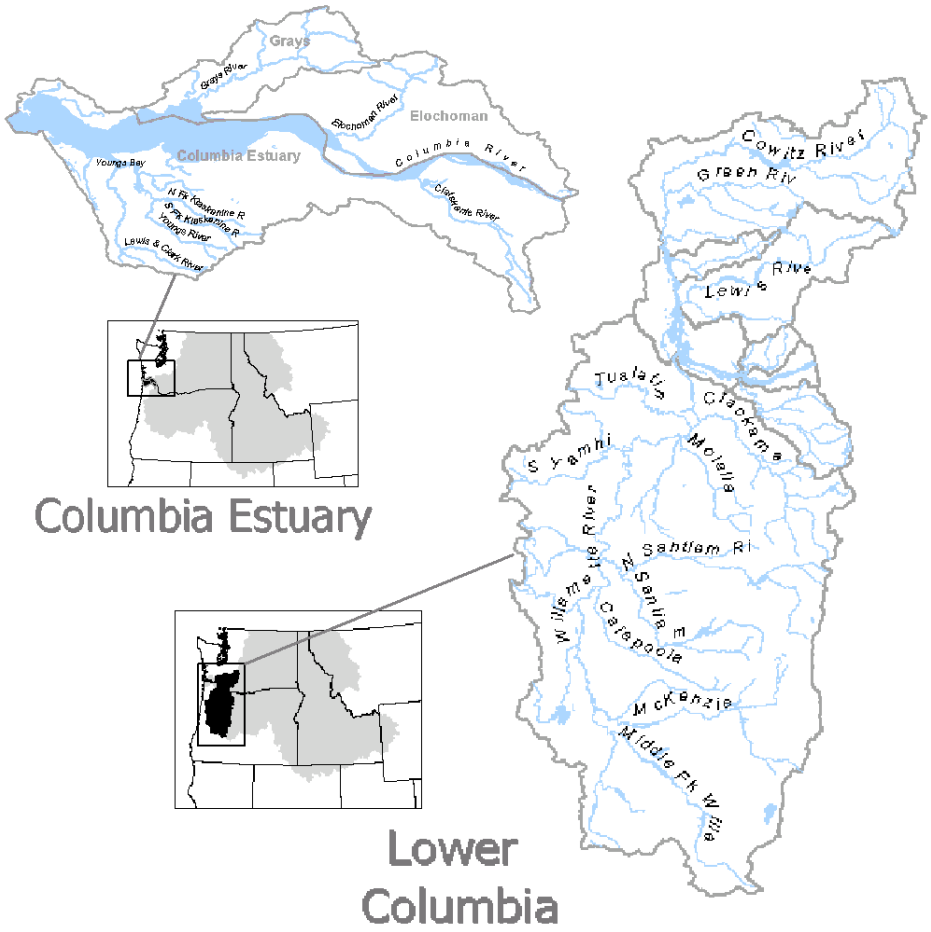
Draft FY 2003-2005 Lower Columbia and Columbia Estuary Provinces Work Plan



Prepared for the
Northwest Power Planning Council

by the
Columbia Basin Fish and Wildlife Authority

May 17, 2002

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Introduction

The Rolling Provincial Review process was developed by the Northwest Power Planning Council (NWPPC) in February 2000 in response to recommendations by the Independent Scientific Review Panel (ISRP) and the Columbia Basin Fish and Wildlife Authority (CBFWA). Under this new province based process each individual project proposal within a province will be reviewed for technical merit and management relevance every three years. Under the previous process all project proposals for Bonneville Power Administration (BPA) funding under the Fish and Wildlife Program were reviewed annually. The purpose of the NWPPC's new multi-year process is to reduce the burden of reviewing large numbers of proposals, most of which had been reviewed just one year before, and to provide for a more thorough review of the project proposals in the context of a subbasin summary. Additionally, the process is intended to provide the opportunity for site visits by reviewers, project presentations with a question and answer period, and provide reviewers with more detailed background and planning documents which will reduce the reviewer's reliance strictly on the proposal form.

The subbasin summaries developed under this process are intended to be interim and will be replaced by subbasin plans developed to meet requirements of the recently amended Fish and Wildlife Program. The Lower Columbia and Columbia Estuary Provinces were the ninth and tenth provinces to be reviewed under this new process. The results of this review are summarized here.

This document was developed collaboratively by the NWPPC staff, ISRP, fish and wildlife managers, other stakeholders, and CBFWA staff, culminating in project and budget recommendations for FY 2003-2005. The subbasin summaries are provided only as context for the project recommendations.

The CBFWA process for providing these recommendations utilized the ISRP preliminary findings and integrated manager evaluations of the technical and management merits of the project proposals relative to anadromous fish, resident fish and wildlife management needs, and the goals and objectives identified in the subbasin summaries. A total of 61 project proposals were submitted and reviewed with two proposals being withdrawn and ten proposals receiving a "Do Not Fund" recommendation. The 49 recommended projects address needs identified in the subbasin summaries and include 37 new and 12 ongoing projects totaling $25.2 million.

This draft work plan includes the subbasin summaries, which describe the physical and biological characteristics of each subbasin within the Lower Columbia and Columbia Estuary Provinces. The summaries also identify past accomplishments, limiting factors, management objectives and strategies, current needs and recommended budgets for project implementation.

Geographic Description

The Lower Columbia and Columbia Estuary Provinces (Figure 1) are located in northwestern Oregon and southwestern Washington. These two provinces extend from Bonneville Dam to the Pacific Ocean, including the Columbia River plume.

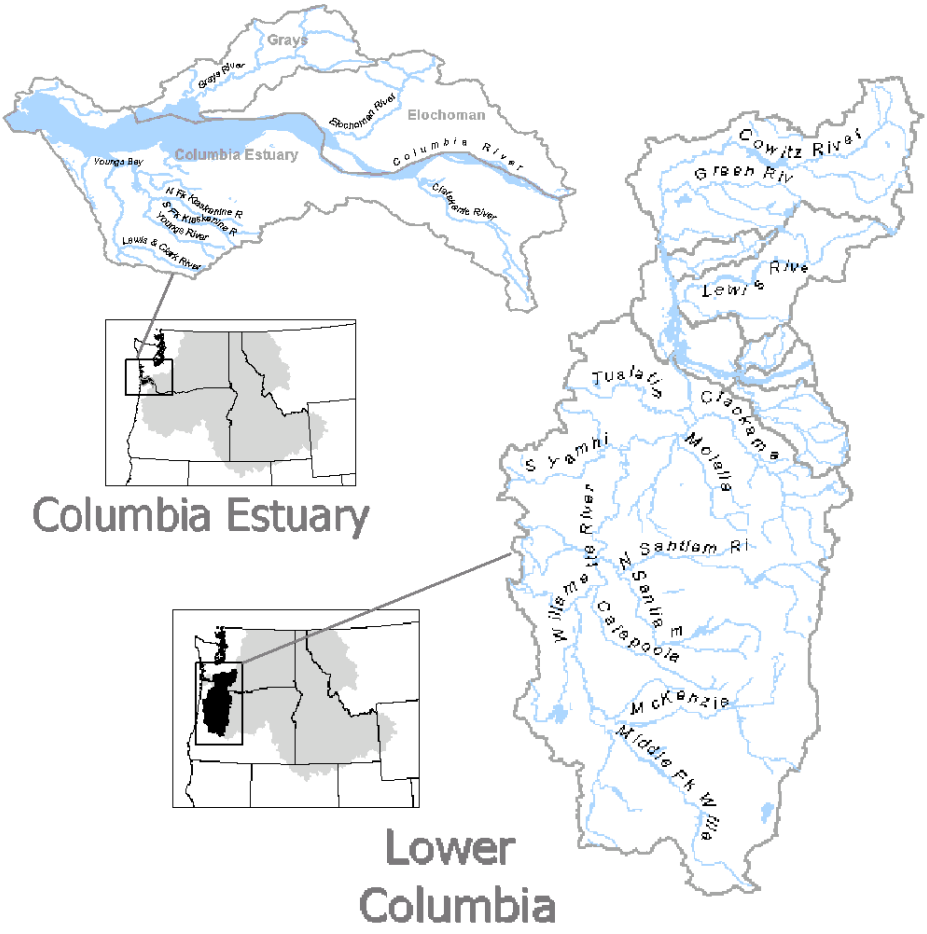

Figure 1. Lower Columbia and Columbia Estuary Provinces

Project Review Process

Subbasin Summaries

The Lower Columbia and Columbia Estuary Provinces Review was initiated at an August 22 meeting in Portland, Oregon. An invitation was sent to an extensive distribution list to encourage all interested parties (i.e. land and water managers, representatives of watershed councils, etc.) to attend and provide input. The purpose of this first meeting was to provide all interested parties with the opportunity to identify sources of information necessary for the development of subbasin summaries for this province (i.e. monitoring data, habitat restoration results, existing assessments, etc.). The intent was to ensure BPA expenditures for fish and wildlife projects compliment and enhance existing efforts and ensure that priority needs are addressed. Subsequent meetings were held to review draft summaries and identify goals and objectives.

Previously, ecosystem summaries for each subbasin were developed as a means of providing context for project proposals. Under the new process, a more formal structure with subbasin teams was formed to develop the more comprehensive subbasin summaries of the newly identified provinces. Other local interested parties also provided input to and participated on the subbasin teams (i.e. other land and water managers, representatives from watershed councils, etc.).

Subbasin summaries for the Lower Columbia and Columbia Estuary Provinces were completed in October 2001. The BPA issued the solicitation for project proposals for the Lower Columbia and Columbia Estuary Provinces on November 8, 2001, with project proposals due December 21, 2001. The project sponsors were asked to show a direct tie between their projects and the needs identified in the subbasin summaries.

Review by the ISRP

The ISRP reviewed 61 project proposals for the Lower Columbia and Columbia Estuary Provinces. To ensure a consistent and fair evaluation, standard formats and criteria were applied to all proposals to generate comments and scores prior to the proposal review workshop. These scores and comments were not made available to the project sponsors at the workshop, but were used by the ISRP to develop questions for the site visits and workshop presentations. The workshops consisted of site visits and project presentations.

Site Visits (February 19-20, 2002)

The ISRP, subbasin teams, fish and wildlife managers, the CBFWA province review team and other stakeholders toured the province to gain a better understanding of the existing ecological conditions and limiting factors as well as view some ongoing projects in each subbasin. During the tour, managers provided oral presentations for areas/projects within the province that the group was unable to visit.

Project Presentation (February 21-22, 2002)

Prior to the presentation of individual project proposals, subbasin team leaders provided a general overview for their respective summaries. Following each subbasin summary

presentation, project proposals relative to that subbasin were presented to the ISRP, CBFWA province review team, fish and wildlife managers, NWPPC staff, CBFWA staff and other stakeholders. All project sponsors were provided 15 minutes to present their proposal and answer questions. During this review, the CBFWA province review team applied Subbasin Project Review Criteria (Table 1) to each project. Every effort was made to be consistent among all project proposals reviewed.

Table 1. The CBFWA subbasin project review criteria.

Technical Criteria	
1. Does the proposal demonstrate that the project uses appropriate scientifically valid strategies or techniques and sound principles (best available science)?	**Y or N**
2. Are the objectives clearly defined with measurable outcomes and tasks that contribute toward accomplishment of the objectives?	**Y or N**
3. Are the resources proposed (staff, equipment, materials) appropriate to achieve the objectives and time frame milestones?	**Y or N**
4. Does the proposal include monitoring and evaluation to determine whether objectives are being achieved (including performance measures/methods) at the project level?	**Y or N**
5. Will the proposed project significantly benefit the target species/ indicator populations?	**Y or N**
6. Does the proposal demonstrate that project benefits are likely to persist over the long term and will not be compromised by other activities in the basin?	**Y or N**
7. Does the proposal demonstrate that all reasonable precautions have been taken, to not adversely affect habitat/populations of wildlife, native resident and anadromous fish?	**Y or N**
8. Are there explicit plans for how the information, technology etc. from this project will be disseminated or used?	**Y or N**
Management Criteria	
1. Does the proposed project address fish and wildlife related objectives, strategies, needs and actions as identified in the subbasin summaries?	**Y or N**
2. Does the project address an urgent requirement or threat to population maintenance and/or habitat protection (i.e., threatened, endangered or sensitive species)?	**Y or N**
3. Does the project promote/maintain sustainable and /or ecosystem processes or maintain desirable community diversity?	**Y or N**
4. Is there cost share for the construction/implementation and/or monitoring and evaluation of the project?	**Y or N**
5. Will the project complement management actions on private, public and tribal lands and does the project have demonstrable support from affected agencies, tribes and public?	**Y or N**
6. Will the project provide data critical for in season, annual and/or longer term management decisions?	**Y or N**
7. Will this project provide or protect riparian or other habitat that may benefit both fish and wildlife?	**Y or N**

Preliminary ISRP Report

On March 1, 2002, the ISRP released a *Preliminary Review of Fiscal Year 2003 Project Proposals for the Upper Snake and Middle Snake, Columbia Cascade, and Lower Columbia and Estuary Provinces* (ISRP 2002-2 at NWPPC). This report summarized the ISRP's preliminary review of each project proposal and identified areas of concern where they had requested a written response to questions. The due date for written responses to this report was March 15, 2002.

CBFWA Province Review Group

During April 9-10, 2002, the CBFWA Province Review Group reviewed all project proposals within the province using criteria listed in Table 1 which resulted in a consensus Yes or No. Subbasin team members also participated in the review of the project proposals. The following elements were considered during the review:

- How well does the project relate to the criteria (Table 1)
- Validation of existing work- is the current funding level appropriate (Section 6 O&M and Section 7 M&E of existing projects)? Is it appropriate to continue implementation of existing work (Section 4 P&D and Section 5 C&I of existing projects)?
- Evaluation of proposed new work- does a new project proposal demonstrate a priority need over implementation strategies within existing projects (Sections 4 and 5 of existing projects)?

