamprey investigations are currently being conducted by the Yurok and Karuk tribes in the Lower Klamath Basin.

Primary factors for disparity between desired and current status

The primary factor causing the disparity between desired and current status is lack of fish passage at PacifiCorp's hydroelectric facilities on mainstem Klamath River. Pacific Lamprey populations have not adapted to a primarily resident life history, and do not exist above hydroelectric facilities without fish passage. The current upstream distribution of Pacific Lamprey in the Klamath River Basin stops at Iron Gate Dam.

Short and long-term management strategies

A major assumption in this plan is that acceptable upstream and downstream fish passage is provided throughout the Klamath River corridor, either through passage facilities at PacifiCorp's four mainstem hydroelectric dams which meet state and federal standards, or through dam removal.

The **Re-Introduction Implementation Plan** will identify near-term and long-term actions necessary to address key uncertainties and develop specific strategies for achieving the goals of re-introduction.

The **Re-Introduction Implementation Plan** will identify and address key uncertainties necessary to complete an **Anadromous Fish Conservation Plan** for the Oregon portion of Klamath River, Upper Klamath Lake and tributaries, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).

As part of the **Re-Introduction Implementation Plan**, a stock recruitment model or other basis for management will be developed for Pacific Lamprey utilizing the Oregon

portion of Klamath River, Upper Klamath Lake and tributaries to determine specific escapement numbers necessary to meet conservation and other management goals to be finalized in the **Klamath Anadromous Fish Conservation Plan**.

Necessary monitoring, evaluation, and research to gauge success of corrective strategies

Monitoring upstream and downstream fish passage at the three PacifiCorp hydroelectric dams in California is outside the purview of this plan. However, as part of the **Re-Introduction Implementation Plan** the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries will develop a monitoring and evaluation plan. They will also identify necessary facilities to document natural re-colonization of Pacific Lamprey into the Oregon portion of Klamath River and tributaries in coordination with monitoring activities on the California portion of the Klamath River.

As part of the **Re-Introduction Implementation Plan**, the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries will develop criteria and research protocol for determining when natural re-colonization of Pacific Lamprey is not occurring or is too slow. These criteria and research protocols will also be used to determine if, when, and how the Department and the Klamath Tribes will actively re-introduce Pacific Lamprey into the Oregon portion of Klamath River and tributaries.

Process to modify corrective strategies

As part of the **Re-Introduction Implementation Plan**, an adaptive management approach will be used to identify and implement corrective strategies followed by assessment of effectiveness of those strategies. In some instances corrective strategies may be refined to improve performance. In other instances those strategies will be abandoned in favor of more effective techniques. This plan should avoid codifying all but the most proven management strategies to maintain future options. This plan sets overall programmatic goals and objectives that allow management flexibility. Specific lower level Project and research plans tiered to this plan will be used to assess management options and recommend specific actions consistent with the proposed management direction.

Criteria indicating significant deterioration in status, triggering plan modification

Since Pacific Lamprey are currently not present in the Oregon portion of the Klamath River Basin, re-introduction efforts will be directed through a **Re-Introduction Implementation Plan**. This implementation plan will be an administrative Appendix to the Amended Klamath River Basin Fish Management Plan. This plan will be adaptive in nature, including triggers for when re-introduction efforts need to be modified.

It is anticipated that successful anadromous fish re-introduction into the Oregon portion of Klamath River and tributaries will likely require many generations for each species

affected. Monitoring of existing Pacific Lamprey populations in California with respect to distribution, abundance, fish health, and genetics will be used to detect and assess any direct impacts of Phase 1 re-introduction efforts on those populations.

Once self sustaining population(s) of Pacific Lamprey are established in the Oregon portion of Klamath River and tributaries, an **Anadromous Fish Conservation Plan** for Pacific Lamprey in the Oregon portion of Klamath River and tributaries shall be prepared for Oregon Fish and Wildlife Commission approval, consistent with the stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).

The **Anadromous Fish Conservation Plan** will provide policy direction to guide management of established anadromous fish populations in the Oregon portion of the Klamath River Basin. This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River.

Annual and long-term reporting

Annual and long term reporting on progress of re-introduction efforts will be subsequently prepared as part of the **Re-Introduction Implementation Plan** and the **Anadromous Fish Conservation Plan** reporting requirements.

Other agencies, tribes, stakeholders, cooperating entities, private landowners, and hydropower owner/operators will be responsible for monitoring and reporting of their activities voluntarily or through license and permit requirements if applicable.

Potential impacts to other native species

Impacts to other indigenous species from natural re-colonization of Pacific Lamprey into the Oregon portion of the Klamath River Basin are unknown at this time. Investigations into native fish interactions will be initiated as part of the **Re-Introduction Implementation Plan**. Competition between Pacific Lamprey and currently present indigenous species such as redband trout is also unknown but not assumed to be a major limiting factor since these species historically co-evolved together.

Management Direction

Oregon portion of Klamath River, Upper Klamath Lake and tributaries

Goal 1 Restore self-sustaining populations of naturally produced Pacific Lamprey in the Oregon portion of Klamath River and tributaries.