Project proposals were grouped by subbasin during their review. The preliminary ISRP technical review of all proposals was utilized while discussing the technical merits of each project. Following the technical and management review, the project proposals were prioritized within each subbasin according to the fish and wildlife needs within that subbasin. The following definitions were used for the subbasin prioritization:

- High Priority - These projects or tasks within a project are high priority within the subbasin. The project addresses a specific need within the subbasin summaries.
- Recommended Actions - These are good projects that cannot demonstrate a significant loss by not funding this year. These projects should be funded, but under a limited budget could be delayed temporarily without significant loss.
- Do not fund - These projects are either technically inadequate or do not address a need within the subbasin summaries. These projects may be inappropriate for BPA funding.

CBFWA Review and Approval of Project Recommendations and Subbasin Summaries

The final step in the project proposal review process was the consensus approval of the project recommendations by CBFWA Members. The CBFWA Members review and the recommendations in the subbasin summaries and province work plan demonstrate regional support by the fish and wildlife managers.

On April 22, 23, and 24, 2002, the province recommendations and subbasin summaries were discussed in the CBFWA Wildlife, Resident Fish, and Anadromous Fish committees, respectively. The committees made some modifications to the province recommendations based on technical or regional management concerns.

Proposal Review Results

A total of 61 project proposals were reviewed in the Lower Columbia and Columbia Estuary Provinces (12 ongoing projects and 49 new proposals, (Appendix A)). Two proposals were withdrawn from review (Project Numbers 30009 and 30014). A total of ten proposals were categorized as "Do Not Fund" (Project Numbers 30007, 30010, 31010, 31011, 31021, 31025, 31028, 31029, 31030, and 31031). Most of the Do Not Fund recommendations were based on the issue of BPA funding responsibility.

Three-year Budget Recommendation

Appendix B provides a three-year funding recommendation for the Lower Columbia and Columbia Estuary Provinces that strives to meet the goals, objectives and needs of the Provinces. A total of 49 projects that address needs identified in the subbasin summaries are recommended for funding and include new and ongoing projects totaling $25.2 million for Fiscal Year 2003. All of the projects recommended here should be initiated within the next three years.

Lower Columbia River/ Columbia River Estuary Subbasin

Columbia River Estuary

One existing project is recommended for continued funding in the Columbia River Estuary (Table 2). Project 198801400, *Survival and Growth of Juvenile Salmonids in the Columbia River Plume*, will continue to evaluate the role of the Columbia River plume in survival of juvenile salmon through long-term observations, fine-scale process studies, retrospective assessments, and modeling to assess management of flow to improve habitat opportunity.

Eleven new project proposals are recommended for funding in this subbasin (Table 2). Project Proposal 30001, *Historic Habitat Opportunities and Food-web linkages of juvenile Salmon in the Columbia River Estuary: Implications for Managing Flows and Restoration,* will evaluate the role of river flow on habitat opportunities and food web structure for juvenile salmon by comparing historic and current conditions using model simulations and empirically derived food-web linkages. Project Proposal 30002, *Optimizations of FCRPS Impacts on Juvenile Salmonids: Restoration of Lower-Estuary and Plume Habitats*, will allow for the initiation of efforts to restore Columbia River estuary and plume juvenile salmonid habitats and optimize FCRPS impacts on the plume through improved understanding of estuary and plume physical processes and definition of possible future management scenarios. Project Proposal 30006, *Effectiveness Monitoring of the Chinook River Estuary Restoration Project*, will allow for the monitoring and evaluation of changes in habitat attributes and juvenile salmonid use

before and after the Chinook River estuary restoration project. Project Proposal 30011, *Preserve and Restore Columbia River Estuary Islands to Enhance Juvenile Salmonid and Columbian White-tailed Deer Habitat,* will allow for the purchase of 626 acres on Crims and Walker Islands and subsequent restoration of tidal emergent marsh and riparian forest habitat by enhancing tidal channels. These improvements will provide juvenile salmonid rearing/ foraging habitat and aid in the recovery of the Columbian white-tailed deer. Project Proposal 30015, *Lower Columbia River and Columbia River Estuary Ecosystem Monitoring and Data Management*, will allow for the development of protocols, procedures, and indicators for measuring habitat condition, assess exposure levels to toxic contaminants, develop ecosystem restoration information center for housing and accessing data specific to lower Columbia River and estuary. Project Proposal 30018, *Salmonid Population and Habitat Monitoring in the Oregon Portion of the Columbia Estuary*, will allow for the implement of fish population and habitat monitoring (EMAP) in the Oregon portion of the Columbia Estuary. Project Proposal 31001, *Artificial Production Facilities Improvement s to Support Lower Columbia Chum Salmon Reintroduction into the Chinook River*, will provide for improvements to the Sea Resources hatchery facilities that will enable staff to perform tasks in support of the reintroduction of Lower Columbia chum salmon into the Chinook River. Project Proposal 31014, *Evaluate Juvenile Salmonid Use of the Restore Floodplain Wetlands in the Lower Columbia River Estuary*, will evaluate benefits and effects of wetland habitat restoration on juvenile salmonids rearing and migrating through the Lower Columbia and implications for restoration and salmon recovery. Project Proposal 30004, *Blind Slough Restoration Project-Brownsmead, Oregon*, will allow for the restoration of tidal exchange between the Columbia River Estuary and Blind Slough in the community of Brownsmead, Oregon. BPA funds will be used to match U.S. Army Corps Section 1135 funding for 25% of the total project costs. Project Proposal 30016, *Implement the Habitat Restoration Program for the Lower Columbia Estuary and Lower Columbia River,* will establish program to identify and prioritize on-the-ground habitat restoration projects and plan their monitoring and evaluation. Project Proposal 30017, *Columbia River Tidewater Assessment for Recovery Planning,* will characterize habitat/fish productivity relationships; identify factors that limit recovery, early actions for recovery; and research, monitoring, and evaluation needs.

Table 2. Projects recommended for funding in the Columbia River Estuary Subbasin.

ProjectID	Title	Sponsor
198801400	*Survival and Growth of Juvenile Salmonids in the Columbia River Plume*,	NMFS
30001	*Historic Habitat Opportunities and Food-web linkages of juvenile Salmon in the Columbia River Estuary: Implications for Managing Flows and Restoration,*	NMFS
30002	*Optimizations of FCRPS Impacts on Juvenile Salmonids: Restoration of Lower-Estuary and Plume Habitats*	OHSU, OGI
30006	*Effectiveness Monitoring of the Chinook River Estuary Restoration Project*,	SR
30011	*Preserve and Restore Columbia River Estuary Islands to Enhance Juvenile Salmonid and Columbian White-tailed Deer Habitat*	USFWS
30015	*Lower Columbia River and Columbia River Estuary Ecosystem Monitoring and Data Management*	LCREP

ProjectID	Title	Sponsor
30018	*Salmonid Population and Habitat Monitoring in the Oregon Portion of the Columbia Estuary*	ODFW
31001	*Artificial Production Facilities Improvements to Support Lower Columbia Chum Salmon Reintroduction into the Chinook River*,	SR
31014	*Evaluate Juvenile Salmonid Use of the Restore Floodplain Wetlands in the Lower Columbia River Estuary*	DU
30004	*Blind Slough restoration Project-Brownsmead, Oregon*,	CREST
30016	*Implement the Habitat Restoration Program for the Lower Columbia Estuary and Lower Columbia River,*	LCREP and CREST
30017	*Columbia River Tidewater Assessment for Recovery Planning*	UP

Lower Columbia River

Three existing projects are recommended for continued funding in the Lower Columbia River Subbasin (Table 3). Project 199306000, *Select Area Fishery Evaluation,* will continue to develop and enhance fisheries in the lower Columbia River utilizing hatchery stocks; while protecting depressed wild stocks through application of net-pen rearing; and monitor and evaluate rearing effects on habitat at net-pen sites. Project 200001200, *Evaluate Factors Limiting Columbia River Gorge Chum Salmon Populations*, will continue to evaluate factors limiting chum salmon production in Hardy Creek, Hamilton Springs, and Columbia River side-channel. Project 200105300, *Reintroduction of Lower Columbia River Chum Salmon into Duncan Creek,* will continue to monitor and evaluate the success of the recently restored spawning channels for chum salmon at Duncan Creek.

Five new project proposals are recommended for funding in this subbasin (Table 3). Project Proposal 31006, *Protect Wood's Landing Chum Spawning Site,* will allow for the protection of a significant chum spawning site on the mainstem of the Columbia and will also restore the lower 350 feet of the adjacent creek through the acquisition of property and easements on 12 acres and 1000 feet of shoreline. Project Proposal 31024, *Protect, Enhance, Maintain, Wetland, Riparian, and Upland Habitat on the Shillapoo Wildlife Area*, will allow provide for the maintenance and implementation of measures to restore and enhance wetland, riparian, and upland habitat in the Vancouver Lake Lowlands area. Project Proposal 31032, *Develop a Well Water Supply System for Hardy Creek Chum Salmon Spawning Channel,* will allow for the development of a well water supply system for the Hardy Creek chum salmon spawning channel. This system will mimic spring and seepage flow to ensure that water will be provided to the spawning channel during subfreezing weather when Hardy Creek is frozen. Project Proposal 31033, *Restoration of Columbia River Floodplain Functions to Steigerwald Lake*, will Reconnect Columbia River flows, restore riparian/wetland ecosystem functions, and improve salmon habitat on Steigerwald Lake and associated floodplain habitat. Project Proposal 31034, *Salmonid Population and Habitat Monitoring in the Oregon Portion of the Lower Columbia Province,* will allow for the implementation of fish population and habitat monitoring (EMAP) in the Oregon portion of the Lower Columbia Province. Project Proposal 31003, *Distribution and Life History Characteristics of Lampreys in Tributaries of the Lower Columbia River Basin,* will identify tributaries containing lamprey, and

quantitatively evaluate populations and their habitats in two streams below Bonneville Dam. Project Proposal 31015, *Sturgeon Lake/Dairy Creek Restoration,* will reopen the Dairy Creek channel to Upper Sturgeon Lake, construct a rock spur jetty in the Columbia River, re-construct and replace an existing debris boom, and repair an existing culvert.

Table 3. Projects recommended for funding in the Lower Columbia River Subbasin.

ProjectID	Title	Sponsor
199306000	*Select Area Fishery Evaluation*	WDFW, ODFW, CCEDC
200001200	*Evaluate Factors Limiting Columbia River Gorge Chum Salmon Populations*	
200105300	*Reintroduction of Lower Columbia River Chum Salmon into Duncan Creek*	
31006	*Protect Wood's Landing Chum Spawning Site*	CV
31024	*Protect , Enhance, Maintain, Wetland, Riparian, and Upland Habitat on the Shillapoo Wildlife Area*	WDFW
31032	*Develop a Well Water Supply System for Hardy Creek Chum Salmon Spawning Channel*	USFWS
31033	*Restoration of Columbia River Floodplain Functions to Steigerwald Lake*	USFWS
31034	*Salmonid Population and Habitat Monitoring in the Oregon Portion of the Lower Columbia Province,*	ODFW
31003	*Distribution and Life History Characteristics of Lampreys in Tributaries of the Lower Columbia River Basin*	USFWS
31015	*Sturgeon Lake/Dairy Creek Restoration*	WMSWCD

This suite of recommended project proposals for the Columbia River Estuary and Lower Columbia River subbasins addresses key needs identified in the Lower Columbia River/Columbia River Estuary Subbasin Summary including:

> Wy-Kan-Ush-Mi Wa-Kish-Wit Spirit of the Salmon The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs, and Yakama Tribes, 1995

The Spirit of the Salmon, provides a framework to restore the Columbia River salmon, simply stated: put the fish back into the rivers. According to Spirit of the Salmon, past attempts to maintain or restore declining salmon numbers all assumed that technology alone could "fix" the damage caused by disregard for the underlying, interconnected processes of nature which gave rise to and sustained the great salmon runs of the Columbia Basin. Simple solutions could not replace the complexity of nature; naturally these attempts failed. The Spirit of the Salmon provides institutional and technical recommendations below.

Institutional Recommendations

- Use the Columbia River Fish Management Plan, the Northwest Power Planning Council's Fish and Wildlife Program, and orders of the Federal Energy Regulatory Commission as a basis for management
- Plan and implement production called for in the Columbia River Fish Management Plan

- For public lands and water project management, implement a dispute resolution process similar to Columbia River Fish Management Plan and Federal Energy Regulatory Commission processes
- Establish a new state and tribal fish and wildlife entity using Bonneville Power Administration funding
- Support ongoing and implement new subbasin planning through a Columbia Basin watershed trust program
- Base Endangered Species Act listing on the status of species throughout a significant portion of its spawning and rearing range. In the absence of scientific proof, the National Marine Fisheries Service should withdraw its Evolutionarily Significant Unit (ESU) interim policy as a basis for Endangered Species Act listings
- Transfer federally funded hatcheries located on reservations and at other upriver sites to tribal control
- Encourage state, tribal and federal fish agencies to coordinate and set priorities for research, monitoring and evaluation programs
- Continue development of and make research and monitoring data available through a coordinated information system
- Update provisions of the Pacific Salmon Treaty and the Columbia River Fish Management Plan based on the latest survival rate and catch level information
- Continue coordinated harvest law enforcement; develop habitat protection law enforcement

Technical Recommendations

- Begin improving in-channel stream conditions for anadromous fish by improving or eliminating land-use practices that degrade watershed quality
- Protect and increase instream flows by limiting additional consumptive water withdrawals, using the most efficient irrigation methods, preventing soil compaction and riparian vegetation removal and wetland destruction; where necessary, restore soil, restore riparian vegetation and re-create wetlands
- Actively restore watersheds where salmon populations are in imminent danger of extirpation. Use "Coarse Screening Process" to develop demonstration projects
- Use supplementation to help rebuild salmon populations at high demographic risk of extirpation
- Use supplementation to reintroduce salmon to watersheds from which they have been extirpated
- Use flow, spill, drawdowns, peak efficiency turbine operation, new turbine technology, and predator control projects to improve inriver juvenile salmon survival; avoid fluctuations caused by power peaking operations
- Protect and restore critical estuary habitat
- Establish Alaskan and Canadian ocean fisheries based on chinook abundance.
- Use stored cold water, additional ladders, ladder improvements and ladder maintenance to enhance mainstem adult passage; incorporate 24-hour video fish counting

- Improve water quality by eliminating sources of toxic pollution that accumulates in fish tissue and by reducing discharges of other contaminants to meet water quality criteria for anadromous fish
- Closely monitor tributary production and escapement to improve management
- Conduct research on Pacific lamprey and design artificial propagation strategies to supplement natural production
- Develop artificial propagation and management strategies for white sturgeon populations above Bonneville Dam

Oregon Department of Fish and Wildlife

- Mitigate the loss of salmon spawning habitat caused by dams on the mainstem of the Columbia River
- Adapt the management and selective harvest on mixed stock of salmon to respond to changing conditions
- Implement new live capture techniques to allow harvest on hatchery fish while reducing the impact on natural spawning populations
- Encourage select area fisheries to develop a commercially viable program that will use a brood stock that will minimize impact on naturally spawning populations
- Tag hatchery fish with a fin mark and coded wire tags to enable staff to collect the data and provide analysis to modify or improve the program

White Sturgeon Mitigation and Restoration in the Columbia and Snake Rivers Upstream from Bonneville Dam, Washington Department of Fish and Wildlife, the Oregon Department of Fish and Wildlife, and The U.S. Geological Survey

The removal of over 26,000 white sturgeon and the planned removal of 5,000-10,000 juvenile fish annually for an unspecified number of years will have an impact on the white sturgeon population residing in the Lower Columbia Province. The significance of this action needs to be assessed. Construction of Bonneville Dam reduced the only spawning habitat used by the lower river population, possible reducing potential productivity and thus increasing the population's sensitivity to losses. Current knowledge of the status of the lower river population is inadequate to determine the impact of removing juvenile fish. State funded monitoring programs designed to meet fishery management obligations are limited to indexing annual legal size (42"-60") abundance and estimating harvest. Sublegal, over-legal, and broodstock population parameters are not monitored. An accurate assessment of the sublegal, legal, over-legal, and broodstock population is needed to properly evaluate transport strategies.

Bonneville to Portland

Bonneville Tributaries Subbasin Stock Summary and Habitat Priorities

The Bonneville Tributaries Subbasin Stock Summary and Habitat Priorities report (see Appendix A) identifies the following needs to mitigate the effects of the listed limiting factors:

- Reconnect and preserve off-channel and side channel habitat and associated wetlands wherever they occur. Lower Gibbons Creek, Steigerwald Refuge, Frans Lake, and Greenia Creek wetlands are priorities

- Protect and enhance riparian corridors, especially in the upper watersheds of the Bonneville Tributaries Subbasin
- Protect existing mature riparian vegetation for LWD recruitment
- Maintain current appropriate pieces of LWD, and other natural structures through increased education and enforcement
- Preserve healthy riparian corridors in the headwaters of all the subbasins' tributaries, especially in Hardy, Hamilton, and Greenleaf Creeks
- Protect riparian corridors in all headwaters areas to maintain the supply of cool, clean water to critical downstream spawning and rearing areas
- Protect the supply of water to springs that provide critical chum spawning sites in Duncan, Hardy, and Hamilton Creeks
- Preserve riparian corridors and wetlands with native vegetation

Oregon Columbia Tributaries West: Watershed Analysis, Columbia River Gorge National Scenic Area, 2001

The Oregon Columbia Tributaries West Watershed Analysis, completed in 2001, describes how the study area has changed over time, the existing conditions and how management or restoration can move the watershed toward the desired future condition. The following needs were identified as necessary to the restoration of the watershed:

- Maintain the general healthy condition of upper stream reaches of Multnomah, Oneonta, Horsetail, Gordon, and Moffett creeks and enhancement of Bridal, Young and Latourell creeks. Also mimic streams with similar characteristics that are in good condition
- Based on conditions, either achieve Mount Hood National Forest westside standards, or defer to the professional judgment of the wildlife fish biologist
- Enhance natural wetland plants in wetland areas along Columbia River (Rooster Rock, Horsetail Falls etc.). Leave riparian zone widths as detailed in the Northwest Forest Plan
- Encourage Oregon State Parks to improve riparian habitat, especially on lower elevation parks near the Columbia River
- Re-establish natural stream channels as opportunities arise
- Widen flow channels by constructing more fish-friendly culverts (with a natural stream bottom) and more bridges and overflow channels
- As opportunities arise, work with other agencies and landowners to eliminate or reduce flow restrictions at stream mouths
- Add large wood to anadromous portions of all streams where they are currently below standards and to the upper reaches of resident habitat of Bridal Veil, Young, Latourell, Lawton, Woodward, Hamilton and other creeks. This will provide more fish cover and pool habitat for juvenile salmonid rearing on both federal and non-federal lands. Facilitate an interagency effort where necessary
- Increase the amount of pool habitat in the anadromous streams where it is below standards and in the upland reaches of the three aforementioned creeks
- Explore opportunities for a pond to hold overwintering fry at McCord Creek
- Preserve hardwood riparian habitat on all ownerships, especially along the Columbia River

- Support other agencies to re-introduce Columbia River flushing flows to carry sediment and vary water level
- Recreate and/or enhance hardwood riparian habitat wherever possible. Facilitate an interagency effort where necessary
- Re-examine the road access to Beacon Rock boat launch site/Doetsch dayuse area
- Reduce road density and/or stream crossings wherever possible to enhance stream function
- Work with USFWS on re-routing of Lawton Creek to its historical route
- Explore possibilities of a separate routing for "Marshal" Creek at SR14 crossing. (It is now channelized to join Good Bear Creek.)
- Maintain existing habitat for east-west demographic and genetic exchanges and enhance habitat on the north side of the river
- Promote nesting habitat for snag-dependent and large tree-dependent species.
- Investigate improving pond and painted turtle habitat
- Explore beaver reintroduction to enhance wetlands in upper watershed
- Protect instream fauna by limiting the amount of dredging and gravel removal

Re-introduction of Columbia River Chum Salmon into Duncan Creek, Washington Department of Fish and Wildlife, 2000-2001

Duncan Creek is located approximately five miles below the Bonneville Dam on the Washington side of the Columbia River. In the 1960's a dam and culvert were placed across the stream to create an artificial lake. Surveys conducted by the Washington Department of Fisheries before the dam was installed indicated that four to five hundred chum salmon returned to the stream and used natural springs or seeps as spawning areas. After the dam was installed, chum salmon were no longer able to use the stream as a natural spawning area. Fish-passage work completed in 2000 and recent landowner agreements, however, will allow chum salmon to once again enter the stream. Significant renovation work on Duncan Creek is currently taking place, gravel in four branches of the stream is being removed and replaced with gravels that are expected to maximize chum salmon egg-to-fry survival rates. Uplands immediately adjacent to the channels will be planted with indigenous vegetation to protect the integrity of the rehabilitated areas.

Questions about possible domestication effects, and whether such fish demonstrate higher straying proclivities than wild cohorts need to be addressed. The assumption that natural colonization into newly created spawning and incubation habitats will be low also needs to be evaluated. Finally too, the physical parameters used as criteria for the renovated portions of Duncan Creek were derived from data collected on Puget Sound chum salmon. How well chum salmon native to the Columbia River survive in such areas needs to be assessed as well as whether the habitat created actually resembles what was recommended. The approach to chum salmon recovery in place in the Columbia needs to be tested and its consequences evaluated. Further refinement on how spawning and incubation habitats for this species should be built in this part of the basin may need to be examined.

For the Duncan Creek project the following general information needs should be addressed:

- What egg-to-fry survival rates are being achieved in the renovated portions of the stream
- What is the survival of the eggs and fry used in the artificial rearing program that will take place at Duncan Creek
- What is the survival and spawning ground distribution of adult chum salmon produced from the renovated habitat areas and from the rearing program
- What is the straying rate of non-project chum into Duncan Creek
- What are the physical characteristics present in the renovated portions of Duncan Creek (dissolved oxygen, water temperature, velocity, up- and down welling zones, gravel composition, suspended sediments, and flow and how do these attributes affect survival)

Sandy River Delta Plan and EIS 1996 and Sandy River Watershed Analysis, Columbia River Gorge National Scenic Area, 1995

The Sandy River Delta Plan and EIS 1996 and Sandy River Watershed Analysis has identified the following needs:

- Restore wetland, riparian forest, shrub-scrub, upland forest, and upland meadow habitats.
- As first priorities, restore riparian forest and wetland restoration, with long-term objectives of re-establishing 600 acres of Columbia River bottomland riparian forest (dense stands of black cottonwood, will and ash), and re-establishing about 200 wetland acres and associated upland habitat.
- Consider breaching levees and dikes to restore sloughs and backwater channels.

Portland to Skomokowa River Mile 34

Columbia-Clatskanie Watershed Assessment, *Portland State University, 2001*

This watershed assessment, prepared for the Lower Columbia River Watershed Council, will be used as a guide for the prioritization and design of restoration projects. The conclusions drawn lead to the following list of needs:

- Complete fieldwork to verify impacts to wetlands from road building within the interior of the subbasin
- Incorporate the list of data gaps identified in each section of the watershed assessment in a monitoring program
- Conduct culvert inventories and natural barrier evaluations to determine if all potential habitat is accessible and being utilized by the species of concern
- Conduct aquatic habitat surveys and biological surveys for some watersheds to determine the current status of habitats and verify the assumptions made for the distribution of the species of concern. Watersheds that need to be surveyed include: Green Creek, Goble Creek, Beaver Creek (below the falls), Merrill Creek, Tide Creek, Fox Creek, Nice Creek and McBride Creek
- Include the following subwatersheds, within the Clatskanie River watershed, in the surveys: Page Creek, North Fork Clatskanie River and Little Clatskanie River

- Address the lack of large woody debris for instream habitat complexity, high stream temperatures, a lack of large conifers within the riparian zone and floodplain connectivity

Revised Columbia White-Tailed Deer Recovery Plan, *U.S. Fish and Wildlife Service, 1976*

The Revised Columbia White-Tailed Deer Recovery Plan outlines methods of re-establishing white-tailed deer near the Columbia River. The conclusions of the Revised Columbian White-Tailed Deer Recovery Plan includes the following Columbia River white-tailed deer population needs:

- Secure the habitat of one additional subpopulation so that there are three secure and viable subpopulations
- Secure habitat through acquisition (fee title or easement) or long-term agreements with private organizations, e.g., Columbia Land Trust and The Nature Conservancy, which own habitat
- Develop a monitoring/management plan that will be required to ensure the population remains recovered

Scappoose Bay Watershed Assessment

The Scappoose Bay Watershed Assessment suggests that protection be given a higher priority than restoration, and recommends that areas identified as "refugia" be targeted for protection first. In Scappoose Bay Watershed, where refugia are primarily in private hands, that means either convincing private landowners to voluntarily increase protection standards for critical habitat, or securing conservation easements and/or buying critical habitat.

A prioritized list of protection and restoration opportunities identifies the Scappoose Creek estuary (a remnant intact wetland and nodal refugia at the south end of Scappoose Bay) as the highest protection opportunity in the watershed. Also listed as high priority are protection of North and South Scappoose Creek headwaters (primarily private timberland), correction of barriers to fish passage (now underway), road maintenance and/or removal projects, riparian planting and large wood placement in "adjunct refugia" (the corridors through which salmonids must pass to reach refugia), and restoration within the diked, channelized and tide-gate challenged flood plain. The Council's Comprehensive Assessment of Fish Passage Barriers identifies and prioritizes 107 barriers to fish passage in this small (85,000 acre) watershed. An OWEB grant in the amount of about $450,000 has been awarded to address the first ten barriers. Additional funding is being provided by county and municipal governments, private timber, and other non-profit agencies (including For the Sake of the Salmon).

Evaluation of Spawning for Fall Chinook and Chum Salmon just below the four Lower most Columbia River Dams (BPA project number 1999-003-001), Washington Department of Fish and Wildlife, 1999-2001

The project is composed of three closely related activities. Pacific States Marine Fisheries Commission (PSMFC) is leading the adult studies portion, ODFW is leading the juvenile studies portion, and the U.S. Fish and Wildlife Service (USFWS) is leading the habitat assessment portion of the project. ODFW and PSMFC have conducted chum salmon spawning ground surveys from The Dalles Dam downstream to the estuary, and

are scheduled to continue those surveys. As part of these efforts, the following needs have been identified.