Policy 1. *Pacific Lamprey shall be monitored for natural re-colonization into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.*

Policy 2 *A **Re-Introduction Implementation Plan** shall be prepared which identifies facilities and evaluation activities to monitor natural re-*

colonization of Pacific Lamprey into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.

Policy 3. *Pacific Lamprey in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries shall be managed for natural production consistent with the Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).*

Policy 4 *No Pacific Lamprey shall be released into the Oregon portion of Klamath River and tributaries, unless re-colonization is not occurring or is too slow as described through criteria directed under the* ***Re-Introduction Implementation Plan.***

Policy 5 *An* ***Anadromous Fish Conservation Plan*** *for Pacific Lamprey in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002) shall be prepared for Oregon Fish and Wildlife Commission approval once self sustaining population(s) of Pacific Lamprey are established in the Oregon portion of the Klamath River and tributaries.*

Policy 6 *The* ***Anadromous Fish Conservation Plan*** *prepared for Oregon Fish and Wildlife Commission approval shall provide policy direction to guide management of established Pacific Lamprey populations in the Oregon portion of the Klamath Basin. This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin.*

Objective 1 Monitor natural re-colonization of Pacific Lamprey into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.

Assumptions and Rationale:

1. Suitable habitat exists in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries for Pacific Lamprey.

2. Upstream and downstream fish passage is provided throughout the Klamath River corridor consistent with state and federal standards at PacifiCorp's four mainstem hydroelectric dams, or through dam removal.

3. Pacific Lamprey are relatively abundant in mainstem Klamath River and tributaries immediately downstream of Iron Gate Dam. Significant potential lamprey habitat exists in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries, which will aid natural re-colonization of upstream reaches once fish passage is restored past PacifiCorp's four mainstem hydroelectric dams.

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4. The **Re-Introduction Implementation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries, and will be implemented by the Department and the Klamath Tribes.

Actions

Action 1.1 As part of the **Re-Introduction Implementation Plan**, develop a monitoring and evaluation plan to document natural re-colonization of Pacific Lamprey into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries in coordination with monitoring activities on the California portion of the Klamath River.

Action 1.2 Develop upstream and downstream fish monitoring facilities for Pacific Lamprey in Spencer Creek and at Keno Dam.

Action 1.3 Develop upstream and downstream fish monitoring facilities for Pacific Lamprey at J.C. Boyle Dam in Oregon in coordination with monitoring facilities at dams on the California portion of the Klamath River.

Action 1.4 As part of the **Re-Introduction Implementation Plan**, develop criteria and research protocol for determining when natural re-colonization of Pacific Lamprey is not occurring or is too slow. These criteria and research protocols will also be used to determine if, when, and how the Department and the Klamath Tribes will actively re-introduce Pacific Lamprey into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.

Action 1.5 As part of the **Re-Introduction Implementation Plan**, identify the appropriate population performance thresholds, such as juvenile or adult seeding levels, that will define when natural re-colonization of Pacific Lamprey into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries has been successful.

Action 1.6 Investigate the possibility that Pacific Lamprey use pheromones to find spawning tributaries similar to the Sea lamprey.

Objective 2 Protect and improve Pacific Lamprey habitat in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.

Assumptions and Rationale

1. Upstream and downstream fish passage is provided throughout the Klamath River corridor consistent with state and federal standards at PacifiCorp's four mainstem hydroelectric dams, or through dam removal.

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2. Pacific Lamprey habitat in the Oregon portion of mainstem Klamath River downstream of J.C. Boyle Dam has been impacted by hydropower operations.

Actions

Action 2.1 Develop and implement a habitat monitoring and improvement plan for the Oregon portion of Klamath River and tributaries in consultation with Klamath Tribes, PacifiCorp, state and federal land managers and appropriate private land owners.

Objective 3 Integrate self sustaining populations of Pacific Lamprey returning to the Oregon portion of the Klamath River Basin into tribal and sport fisheries through development of an **Anadromous Fish Conservation Plan**.

Assumptions and Rationale

1. Self sustaining populations of Pacific Lamprey are returning to the Oregon portion of Klamath River, Upper Klamath Lake and tributaries.

2. Population performance thresholds defining successful re-introduction of Pacific Lamprey into the Oregon portion of Klamath River, Upper Klamath Lake and tributaries as listed in the **Re-Introduction Implementation Plan** (Action 1.5 above) have been met.

3. The **Anadromous Fish Conservation Plan** shall be written consistent with the stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002).

4. Information necessary to address stipulations in the Department's Native Fish Conservation Policy will have previously been determined through Phase 1 management actions.

5. The **Anadromous Fish Conservation Plan** will be written collaboratively among the Department, the four Tribes of the Klamath River Basin, California Department of Fish and Game, USFWS and NOAA Fisheries

Actions

Action 3.1 Prepare a **Klamath Anadromous Fish Conservation Plan** for Pacific Lamprey and other anadromous fish in the Oregon portion of Klamath River, Upper Klamath Lake and tributaries, consistent with stipulations of the Department's Native Fish Conservation Policy (OAR 635-007-0503, ODFW 2002). This plan will be incorporated into a comprehensive plan for fisheries management of the entire Klamath River Basin.

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