Chum Salmon

- Additional land acquisition and purchase of conservation easements for total protection of the Wood's Landings and Rivershore seeps. This is essential to protect one of the only two mainstem spawning sites for Columbia River chum salmon.
- Determine the effects of water flows and tides on spawning habitat, and identify, record, and map chum spawning locations at this site.
- Continue to survey the mainstem Columbia River downstream from Bonneville Dam to identify other potential chum spawning habitat including spring seeps and areas with ground water/surface water interactions for possible acquisition or restoration.
- Continue annual chum spawning ground counts (both index and non-index) to determine presence/absence, spawn timing, generate population estimates, determine carrying capacity, and determine trends in populations.
- Continue collecting chum at the Bonneville trap and collect biological and genetic data plus radio tag a portion of those fish to determine migration routes and spawning locations above Bonneville Dam.
- Continue collecting biological data from adult chum salmon to profile age, age at return, sex ratios, fecundity, and potential production.
- Continue collecting biological data from juvenile chum to estimate egg to fry survival rates, and use strontium to mark the juveniles to determine fry to adult survival rates and straying rates.
- Determine total emergence, emergence timing, rearing duration, rearing distribution, and emigration timing for chum salmon.

Fall chinook

- Conduct annual spawning ground surveys for Lower Columbia River and upriver bright fall chinook in the Ives/Pierce Island complex to estimate the population size, determine the carrying capacity, and collect data for age composition and CWTs to profile the stock composition.
- Determine rearing duration, rearing distribution, and emigration timing for fall chinook in the Ives/Pierce Island complex.
- Continue to apply CWT's to juvenile chinook captured in the Ives/Pierce Island complex to determine juvenile to adult survival rates, ocean and freshwater distribution, and harvest impacts.

Stranding Studies

- Quantify the effect of Bonneville Dam flow fluctuations on stranding of salmonid species below the dam, and determine the relative impact of stranding on the total population.

Habitat

- Conduct surveys of the entire mainstem Columbia River downstream from Bonneville Dam to identify areas outside the Ives/Pierce Island complex that may

be used by Lower Columbia River fall chinook, bright fall chinook, or chum salmon for spawning/rearing.

- Investigate whether there is a relationship between mainstem spawning and rearing habitat for fall chinook/chum salmon, and production of adults.
- Complete physical modeling for a real-time water elevation model that incorporates ocean tides and tributary backwater effects on Bonneville discharges and associated physical habitat parameters. This is required for both habitat modeling and stranding evaluations.
- Conduct temperature profiling of river bed temperatures over large spatial areas around chum salmon spawning sites to create a spatial data layer that would indicate the extent of chum spawning habitat. Determine how river bed temperatures in spawning areas change as surface water temperature changes, and as river discharge changes. Determine the effect of these changes on spawning habitat selection by chum salmon.
- Develop a more quantitative understanding of the source and configuration of groundwater resources around chum salmon spawning areas so hydrosystem management actions don't negatively impact the potential interaction of groundwater and surface water thus restricting potential spawning habitat.
- Determine particle size distribution and hydraulic conductivity of bed sediments to quantify groundwater flux. Determine the relationship between groundwater flux and spawning habitat selection by chum salmon.
- Conduct an evaluation of the effect of hourly flow fluctuations resulting from power production at Bonneville Dam on mainstem spawning and rearing habitat.
- Continue to provide in-season recommendations for hydrosystem operation to maintain or enhance spawning, incubation, and rearing habitat for fall chinook and chum salmon.
- Complete a real-time, Internet-based tool that fish and wildlife managers and hydrosystem operators can use to evaluate the effects of hydrosystem management options on habitat for mainstem spawning fish species in areas downstream from Bonneville Dam.
- Investigate physical and/or hydraulic parameters used by spawning and rearing white sturgeon downstream from Bonneville Dam, and determine the relationship between hydrosystem operation/river discharge and physical habitat.

Limiting Factors

- Columbia River discharge as controlled by Bonneville Dam currently limits production of mainstem spawning anadromous salmonids, white sturgeon, and possibly other species. In addition, hourly flow fluctuations resulting from power production have a negative effect on spawning and rearing habitat, and cause direct mortality of both adults and juveniles. Alternate watering and de-watering of areas characterized by groundwater/surface water interaction is negatively effecting spawning and rearing habitat in critical areas for ESA listed Columbia River chum salmon.

Abernathy, Germany, and Mill Creeks—Multiple projects, Washington Department of Fish and Wildlife

Related to the mainstem Columbia, the Washington Department of Fish and Wildlife is implementing projects to determine abundance and monitor natural production of juvenile, smolt and adult salmonids in Abernathy, Germany and Mill Creeks. Continued monitoring at current levels is necessary to provide annual adult escapement and juvenile/smolt production estimates for these systems. In addition, adult trapping needs to be expanded to include Germany and Mill Creeks. Tributaries Subbasin Stock Summaries and Habitat Priorities for these streams are included in Appendix D.

River Mile 34 to Astoria

Salmon at River's End: The Role of the Estuary in the Decline and Recovery of Columbia River Salmon, *U.S. National Marine Fisheries Service, Seattle, January 2001*

Salmon at the River's End offers the following recommendations as potential means to promote salmon recovery and improve estuarine conditions, as well as to advance understanding of salmon-rearing requirements:

Retrospective analyses

- Identify and protect the full variety of geographic features and disturbance processes in the basin that allow for diverse salmon life histories, including different patterns of estuarine rearing. Evaluate information on hatchery, harvest, and habitat management practices that reduce salmon life-history diversity, particularly diversity of subyearling, ocean-type migrants that are potentially most dependent on estuarine habitats
- Reconstruct the historical structure of mainstem and tributary shallow-water habitat in the predevelopment tidal floodplain and compare with contemporary conditions. Evaluate the potential habitat function of this extensive area for juvenile salmon rearing and migration, and its contribution to the estuary in terms of sediment accretion and erosion, large woody debris and food web sources, and disturbance regimes
- Evaluate options for restoring more natural flow regimes to the estuary and assess their potential effects on habitat opportunity under a variety of different wetland-recovery scenarios
- Evaluate effects of past hatchery rearing and release practices on the sizes and times of downstream migration, estuarine residence periods, and potential densities of juvenile salmon in the estuary. Propose hatchery management alternatives for expanding the diversity of estuarine rearing behaviors and reducing the risks of hatchery programs on salmonid performance in the estuary
- Revise historical bathymetric data and acquire new data on present-day, shallow-water bathymetry and circulation processes to resolve the lack of confidence and robustness in model predictions of habitat opportunity, especially those based on the depth criterion
- Review the scientific basis for proposed habitat and bathymetric changes in the estuary relative to the restoration goals of the Columbia Basin Fish and Wildlife Program.

- Review the scientific assumptions of Columbia River dredging and disposal programs relative to the goals and conceptual framework of the Columbia Basin Fish and Wildlife Program
- Review the potential effects of historical changes in bathymetric profile on the distribution and availability of salmonid habitat and, in particular, the estuary's capacity to support a diversity of salmon life histories
- Review the significance of dredge disposal activities as a factor in estuarine habitat and ecosystem change that could affect the performance of juvenile salmon
- Review the scientific design and results of recent estuarine predation studies in the context of historical changes in salmon populations and estuarine habitat opportunity
- Review results of estuarine predation studies in the context of salmon population and habitat change
- Review the effects of bird predators on rates of adult salmon returning to the Columbia River Basin
- Evaluate historical and present-day relationships between flow variability, production of key salmonid prey species (e.g., Corophium spp.), and the timing of salmonid migrations to the estuary
- Assess long-term human and climatic effects on sediment budgets and inputs of organic matter

Experimental/observational studies

- Establish experimental restoration projects at a few representative wetland sites to evaluate the effectiveness of dike removal as a method of salmon recovery. Conduct a monitoring program at experimental and previously unaltered (undiked) reference sites to assess rates of habitat recovery, and identify conditions that affect salmonid use and performance
- Monitor variations in life-history diversity, habitat use, and performance of juvenile salmon in the estuary
- Monitor fish use of a variety of potential rearing habitats to assess variability and causal relationships affecting size characteristics, residence times, growth, and habitat use among hatchery-reared and wild salmonids
- Initiate intensive studies of the spatial and temporal distribution, abundance, and ecology of subyearling, ocean-type juvenile salmon in selected shallow-water habitats of the estuary. Document variability in life-history diversity in their use of emergent and forested wetlands
- Identify upstream sources and freshwater histories of fish captured in the estuary through mark and tag recovery and DNA, scale, and otolith analyses. Initiate in-depth life-history studies based on analyses of existing or new materials including scales or otoliths
- Investigate patterns of movement and migration through the estuarine gradient, from tidal freshwater through brackish and estuarine habitats in different regions of the estuary

- Compare patterns of estuarine wetland use by juvenile salmonids in the Columbia River with those in the Fraser River as a method for further evaluating flow regulation and hatchery influences, which are much greater in the Columbia system
- Examine the assumptions and results of ongoing predator studies in the context of historical and present-day estuarine habitat opportunity; salmon migration, rearing, and feeding behaviors; and fish densities in the estuary
- Assess the effects of altered habitats and food webs on the capacity of the estuary to support juvenile salmon
- Use natural stable isotope analyses or other methods to investigate potential food web disruptions due to habitat loss and degradation. These losses also should be evaluated in terms of changes to estuarine physical processes, through numerical model investigations and analyses of historical and contemporary data
- Evaluate through field studies and modeling the potential risk imposed on salmon recovery by non-indigenous species influencing estuarine habitats and food webs supporting juvenile salmon. This should include, but not necessarily be limited to American shad, Asian clam (*Pseudodiaptomus inopinus*), purple loosestrife (*Lythrum salicaria*), and other potential non-indigenous community dominants
- Evaluate the potential effect of sea-level rise on the feasibility of salmon recovery actions that involve estuarine habitat restoration and river-flow modifications

Computer modeling

- Use physical observations and hydrodynamic modeling to assess the effects of bathymetric change, flow regulation, and alternative restoration designs on habitat opportunity for juvenile salmon
- Conduct new simulations that include three-dimensional modeling of salinity intrusion and stratification as a third environmental variable (in addition to depth and velocity) that is an important determinant of juvenile salmon distribution and residence time. Use the model to evaluate sensitivity of the estuary to incremental physical changes associated with diking, dredging, and flow regulation and the implications of these results for future management of the estuary
- Re-examine the results of hydrodynamic modeling to evaluate landscape connectivity and other spatial indices affecting salmon habitat opportunity between historical conditions and the modern estuary configuration
- Conduct simulations to evaluate changes in salmon habitat opportunity for alternative restoration scenarios and a range of flow conditions

Management actions

- Adopt an explicit ecologically-based conceptual framework for estuary management and restoration that identifies and protects diverse salmon life histories, including variations in the estuarine rearing behaviors of subyearling migrants
- Establish performance criteria for evaluating whether management activities in the basin will impact salmon diversity and the productive capacity of the estuary
- Protect and restore opportunities for salmon to access emergent and forested wetlands in the estuary and riparian wetlands in the tidal floodplain
- Develop a comprehensive plan for wetland restoration throughout the tidal river and estuary, including habitat recovery objectives; criteria for site selection and

restoration priorities; an inventory of diked, filled, and excavated lands; and a list of high-priority sites most likely to benefit salmon recovery

- Expand phenotypic diversity of salmon, including a broader range of sizes, times of entry, and duration of residency in the estuary
- Improve accessibility of all hatchery data and accounting of all marked groups of salmon to allow future auditing of hatchery practices and their effects on the estuarine rearing patterns of juvenile salmon
- Expand marking programs or develop alternative techniques to improve discrimination of hatchery from wild fish in the estuary. These data are critical to discern differences between the estuarine rearing behaviors of hatchery and wild fish, and ultimately, to evaluate whether basin-wide salmon recovery programs are succeeding
- Recommend methods for testing alternative hypotheses to explain high predation rates, and identify what, if any, further recovery measures may be appropriate

Salmon and Steelhead Limiting Factors Water Resource Inventory Area 28, Washington State Conservation Commission, 2000

WRIA 28 is located in Southwest Washington, with boundaries that extend to the western margins of the Wind River to the east, the Columbia River to the south, and the East Fork Lewis River to the north (see Map A-1). The inventory area includes the southern and eastern portions of Clark County and southwestern Skamania County. For purposes of this report WRIA 28 was divided into three major subbasins: the Lake River Subbasin, the Washougal River Subbasin, and the Bonneville Tributaries Subbasin. These drainages cover approximately 316,365 acres or 494 square miles and enter the Columbia River between river mile (RM) 87.6, at Lake River, and RM 142.3 near Bonneville Dam.

There were a number of habitat limiting factors, and recommendations to address these factors, that apply across the entire WRIA including:

- Various land uses practices have negative impacts on habitat conditions for salmonids. If these impacts continue at the existing rate in many of the subbasins of WRIA 28, habitat degradation will outstrip any possible restoration strategy. The TAG suggests that critical area ordinances be developed and/or updated to ensure protection of critical habitat for threatened and endangered salmonids.
- Stormwater in urban areas contributes to increased peak flows, leading to bed and bank scour and channel shifting. These inputs also contribute fine sediments and reduce water quality. Where possible, alter stormwater facilities to reduce direct runoff to streams and increase infiltration. Protect and enhance wetlands and other water recharge areas.
- Almost every stream system within WRIA 28 has inadequate levels of large woody debris (LWD). Supplement LWD in appropriate stream channels, to provide short-term habitat benefits. Protect and enhance riparian habitat to increase LWD supplies over the long-term.
- Riparian restoration is needed almost throughout WRIA 28. Many commercial forestlands are in the process of recovering from disturbances early in the last century. Other areas have reduced riparian function due to urban and rural development. Protect existing functional riparian habitat and restore those areas

that have been degraded by past activities, starting with productive anadromous tributaries.

- The headwaters of most streams within WRIA contain the vast majority of functional habitat. These areas also provide cool, clean water, spawning sediments and woody debris that helps buffer downstream land use activities. Focus on protecting these more pristine habitat reaches from additional land-use impacts.
- Elevated water temperatures are a problem in many stream systems within WRIA 28. Poor riparian conditions, low-flow problems, high width-to-depth ratios, and impounded water all contribute to elevated water temperatures. A comprehensive approach to water quality improvements is needed that addresses all of these related problems across the watershed.
- Water withdrawals, for both industrial and domestic uses, reduce instream flows and the habitat available for salmonids. Explore opportunities to protect and augment stream flows in WRIA 28 during low-flow periods.

Subbasin Stock Summary and Habitat Priorities for the Elochoman/Skomakawa, Lake and Chinook Rivers are included in Appendices B, C and E respectively.

Mouth, Plume and Youngs Bay

Ecology Of Marine Predatory Fishes: Influence on Salmonid Ocean Survival

This study examined the temporal dynamics and abundance of marine fish predators and forage fishes in the nearshore ocean off the Columbia River during the juvenile salmon outmigration period, the food habits of predatory marine fishes, and measures of selected oceanographic conditions in the nearshore ocean off the Columbia River. It also identified the distribution and abundance of predator and forage fish to oceanographic conditions and ocean survival of juvenile salmonids historically and to the present to identify the impacts of predators on salmonids.

A comprehensive program to rebuild anadromous salmon runs must:

- Focus on all life history stages and all opportunities to increase salmonid survival. However, efforts to date have largely been limited to the freshwater life stages, with attempts to rehabilitate and mitigate for losses occurring primarily in the riverine environment
- Focus on the entire salmonid life cycle (NRC 1996). In particular, research into the transition period of juvenile salmonids from freshwater to seawater is clearly warranted
- Measure, predict and reduce salmonid losses in the marine environment if the marine environment affects recruitment success in a predictable manner (relative to specific measurable variables). This information would strongly complement freshwater-related salmonid restoration efforts by providing measures of project success using adult return data that would not be confounded by fluctuations in marine mortality
- Develop tools for forecasting salmonid survival by understanding interactions between physical and biological attributes in the marine environment and long-term trends in coastal salmon production. Such tools are essential for rational harvest

management. Many fisheries managers believe that salmon populations cannot be rebuilt by just improving freshwater habitats and/or improved hatchery practices.
- Conduct estuarine and nearshore ocean research. This research is critical to developing information to effectively manage Pacific salmon populations (Emmett and Schiewe 1997)
- Demonstrate the effect of ocean conditions on stock size if improvements to habitat do not result in immediate improvements in this area

Youngs Bay, Nicolai-Wickiup River and Skipanon River Watershed Assessments

The purpose of these watershed assessments, completed in 1999, is to inventory and characterize watershed conditions of the Youngs Bay, Nicolai-Wickiup and Skipanon River watersheds and to provide recommendations that address the issues of water quality, fisheries and fish habitat, and watershed hydrology. These assessments were conducted by reviewing and synthesizing existing data sets and some new data collected by the watershed council, following the guidelines outlined in the Oregon Watershed Enhancement Board (OWEB) watershed assessment manual (WPN 1999).

The following needs were commonly identified in the OWEB watershed assessment conducted by most watershed councils in the Columbia River Estuary subbasin:

- Prioritize restoration and watershed management activities in areas with known salmonid use for both spawning and rearing, following protocols established by state and federal government.
- Maintain data in an accessible location and format.
- Collect additional data in priority areas.
- Get expert advice on data collection and processing.
- Evaluate the GIS data layers.
- Verify all land use categories before restoration actions occur.
- Develop a study to verify the accuracy of the roads coverage.
- Verify the channel habitat type in the field before any restoration actions occur
- Perform a more rigorous analysis of the GIS data. (Field data have been provided to the watershed council.).
- Refine the land use layer. Continue to develop the land use layer to reflect changes in land use. Update the layer with digital NWI data, as they become available.
- Develop and update a fish limits coverage. This process has been started by ODFW.
- Work with ODFW to identify viable populations and distributions of sensitive species, particularly salmonids. These data are critical in developing watershed enhancement strategies.
- Identify and survey areas currently used by salmonids. Collect stream survey data according to ODFW protocols.
- Work with ODFW to establish a brood stock development program that will provide fish stocks capable of establishing self-sustaining populations of coho, chum, chinook, sea-run cutthroat, and steelhead.
- Field verify the channel habitat type GIS data layer. A statistical approach should be applied to these data.

- Field verify the riparian GIS data layers. A statistical approach should be applied to these data.
- Prioritize stream reaches for restoration of riparian vegetation. Start in areas currently used by salmonids and lacking in LWD recruitment potential, good shade conditions, or instream LWD.
- Plant riparian conifers and native species in areas lacking LWD recruitment potential. Start in areas of known salmonid use, and use the riparian vegetation map provided with the watershed assessments and ODFW stream surveys to identify candidate reaches. Before any reaches are targeted for planting, they should be field verified for suitability and actual conditions. Vegetation planting should use only native species and mimic comparable undisturbed sites.
- Develop a riparian fencing strategy to maintain riparian vegetation.
- Complete a culvert survey of all culverts that have not been evaluated for fish passage. Data should be maintained in a GIS. The road/stream crossing coverage is a good place to start. The culvert survey should begin in priority subwatersheds at the mouth of each of the streams. Establish priorities for culvert replacement.
- Replace priority culverts identified in the culvert survey.
- Install fish passages at known fish passage barriers that are caused by human influences.
- Prioritize estuarine wetlands for restoration options based on their value to salmonids for restoration, creation, or maintenance. Landowners with priority wetlands can then be contacted for possible wetland restoration.
- Prioritize for restoration, creation, or maintenance, palustrine wetlands that are connected to streams and provide back water rearing areas for salmonids. Start in areas with known salmonid rearing and spawning habitat.
- Create, restore, and maintain estuarine wetlands based on their prioritization.
- Create, restore, and maintain palustrine wetlands based on their prioritization.
- Develop a strategy to collect continuous discharge data in the primary rivers that flow into Youngs Bay. Work with OWRD or the USGS to get stream gages installed.
- Collect meteorologic data and rainfall data to improve modeling capabilities for water availability and flooding. This could be accomplished through local high schools or volunteers.
- Develop an outreach program to encourage water conservation. One of the primary water withdrawals is for municipal use. Educate the public about dewatering effects and how water conservation will help salmonids in the watersheds.
- Identify water rights that are not currently in use and that may be available for instream water rights through leasing or conversion.
- Update and refine the roads layer. Keep in contact with ODF as the roads layer is updated. Check with other groups (private land owners) to update the roads layer and evaluate its accuracy.
- Identify roads that have not been surveyed for current conditions and fill these data gaps. Work with ODF to develop road survey methodologies.

- Map road failures in areas where data are lacking. Coordinate with watershed stakeholders that are currently collecting road data such as ODF and private timber companies. Develop a strategy to fill in the data gaps.
- Map culvert locations and conditions in conjunction with the culvert survey conducted for fish passage barriers. Check with ODF, ODFW, and local foresters for the best methodologies and data to collect.
- Map all debris flows and landslides. Begin in the areas most susceptible to landslide activity as identified in the DOGAMI debris flow hazard map
- Where possible, conduct road restoration activities such as road reconstruction, decommissioning, and obliteration.
- Replace undersized culverts that are at risk of washing out. Prioritize these culverts from the culvert surveys.
- Develop a systematic water quality monitoring program for areas with high priority for restoration activity. Focus the water quality monitoring on constituents that are important for the specific area being restored. Use the water quality data to refine the restoration plans.
- Develop or expand the continuous temperature monitoring network with monitors at strategically located points such as the mouths of tributary streams, at locations of known spawning beds, at the interface between major land use types, or downstream of activities with the potential to influence water temperature.
- Include a plan for long-term monitoring in any restoration plan to measure the effects of the restoration activity. Begin to develop the capacity within the watershed council to conduct high quality, long-term water quality monitoring to document the success of restoration activities.
- Locate and map potential sources of nitrogen, phosphorus, and bacteria in the watershed.
- Conduct all water quality monitoring activities according to established guidelines such as those published by the Oregon Plan for Salmon and Watersheds (OPSW 1999), or EPA (1997, 1993). Cooperate with DEQ and other agencies to share data and expertise. Coordinate the council's monitoring activities with those of the agencies, including DEQ's efforts to develop Total Maximum Daily Loads for water quality limited stream segments.

WDFW Future Fish Management needs within the Lower Columbia/Estuary Provinces

1. Monitor and evaluate chum salmon in the Lower Columbia, including the Gray's River, I-205 seeps, mainstem Columbia, Hardy/Hamilton/Duncan Creeks, and Pierce/Ives Island populations.
2. Monitor non-index tributaries for the presence of chum salmon and/or suitable habitat. Implement appropriate recovery measures for chum salmon.
3. Assess the effect of Bonneville Dam operations on the fish and wildlife production capacity of tributaries and mainstem areas below the dam.

4. Evaluate and monitor fisheries for meeting performance indicators identified in the NMFS Fisheries Management and Evaluation Plan (FMEP) for the Lower Columbia River.
5. Expand monitoring and development of live capture gear and techniques (such as tangle nets) to allow selective harvest of salmonids by commercial fishers.
6. Continue assessment of habitat within the province to determine areas of critical importance and prioritize habitat restoration/preservation projects. Implement restoration actions identified in the watershed assessments that are consistent with recovery of fish and wildlife populations and their habitat. Determine the effectiveness of habitat restoration projects on achieving the desired physical change and measure the response of wild salmonid populations to these changes.
7. Continue watershed coordination and local stewardship programs.
8. Increase monitoring of naturally produced juvenile, smolt and adult salmonids within Lower Columbia River tributaries. Determine abundance, distribution, survival by life-stage, and status of fish and wildlife native to the watersheds within the province including steelhead, coastal cutthroat, fall chinook, bull trout, coho salmon, lamprey, crayfish and others.
9. Increase evaluation of hatchery and wild fish interactions within Lower Columbia River tributaries. Determine genetic and life history types of native fish and wildlife within the province and the strength of their current expression relative to historical and desired future conditions.
10. Implement an aquatic macro-invertebrate monitoring program within tributaries of the Lower Columbia.
11. Assess the effects of transporting white sturgeon from the unimpounded Lower Columbia River upstream to The Dalles and John Day reservoirs, including an accurate assessment of sub-legal, legal, over-legal, and broodstock populations.
12. Expand the mainstem Columbia River smelt egg and larvae sampling program to properly assess harvest impacts and insure proper resource management.

Cowlitz River Subbasin

Four new project proposals are recommended for funding in this subbasin (Table 4). Project Proposal 31017, *Monitor and Evaluate the Success of Hatchery Salmonid Reproduction for Reintroduction of Anadromous Salmonids to the Upper Cowlitz Basin*, will monitor the success of the reintroduction of anadromous salmonids to the upper Cowlitz Basin, including distribution, timing and success of reproduction of hatchery adults and success of upper basin seeding. Project Proposal 31005, *Incorporating PIT Tag Technology to Evaluate and Monitor the Reintroduction Effort for Anadromous Salmonids in the Upper Cowlitz Watershed*, will update the pit tag system to basin ISO standards at the Cowlitz Falls Dam and Fish Facility and use pit tags to monitor and measure collection, collection efficiency, smolt production, and a prototype surface collector entrance. Project Proposal 31020, *Monitor Coweeman River Salmoind Populations*, will determine freshwater productivity and marine survival of wild tule fall chinook and wild winter steelhead to develop risk assessments and recovery actions for these ESA listed populations. Project Proposal 31023, *Stream Gaging Installation and*

Operations in the Lewis, Salmon/Washougal, and Gray/Elochoman Subbasins, will allow for the purchase and installation of eight continuos, real-time, telemetered stream flow gages, and six staff gages, at critical reaches and tributaries in each of the three subbasins.

Table 4. Projects recommended for funding in the Cowlitz River Subbasin.

ProjectID	Title	Sponsor
31005	*Incorporating PIT Tag Technology to Evaluate and Monitor the Reintroduction Effort for Anadromous Salmonids in the Upper Cowlitz Watershed*	WDFW
31017	*Monitor and Evaluate the Success of Hatchery Salmonid Reproduction for Reintroduction of Anadromous Salmonids to the Upper Cowlitz Basin*	WDFW
31020	*Monitor Coweeman River Salmoind Populations*	WDFW
31023	*Stream Gaging Installation and Operations in the Lewis, Salmon/Washougal, and Gray/Elochoman Subbasins*	WDOE

This suite of recommended project proposals for the Cowlitz River Subbasin addresses key needs identified in the Cowlitz River Subbasin Summary including:

- Determine abundance, distribution, survival by life-stage, and status of fish and wildlife naturally produced populations native to the watershed including late winter steelhead, coastal cutthroat, spring and fall chinook, coho salmon, lamprey, smelt, sturgeon, and others.
- Monitor the success of the Anadromous Fish Reintroduction Program above Cowlitz Falls and improve collection efficiencies at the Cowlitz Falls Dam. A reintroduction effort initiated in the Tilton has similar needs.
- Assess effect of hatchery production upon natural escapement of salmonid stocks present in the lower Cowlitz River.
- Monitor escapement abundance and stock composition of natural spawning populations of fall chinook in the Lower Cowlitz, Toutle, Green and Coweeman Rivers.
- Preserve viable fish & wildlife populations through improved habitat protection, habitat enhancement and law enforcement.

Elochoman River Subbasin

Four new project proposals are recommended for funding in this subbasin (Table 5). Project Proposal 30003, *Evaluation of Two Captive Rearing Methods for Assisting with recovery of Naturally Spawning Populations of Steelhead and Coho Salmon*, will allow for the testing and evaluation of two hatchery reform methodologies; Assess natural reproductive success of returning hatchery-origin adults; Establish Abernathy, Germany, and Mill creeks as a Tier 3 "monitoring and evaluation" site for anadromous salmonids. Project Proposal 30008, *Instream Evaluation of Populations, Migration Timing, Individual Adult Return Rates, and Wild-Hatchery Interactions of Three Naturally Produced Salmonids*, will evaluate distribution and abundance of juvenile and adult coho salmon, steelhead trout, and cutthroat trout in Abernathy Creek using new PIT tag

techniques. Project Proposal 30012, *Compare bacterial Fish Pathogen Populations in Hatchery Water and in Adjacent Water Creek Water and Evaluate Possible Disease Transfer Between Them*, will determine the presence of bacterial fish pathogens within a hatchery water system and in the waters of an adjacent creek used as part of the hatchery water supply as well as the potential for pathogen transfer between the two water systems. Project Proposal 30013, *Role of Bacteria as Indicator Organisms for Watershed Assessment and Determining Fish Pathogen Relationships with Fauna of Abernathy Creek,* will allow for the development of techniques to assess watershed health and fish health using bacteria as system indicator organisms.

Table 5. Projects recommended for funding in the Elochoman River Subbasin.

ProjectID	Title	Sponsor
30003	*Instream Evaluation of Populations, Migration Timing, Individual Adult Return Rates, and Wild-Hatchery Interactions of Three Naturally Produced Salmonids*	USFWS
30008	*Instream Evaluation of Populations, Migration Timing, Individual Adult Return Rates, and Wild-Hatchery Interactions of Three Naturally Produced Salmonids*	USFWS
30012	*Compare bacterial Fish Pathogen Populations in Hatchery Water and in Adjacent Water Creek Water and Evaluate Possible Disease Transfer Between Them*	USFWS
30013	*Role of Bacteria as Indicator Organisms for Watershed Assessment and Determining Fish Pathogen Relationships with Fauna of Abernathy Creek*	USFWS

Grays River Subbasin

One new project proposal is recommended for funding in this subbasin (Table 6). Project Proposal 30005, *Grays River Watershed and Biological Assessment,* will conduct a watershed and biological assessment of the Grays River watershed to protect and restore chum spawning habitat.

Table 6. Project proposal recommended for funding in the Grays River Subbasin.

ProjectID	Title	Sponsor
30005	*Grays River Watershed and Biological Assessment*	LCRB, PSMFC, PNNL

Lewis River Subbasin

One existing project is recommended for continued funding in this subbasin (Table 7). Project 200001400, *Evaluate Habitat Use and Population Dynamics of Lamprey in Cedar Creek,* will continue to identify and quantitatively evaluate populations of lampreys and their habitats in a stream below Bonneville Dam.

Two new project proposals are recommended for funding in the Lewis River Subbasin (Table 7). Project Proposal 31027, *Movements and Survival of Juvenile and Adult Bull Trout,* will allow for the estimation of juvenile bull trout survival, migration timing and population numbers for in-basin modeling efforts. Project Proposal 31022, *Establish a Water Cleanup Plan (Temperature, TMDL) for the East Fork of the Lewis Subbasin,* will expedite development of a water cleanup plan-TMDL for the East Fork Lewis to identify sources of pollution related to temperature, DO and pH; allocate maximum allowable pollution from various sources; and develop strategies to improve salmonids habitat.

Table 7. Projects recommended for funding in the Lewis River Subbasin.

ProjectID	Title	Sponsor
200001400	*Evaluate Habitat Use and Population Dynamics of Lamprey in Cedar Creek*	USFWS
31022	*Establish a Water Cleanup Plan (Temperature, TMDL) for the East Fork of the Lewis Subbasin*	WDOE
31027	*Movements and Survival of Juvenile and Adult Bull Trout*	USFWS

Sandy River Subbasin

One existing project is recommended for continued funding in the Sandy River Subbasin (Table 8). Project 199902500, *Sandy River Delta Riparian Forest, Wetlands, and Anadromous Estuary Restoration*, will continue to restore a 600 acre island of rare Columbia River floodplain "gallery" riparian forest as well as 200 acres of wetland/associated upland habitat.

Table 8. Project recommended for funding in the Sandy River Subbasin.

ProjectID	Title	Sponsor
199902500	*Sandy River Delta Riparian Forest, Wetlands, and Anadromous Estuary Restoration*	USFS

This recommended project proposal for the Sandy River Subbasin addresses key needs identified in the Sandy River Subbasin Summary including:

- More and better-connected habitat, especially riparian habitat.
- Improved riparian structure and function.
- More natural streamflow regimes, especially in low flow months.
- Higher quality water with temperatures closer to natural historic patterns.
- Improved floodplain function and hydrologic integrity including reconnection of side channel areas and wetlands.
- Land use regulations and incentives should be used to increase protection of currently productive habitats and to encourage future restoration.

Willamette River Subbasin

Six existing projects are recommended for continued funding in this subbasin (Table 9). Project 199107800, *Burlington Bottoms Wildlife Mitigation Project,* will continue to protect, maintain, and enhance a diverse array of wetland habitats for many species of fish and wildlife including the state listed western painted and pond turtles and ESA species including bald eagles and salmon. Project 199205900, *Amazon Basin/Eugene Wetlands Phase Two*, will continue to restore and enhance existing mitigation lands. Habitats being protected or restored include riparian zones of seasonal streams, wet prairie, upland prairie, forested wetland, oak woodland, and dry coniferous forest. Project 199206800, *Implement Willamette Basin Mitigation Program*, will continue to mitigate for impacts caused by hydro-electric facilities through enhancements, easements, acquisitions, restoration, and management of wetlands and other NWPPC target habitat types and species in the Willamette Basin in Oregon. Project 199405300, *Middle fork Willamette River Bull Trout Reintroduction and Basinwide Monitoring*, will continue to evaluate protocols for the re-introduction of bull trout into historic habitats in the upper Willamette River subbasin, and employ methods to monitor and evaluate the status and trends of bull trout populations in the Lower Columbia Province. Project 199607000, *McKenzie River Focus Watershed Program Coordination and Habitat Restoration*, will continue to develop, coordinate, plan, design, implement, and monitor habitat protection, restoration and water quality projects; improve resource stewardship through public outreach and education. Project 200001600, *Protect and Enhance Tualatin River National Wildlife Refuge Additions*, will continue to provide riparian, forested wetland, and off-channel emergent wetland backwater habitats for salmonid rearing and predator avoidance areas adjacent to the main stem Tualatin River.

Eight new project proposals are recommended for funding in the Willamette River Subbasin (Table 9). Project Proposal 31007, *Distribution and Seasonal Habitat Use of ESA-Listed Salmonid Species in Portland Tributary Streams*, will allow for the determination of the distribution and seasonal habitat use of listed salmonids in City of Portland watersheds. Project Proposal 31016, *Calapooia River Flow Acquisition and Fish Passage Assessment*, will provide for improving upstream passage for ESA-listed fish on the Calapooia River by reimbursing the owner of Thompsons Mills to not divert flows for power generation. Project Proposal 31018*, Willamette Basin Riparian Project*, will allow for the implementation of a riparian buffering program using cost-share provided by USDA, state of Oregon and private landowners, including urban areas trials. Conduct restoration project planning and implementation with watershed councils, landowners and other interests. Project Proposal 31002, *Wildlife Habitat Protection, Lower McKenzie Watershed (Jaqua*), will allow for the acquisition of a wildlife habitat conservation easement of over 1240 acres of oak savanna and woodlands, Douglas fir forests, and grasslands to benefit listed and target species in the Lower McKenzie River Watershed. Project Proposal 31004, *Salmon Carcass Enrichment-Willamette (Clackamas) and Sandy Subbasins*, will allow the implementation of a multi-year salmon carcass enrichment project that will be applied over entire 5th field watersheds (with replicates and controls) aimed at restoring native runs of salmon and steelhead in the

Clackamas and Sandy rivers. Project Proposal 31012, *Leveraging Conservation Easements for Fish and Wildlife in the Willamette Basin*, will provide for leveraging conservation easements for fish and wildlife protection in the Willamette Basin. Project Proposal 31013*, Investigate Reestablishing Anadromous Fish Populations Above Man-made Barriers*, will investigate the possibilities of re-establishing spring chinook and winter steelhead populations into historic habitat above impassable man-made barriers in the Willamette basin to link them with existing populations below barriers. Project Proposal 31019, *Fish Passage Assessment and Prioritization Program*, will develop fish passage barrier assessment methodology for road / stream crossings, inventory and assess county owned facilities on a 5th field HUC basis, prioritize passage barriers to core habitat areas for threatened and endangered fish species.

Table 9. Projects recommended for funding in the Willamette River Subbasin.

ProjectID	Title	Sponsor
199107800	*Burlington Bottoms Wildlife Mitigation Project*	ODFW
199205900	*Amazon Basin/Eugene Wetlands Phase Two*	TNC
199206800	*Implement Willamette Basin Mitigation Program*	ODFW
199405300	*Middle fork Willamette River Bull Trout Reintroduction and Basinwide Monitoring*	ODFW
199607000	*McKenzie River Focus Watershed Program Coordination and Habitat Restoration*	MRFW
200001600	*Protect and Enhance Tualatin River National Wildlife Refuge Additions*	USFWS
31002	*Wildlife Habitat Protection, Lower McKenzie Watershed (Jaqua*)	TNC
31004	*Salmon Carcass Enrichment-Willamette (Clackamas) and Sandy Subbasins*	USFS
31007	*Distribution and Seasonal Habitat Use of ESA-Listed Salmonid Species in Portland Tributary Streams*	CP
31012	*Leveraging Conservation Easements for Fish and Wildlife in the Willamette Basin*	CRCD
31013	*Investigate Reestablishing Anadromous Fish Populations Above Man-made Barriers*	ODFW
31016	*Calapooia River Flow Acquisition and Fish Passage Assessment*	ODFW
31018	*Willamette Basin Riparian Project*	MSWCD
31019	*Fish Passage Assessment and Prioritization Program*	WCDLUT

This suite of recommended project proposals for the Willamette River addresses key needs identified in the Willamette River Subbasin Summary including:

- Substantially increased areas where improved floodplain function facilitates vital ecological processes;
- more and better-connected habitat--both upland and lowland--especially through riparian areas and wetlands which connect the two;
- more natural streamflow regimes, especially in low-flow months;
- higher quality water with temperatures closer to natural historic patterns;
- improved access to critical habitats through the Willamette system, especially for anadromous or locally-migratory fish populations.

Key salmon conservation measures identified in *Factors Influencing Production of Willamette River Salmonids & Recommendations For Conservation Actions*

1. Floodplain restoration (including active reconnection of off-channel sloughs and backwaters,

altering flow releases from reservoirs, more effective riparian protection, and more functioning wetlands).
2. Hydrologic management to begin to restore the natural flow and temperature patterns to the extent possible.
3. Predator control, particularly in the short term, when runs are so low and alternate prey seems scarce.
4. Substantially reduced harvest rates on chinook and juvenile steelhead (including through incidental trout fisheries)
5. Reduced hatchery impacts by limiting effects of strays, reducing competition/predation of wild juveniles by hatchery releases, and by reducing the predator aggregation from massive releases of hatchery juveniles.
6. Reduce impacts from exotic fish species.
7. Land use regulations and incentives should be used to increase protection of currently productive habitats and to encourage future restoration.
8. Improved urban stormwater management
9. Nutrient enrichment through increased escapement of adult salmon and the artificial placement of fish carcasses.
10. Providing passage at dams and diversions.
11. Identify and protect key watersheds with high current production as salmon refuges to ensure a base for recolonization (e.g., the McKenzie, Clackamas, Sandy and Little North Fork Santiam).
12. Education and monitoring to inform people about the causes of habitat degradation and involve them in monitoring results.

The Operational Plan describes the need to:

1. Protect, and where necessary recover, existing fish and wildlife populations and their habitats by:

- Implementing action plans for protection and recovery of self-sustaining populations of fish and wildlife.
- Helping ensure water intakes (turbine, irrigation, municipal and industrial water supply, etc.) are properly screened to minimize negative effects on fish and wildlife populations.
- Regulating recreational and commercial harvest consistent with healthy and sustainable fish and wildlife populations
- Helping ensure instream flows and water temperatures are adequate to meet needs of fish and wildlife populations.
- Helping protect existing high quality habitat that is critical to the survival and prosperity of fish and wildlife populations. (Strategy 3, Actions 3.1-3.6)

2. Restore populations of fish and wildlife in habitats from which they have been extirpated or greatly reduced by:

- Helping restore existing low quality habitat to conditions that would ensure the survival and prosperity of fish and wildlife populations by:
- Helping ensure fish and wildlife populations have access to habitats necessary for them to survive and prosper.

- Developing and refining programs to enhance fish and wildlife populations in habitats from which they have been extirpated or greatly reduced. (Strategy 4, Activities 4.1-4.3)

(ODFW Draft Willamette River Basin Operational Plan; action numbers in parentheses)

Screening:
Ensure water right holders properly screen their water intakes (3.2.6.)
Initiate a program to screen all diversions (3.2.4)
Install or improve fish protection screening on: • the Eugene Water and Electric Board Walterville diversion canal.(3.2.3) • Stayton Power Canal (if the former PP&L plant is licensed) (3.2.4) • the main irrigation canal at Stayton (3.2.4) • Sidney ditch (3.2.4) • the 19th Street diversion (3.2.4) • Penn Annex lateral. (3.2.4) • Lebanon-Albany power canal on South Santiam (3.2.5) • Lake Oswego diversion from the Tualatin River (3.2.7) • PGE's three-dam complex on the Clackamas River (3.2.8) • Portland General Electric Sullivan Plant at Willamette Falls (2.2.3)
Fish Passage
Design and complete feasibility studies for providing fish passage at all projects where such work is not ongoing or planned. (4.2.11)
Develop or improve fish passage at: • Cougar and Detroit Dams. (4.2.4) • Dexter, Lookout Point, and Hills Creek dams for downstream-migrating juveniles. (3.2.12) • PGE's three-dam complex on the Clackamas River. (4.2.6) • Geren Island on the North Santiam River (4.2.7) • Lebanon Dam on the South Santiam River (FERC) (4.2.8) • Green Peter Dam (USACE) (4.2.9) • Thompson's Mill Dam and on the Calapooia River (4.2.12) • Brownsville Dam bypass on the Calapooia River (4.2.13)
Streamflows
Work with the U.S. Army Corps of Engineers to provide adequate river flows for migrating salmonids. 3.4.4.
Increase in minimum flows from the canals at Leaburg and Walterville facilities to improve rearing-habitat for juvenile chinook in the McKenzie River (3.4.5).
Temperature
Work with the U.S. Army Corps of Engineers to ensure structures designed to regulate discharge temperature are installed at Cougar and Blue River dams. (3.5.3)
Correct water temperature problems associated with water released from reservoirs in the North and South Santiam Rivers. (3.5.4&5)
Evaluate effects of construction of temperature control structures in Cougar Reservoir on bull trout. (2.2.4)

Population Re-Establishment / Fish transport
Determine the spawning and rearing potential for spring chinook in all habitats from which they have been extirpated or greatly reduced, e.g. above all U.S. Army Corps of Engineers dams. Develop priorities and schedule for restoring and enhancing spring chinook in these habitats. (4.3.1)
Construct surface collection system at the head of Green Peter Reservoir for transport of steelhead and other salmonids around the reservoir and dam on the Middle Fork Santiam River. (3.2.11.)
Increase the number of chinook spawning in the Carmen-Smith spawning channel on the upper McKenzie River. (4.3.2.)
Transport adult spring chinook from the North Fork Ladder trap to underseeded habitat above North Fork Dam (e.g., Big Bottom). (4.3.3.)
Transport adult spring chinook above Fall Creek Dam to seed the spawning and rearing habitat. (4.3.7.)
Provide spring chinook access to production areas lost after the construction of Detroit Dam Work with the U.S. Army Corps of Engineers to. (4.3.8.)
Re-establish naturally produced spring chinook above Cougar Dam. (4.3.6.)
Evaluate effects of lack of spawning gravel below Cougar and Blue River dams on natural production of chinook in the McKenzie River. (2.2.5)
Continue habitat improvement and releases of hatchery chinook to reestablish naturally producing spring chinook in the Mohawk system. (4.3.10).
Release smolts in Abiqua Creek to provide a return of 100 adult spring chinook. (4.3.11.)
Release fingerling spring chinook, or excess hatchery-produced adult spring chinook into Little Fall Creek to increase natural production. (4.3.4.)
Continue to expand the distribution of Oregon chub by transferring individuals into new habitats as identified in the Oregon Chub Recovery Plan. (4.3.5)
Place surplus spring chinook adults, from South Santiam Hatchery, into the South Santiam River above Foster Reservoir to spawn naturally. (4.3.12)
Reintroduce bull trout into the Middle Fork Willamette Basin, Santiam Basin, and Clackamas Basin. (4.3.13.)

Selected fish and wildlife needs in the Willamette Valley (ODFW Wildlife Diversity Program, 1994-1998 Actions)

Initiate and conduct Willamette Valley habitat inventory and complete GIS system.
Map and digitize acorn woodpecker localities and habitat in Willamette Valley for GIS tracking.
Develop incentives for managing/protecting acorn woodpecker habitat on private lands in Willamette Valley
Develop incentives for managing/protecting wetlands, oak woodlands, ash swales, grasslands and brushfields on private lands in Willamette Valley
Develop educational brochures for managing and protecting wetlands, oak woodlands, ash swales, grasslands and brushfields on private lands in Willamette Valley.
Develop incentives for managing/protecting sensitive grassland birds on private lands in Willamette Valley
Revisit a sample of red-legged frog historic localities in Willamette Valley and elsewhere in its range to describe current distribution, general abundance and general patterns of habitat use.
Determine distribution, abundance and population structure of painted turtle in Willamette Valley.
Develop management plan for painted turtle in the Willamette Basin.
Determine distribution, abundance and population structure of sharptail snake in Willamette Valley.
Develop protocol and conduct surveys for Willamette Valley grassland birds to locate nesting areas (horned lark, vesper sparrow, grasshopper sparrow, and western meadowlark).
Develop list of known localities for 13 sensitive birds in Willamette Valley.
Measure and describe habitat at Camas pocket gopher sites in Willamette Valley.
Monitor marked western pond turtles at E.E. Wilson, Staley Creek, Coast Fork Willamette R., and Fern Ridge Reservoir.
Implement management plan for western pond turtle in the Willamette Basin.
Monitor population of black swift on Willamette National Forest.
Monitor number of purple martins colony sites and number of martins per colony in Willamette Valley and central coast estuaries.
Establish breeding populations of purple martin at Dorena, Cottage Grove, Lookout Point., Fall Creek, Rowena, and Fern Ridge Reservoirs.
Conduct coordinated shorebird counts in Willamette Valley 4 times per year as part of coordinated Pacific Flyway monitoring.
Monitor populations of western gray squirrel in Willamette Valley.
Develop and implement long-term monitoring strategy for black-tailed jackrabbit in Willamette Valley and training packet for volunteers.
Evaluate potential sites and establish additional populations of Oregon chub in native range of the Willamette River valley.
Develop volunteer monitoring programs for Willamette Valley Sensitive Species.
Work with state agencies and counties to synchronize Periodic Reviews within a Province or area beginning with Willamette Valley so habitat conservation is applied consistently.
Work with 1000 Friends of Oregon to promote wildlife habitat in Willamette Valley open-space areas.

ODFW critical research, monitoring, and evaluation needs (ODFW 2001, draft Willamette River Basin Operational Plan)

STRATEGY: Collect and analyze scientific information for use in decision-making.
ACTIVITY 1. Assess the status of freshwater and marine fish and wildlife populations and their habitats to assist in establishing Department priorities and programs and to improve our understanding of how populations are performing under the status quo. • Develop and implement protocols to measure and describe population traits of key indicator species…[incorporating] aerial photography, Geographic Information System data, limited ground surveys, habitat quality measurements, etc. ... • Describe species composition and relative abundance in key habitats. • Determine abundance, age-structure, population demographics, and taxonomy of key indicator species at the basin and subbasin scales • Describe distribution and relative abundance of juvenile life stages of key indicator species. • Describe current inventory and distribution of key fish and wildlife habitats using maps, field investigations, Geographic Information System data, aerial photography and "Landsat" satellite imagery. • Develop condition class rating system and describe the present condition class of key habitat types based on census routes within selected sub-samples of each habitat type and condition class.
ACTIVITY 2: Define and characterize limiting factors and factors for decline, including stresses that potentially influence fish and wildlife populations and their habitats, and interpret how the factors influence observed trends to improve our understanding of the relationships between fish and wildlife populations and landscape conditions. • Identify and describe factors, including environmental and human stresses, limiting survival and natural production of key indicator species (e.g. spring chinook in the Molalla River Basin) • Analyze relationships between factors and changes in abundance and other traits of key indicator individual species or species assemblages through time. • Evaluate losses (injuries and deaths) of juvenile fish resulting from operation of the Sullivan Plant (Portland General Electric). Refine operating criteria for the Sullivan Plant to reduce losses. • Evaluate effects of construction of temperature control structures in Cougar Reservoir on bull trout. • Evaluate effects of lack of spawning gravel below Cougar and Blue River dams on natural production of chinook in the McKenzie River. • Identify and determine the status of major prey species of key indicator species.

ODFW critical research, monitoring, and evaluation needs (ODFW 2001, draft Willamette River Basin Operational Plan) continued.

ACTIVITY 3. Assess likelihood of meeting goals and objectives for fish and wildlife populations under current management actions based on our best understanding of limiting factors and factors for decline.

- Develop parent-progeny estimates for key indicator species for as long a time series as possible. Analyze these estimates with regard full seeding of critical habitats.
- Describe population dynamics and life history of key indicator species, including interactions with environmental factors.
- Evaluate change in habitat quantity from present conditions into the future by establishing a network for information gathering that can be used to detect changes in wildlife habitat quantity.

ACTIVITY .4. Evaluate if and how current management programs can be improved to protect, mitigate and enhance fish and wildlife and their habitat.

- Characterize trends in abundance, age-structure, population demographics, etc of key indicator species at the basin scale, e.g. sampling at Willamette Falls.
- Characterize trends in abundance, age-structure, population demographics, etc. of key indicator species at the sub-basin scale, e.g. sampling at dams, spawning surveys, resting hole counts, etc.
- Characterize trends in habitat quality based on changes in condition class of key habitat types.
- Describe the relationships between trends in abundance, age-structure, population demographics, etc. of key indicator species, trends in quality of key habitats, and landscape conditions.
- Set priorities for protection, enhancement, mitigation, and restoration based on information such as the relationships between trends in abundance, age-structure, population demographics, etc. of key indicator species, trends in quality of key habitats, and landscape conditions.
- Design and implement monitoring and evaluation for specific management programs. Monitoring and evaluation will
  - Link information gathered with the program actions that affect change.
  - Identify key decision points or thresholds for defining changes in management programs (i.e., compliance monitoring: Were program actions implemented as intended?)
  - Define mechanisms for identifying new priorities and components for monitoring and evaluation (Identification of important stressors).
  - Enable public involvement, and be transparent and accountable.
  - Identify opportunities for cooperative monitoring programs and/or program development by other groups.
  - Identify roles and responsibilities for those involved in monitoring and evaluation.
- Use available information and analyses to evaluate the effectiveness of and, if appropriate, identify changes to current management programs to protect, mitigate and enhance fish and wildlife and their habitat (adaptive or experimental management).
- Help state and federal land management agencies design programs to monitor the success and effectiveness of stream riparian and water quality protection measures.

ACTIVITY 5. Develop or refine coordinated information system to store and access information for use in research, monitoring and evaluation.

Develop standard protocols for collecting and reporting data.

Willamette Subbasin priorities of the Draft Endangered Species Act Implementation Plan of the Federal Columbia River Power System

Priority Subbasin Enhancement Projects for 4 Priority Subbasins	
Project Area and ID #	**FCRPS Project Description**
Lower-Willamette-Clackamas (#328-330)	Preliminary needs assessment of fish screen, barrier modification, and streamflow opportunities. Initiate NEPA and Consultation. (Habitat - Lower Columbia WILLAMETTE)
Clackamas (#313-315)	Organization and program initiation. Coordinate with NPPC rolling provincial review; evaluate potential actions; coordinate among local, State, and Federal agencies. Implement actions related to fish screens, barrier modifications, and streamflow. (Habitat - Lower Columbia WILLAMETTE)
McKenzie (#298-300) N. Fork Santiam (#316-318)	Continue implementation of multi- year improvements: physically modify instream barriers to permit passage; screen diversions to meet current criteria; purchase available water up to 100% of recommended flow targets. (Habitat - Lower Columbia WILLAMETTE)

Other Priorities	
Project ID #	**FCRPS Project Title/Description/Biological Rationale** (H Sector – Province SUBBASIN)
346	*Enhance flows in the Willamette River and below Bonneville Dam during critical periods:* Enhance flows below Bonneville Dam during critical periods. Provides more consistent water levels required for spawning, rearing, passage, etc. (Habitat - Lower Columbia WILLAMETTE)
348	*Establish a set of sampling reaches that characterize the Columbia, Snake, and Willamette rivers*: Establish a comprehensive set of sampling reaches that characterize the Columbia and Snake rivers. It is essential to establish baseline data, monitor progress, and maintain improvements if salmon recovery goals are to be met. (Habitat - Lower Columbia WILLAMETTE)
270	*Address Passage, Screening and Flow Problems in NMFS identified high priority subbasins*: Fund and manage projects to address passage problems. Improves passage for adults and juveniles. Restores access to blocked habitats. Enhances survival by blocking juveniles from entering irrigation systems. (Habitat - Systemwide COLUMBIA BASIN SYSTEMWIDE)

NMFS Guidance to the Northwest Power Planning Council in selecting projects solicited through the provincial review process in relation to Willamette Subbasin (actions are those specified in the Biological Opinion on the Federal Columbia River Power System)

Action 149: Identify actions that would lead to a three-year plan for funding projects that complement the evolving BOR program to improve stream flows and address passage and screening problems.
Action 150: Identify opportunities to protect currently productive non-federal habitat at risk of degradation according to the criteria contained in the NMFS crediting paper (or joint NMFS/BPA criteria) as appropriate.
Action 151: Encourage projects that could use transactional approaches to increase stream flows.
Action 152: Prioritize projects ready for implementation based on local agreements that can jointly satisfy CWA and ESA requirements as defined under this RPA item.
Action 153: Encourage opportunities to leverage agricultural incentive programs to protect streamside habitat.

Appendix A. Results from the CBFWA Project Proposal Review for Lower Columbia & Columbia Estuary Provinces*

*Due to space constraints, text in the criteria fields shown as "n" over "a" should be interpreted as "n/a"

Lower Columbia

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
Columbia Lower																				
31001	Artificial production facilities improvements to support Lower Columbia chum salmon reintroduction into the Chinook River	Sea Resources	Lower Columbia	y	y	y	n	y	y	y	n	y	y	n	n	y	na	na	Funding this project should be based on the results of Project 30005. NMFS has identified that this project is a BiOp project.* *This project should be located in Columbia Estuary Subbasin	Recommended Action
31003	Distribution and life history characteristics of lampreys in tributaries of the lower Columbia River Basin	United States Fish and Wildlife Service	Columbia Lower	y	y	y	y	y	na	y	y	y	y	na	y	y	y	na		Recommended Action
31006	Protect Wood's Landing Chum Spawning Site	City of Vancouver	Columbia Lower	y	y	y	n	y	y	y	n	y	y	y	y	y	y	y	M&E would be performed through other BPA funded chum projects. NMFS has identified that this project is a BiOp project.	High Priority
31014	Evaluate juvenile salmonid use of restored floodplain wetlands in the Lower Columbia River Estuary	Ducks Unlimited, Inc.	Lower Columbia	y	n	y	na	na	na	y	n	y	y	y	y	y	na	y	It is not clear that this project is well coordinated with other assessment projects in the Lower Columbia/Estuary. The scope and budget should be reviewed in line with other assessments funded in the estuary. NMFS has identified that this project is a BiOp project.* *This project should be located in Columbia Estuary Subbasin	Recommended Action

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
31015	Sturgeon Lake/Dairy Creek Restoration	West Multnomah Soil & Water Conservation District	Columbia Lower	y	n	n	n	y	y	y	na	y	y	y	y	y	na	y	NMFS has identified that this project is a BiOp project.	Recommended Action
31024	Protect, Enhance and Maintain Wetland, Riparian and Upland Habitat on the Shillapoo Wildlife Area	Washington Department of Fish and Wildlife	Columbia Lower	y	y	y	y	y	y	y	y	y	y	y	y	y	na	y	This is an ongoing project (BPA contract number is 96BI97789). This project has been funded through the Washington Wildlife Agreement. NMFS has identified that this project is a BiOp project.	High Priority
31029	Clark County ESA Outreach Program	Clark County, Washington	Columbia Lower	n	y	y	n	y	y	y	y	y	y	y	y	y	y	y	Reviewers question the timing of the proposed work relative to subbasin planning and TRT work.	Do Not Fund
31031	Clatsop County Fisheries Restoration Project	Clatsop County's Clatsop Economic Development Council Fisheries Project (CEDC)	Columbia Lower	n	y	n	n	na	n	n	n	y	y	n	y	n	n	n	This project aggressively relies on unproven technologies.	Do Not Fund
31032	Develop a Well Water Supply System for the Hardy Creek Chum Salmon Spawning Channel	U.S. Fish and Wildlife Service (Columbia River Fisheries Program Office and Pierce National Wildlife Refuge	Columbia Lower	y	y	y	y	y	n	y	y	y	y	y	y	y	y	y	Budget has been reduced to $69,800 -- see response to the ISRP for an explanation. NMFS has identified that this project is a BiOp project.	High Priority
31033	Restoration of Columbia River Floodplain Functions to Steigerwald Lake	U.S. Fish and Wildlife Service/Ridgefield Refuge Complex	Columbia Lower	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	Portions of this project were originally funded through the Washington Wildlife Agreement. NMFS has identified that this project is a BiOp project.	High Priority
31034	Salmonid Population and Habitat Monitoring in the Oregon Portion of the Lower Columbia Province	Oregon Department of Fish and Wildlife	Columbia Lower	y	y	y	na	y	na	y	y	y	y	na	y	y	y	na	The cost appears excessive. Could the budget be reduced? This level of effort should be well coordinated with other monitoring efforts throughout the Basin. NMFS has identified that this project is a BiOp project.	High Priority

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
199306000	Select Area Fishery Evaluation Project	Wash. Dept. of Fish & Wildlife, Oregon Dept. of Fish & Wildlife, and Clatsop County Economic Development Council	Columbia Lower	y	y	y	y	y	na	y	y	y	y	na	y	y	y	na	This project represents a majority of the funding for the Lower Columbia and Estuary Province budget. This project's budget should be reviewed in line with other opportunities in this province.	High Priority
200001200	Evaluate factors limiting Columbia River gorge chum salmon populations.	United States Fish and Wildlife Service	Columbia Lower	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	NMFS has identified that this project is a BiOp project.	High Priority
200105300	Re-introduction of Lower Columbia River Chum Salmon into Duncan Creek	Pacific States Marine Fisheries Commission, Washington Department of Fish and Wildlife	Columbia Lower	y	y	y	y	y	y	y	y	y	y	y	n	y	y	y	NMFS has identified that this project is a BiOp project.	High Priority
Cowlitz																				
31005	Incorporating Pit Tag Technology to Evaluate and Monitor the Reintroduction Effort for Anadromous Salmonids in the Upper Cowlitz Watershed	Washington State Department of Fish and Wildlife	Cowlitz	y	y	y	na	na	na	y	y	y	y	na	y	y	y	na	This project should be considered under the Mainstem and Systemwide Province. The data collected would contribute to a larger database for evaluating populations. NMFS has identified that this project is a BiOp project.	Recommended Action

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
31017	Monitor and evaluate the success of hatchery salmonid reproduction for reintroduction of anadromous salmonids to the upper Cowlitz Basin	Washington Department of Fish and Wildlife	Cowlitz	y	y	y	y	y	na	y	y	y	y	y	y	y	y	na	This project is considered part of the base for the Biological Opinion by NMFS.	High Priority
31020	Monitor Coweeman River Salmonid Populations	Washington Department of Fish and Wildlife	Cowlitz	y	y	y	na	y	na	y	y	y	y	na	y	y	y	na	The reviewers are unclear whether BPA should be responsible for funding this activity. NMFS has identified that this project is a BiOp project.	Recommended Action
31023	Stream Gaging Installation and Operations in the Lewis, Salmon/Washougal, and Gray/Elochoman Subbasins	Department of Ecology	Cowlitz	y	y	y	na	na	na	y	y	y	y	na	n	y	y	na	NMFS has identified that this project is a BiOp project.	Recommended Action
Lewis																				
31022	Establish a Water Cleanup Plan (temperature TMDL) for the East Fork of the Lewis subbasin	Department of Ecology	Lewis	y	y	y	na	na	na	y	y	y	y	na	y	y	y	na		Recommended Action
31027	Movements and Survival of Juvenile and Adult Bull Trout	United States Fish and Wildlife Service	Lewis	y	y	y	na	y	na	y	y	y	y	na	y	y	y	na	USFWS has identified that this project is a BiOp project. CBFWA believes this is a potentially useful and interesting research project; however, it is unclear how results will be used in the management of bull trout. It is also unclear why this work should be funded by BPA. Reviewers question the size of PIT tags relative to fish size.	High Priority

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
200001400	Evaluate habitat use and population dynamics of lampreys in Cedar Creek	U. S. Fish and Wildlife Service	Lewis	y	y	y	na	y	na	y	y	y	y	na	y	y	y	na		High Priority
Sandy																				
199902500	Sandy River Delta Riparian Forest, Wetlands, and Anadromous Estuary Restoration	US Forest Service, Columbia River Gorge National Scenic Area	Sandy	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	NMFS has identified that this project is a BiOp project.	High Priority
Willamette																				
31002	Wildlife Habitat Protection, Lower McKenzie Watershed (Jaqua)	The Nature Conservancy	Willamette	y	y	y	n	?	y	y	y	y	y	y	y	y	y	y	This is a good property acquisition that may be focusing on a lower priority habitat type relative to the mitigation responsibilities of BPA.	Recommended Action
31004	Salmon Carcass Enrichment -- Willamette (Clackamas) & Sandy Subbasins	U.S. Forest Service, Mt. Hood National Forest	Willamette	y	y	y	y	y	n	y	y	y	y	y	y	y	y	na	NMFS has identified that this project is a BiOp project.	Recommended Action
31007	Distribution and seasonal habitat use of ESA-listed salmonid species in City of Portland tributary streams	City of Portland, Endangered Species Act Program	Willamette	y	y	y	na	na	na	y	y	y	y	na	y	y	y	na	There is an outstanding question of whether or not this project is a BPA mitigation responsibility relative to impacts of the hydrosystem.	High Priority
31010	Re-open Off-channel Habitat for Lower Columbia ESU	City of Portland, Endangered Species Act Program	Willamette	y	y	y	n	n	y	y	y	y	y	y	y	y	n	n	CBFWA supports this project for it's benefits to fish; however, CBFWA does not support Bonneville funding for this action. Although Bonneville has funded culvert replacement within the basin, this project is completely within the management jurisdiction of the City of Portland.	Do Not Fund

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
31011	Renaturalize Functional Floodplain Habitat within the Portland Reach of the Lower Willamette River	ZRZ Realty Company (a Zidell Company); City of Portland, Endangered Species Act Program	Willamette	n	y	y	y	?	n	n	y	y	n	?	y	y	n	y	This is an innovative and untested approach towards maximizing urban growth while protecting riparian habitats. There is a lack of discussion regarding the risks of attempting this type of action (erosion, increased predation, etc.) and how those risks would managed.	Do Not Fund
31012	Leveraging Conservation Easements for Fish and Wildlife in the Willamette Basin	Cascade Pacific Resource Conservation and Development, Inc.	Willamette	n	y	n	y	y	n	y	y	y	y	y	y	y	y	y		Recommended Action
31013	Investigate Re-establishing Anadromous Fish Populations Above man-made Barriers	Oregon Department of Fish and Wildlife	Willamette	y	y	y	y	y	n	y	y	y	y	y	y	y	y	na	This project has a very broad scope without clearly defined decision points relative to success or failure of establishing sustainable populations.	Recommended Action
31016	Calapooia River Flow Acquisition and Fish Passage Assessment	Oregon Department of Fish and Wildlife	Willamette	y	y	y	y	y	n	y	y	y	y	y	y	y	y	y	This proposal is an interim fix to provide flow to listed fish while discussion continues with the landowner to pursue a long term solution. It is anticipated that this temporary action will only be necessary for the next two years.	High Priority
31018	Willamette Basin Riparian Project	Marion Soil and Water Conservation District	Willamette	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	This project should be considered High Priority; however, the budget appears high relative to available funds in this province. Scope and budget should be reduced.	High Priority
31019	Fish Passage Assessment and Prioritization Program	Washington County Department of Land Use and Transportation, Operations Division	Willamette	y	y	y	na	na	na	y	y	y	y	y	y	y	y	na		Recommended Action

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
31021	Reduction of gravel road sediment production & interruption of sediment delivery to streams	Washington County Department of Land Use and Transportation, Operations Division	Willamette	y	y	y	y	y	y	y	y	n	n	y	y	y	y	y	Reviewers question whether fixing gravel roads is a BPA responsibility.	Do Not Fund
31025	Construct Fish Screen and Fish Passage Improvements at Lebanon Diversion Dam on South Santiam River	City of Albany, Oregon	Willamette	y	y	y	n	y	y	y	y	y	y	y	y	y	n	n	CBFWA supports this project for it's benefits to fish; however, CBFWA does not support Bonneville funding for this action. Although Bonneville has funded passage and screens throughout the basin, this project directly generates income for the municipality and funding should be the responsibility of the operator.	Do Not Fund
31028	Replace Upper and Lower Bennett Dam Fish Ladders in the North Santiam River at Geren Island (Stayton Island)	City of Salem, Oregon, a municipal corporation	Willamette	y	y	y	n	y	y	y	n	y	y	y	y	y	n	n	CBFWA supports this project for it's benefits to fish; however, CBFWA does not support Bonneville funding for this action. Although Bonneville has funded passage and screens throughout the basin, this project directly generates income for the municipality and funding should be the responsibility of the operator.	Do Not Fund
31030	Santiam Water Control District Fish Screen and Passage Project	Santiam Water Control District	Willamette	y	y	y	y	y	y	y	y	y	y	y	y	y	n	n	CBFWA supports this project for it's benefits to fish; however, CBFWA does not support Bonneville funding for this action. Although Bonneville has funded passage and screens throughout the basin, this project directly generates income for the district and funding should be the responsibility of the operator.	Do Not Fund
199107800	Burlington Bottoms Wildlife Mitigation Project	Oregon Department of Fish and Wildlife	Willamette	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y		High Priority
199205900	Amazon Basin/Eugene Wetlands Phase Two	The Nature Conservancy	Willamette	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y		High Priority

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
199206800	Implement Willamette Basin Mitigation Program	Oregon Department of Fish and Wildlife	Willamette	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	A new objective has been included in this proposal.	High Priority
199405300	Middle Fork Willamette River Bull Trout Re-introduction and Basinwide Monitoring	Oregon Department of Fish and Wildlife	Willamette	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	USFWS has identified that this project is a BiOp project. The proposed project will investigate strategies for reintroduction of bull trout and status and trends of bull trout in the Upper Willamette basin; however, CBFWA believes that the proposed experimental design and data analysis need to be explained in greater detail. Specifically, project sponsors should provide justification for number of release sites chosen and numbers and timing of fish transferred and released. In addition, CBFWA recommends that details of the methods and statistical analyses for Objective 3 need to be defined in greater detail.	High Priority
199607000	McKenzie River Focus Watershed Program Coordination and Habitat Restoration	McKenzie River Focus Watershed	Willamette	y	y	y	y	y	n	y	y	y	y	y	y	y	y	?	The reviewers are concerned about the longevity and certainty of the landowner agreements for habitat protection. New tasks have been added to this ongoing project that modifies its original scope.	High Priority
200001600	Protect and Enhance Tualatin River National Wildlife Refuge Additions	US Fish and Wildlife Service (Tualatin River National Wildlife Refuge), US Geological Survey	Willamette	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y		High Priority

Columbia Estuary

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
Columbia Estuary																				
30001	Historic habitat opportunities and food-web linkages of juvenile salmon in the Columbia River estuary: Implications for managing flows and restoration	Northwest Fisheries Science Center, National Marine Fisheries Service	Columbia Estuary	y	y	y	y	na	na	y	y	y	y	y	y	y	y	y	NMFS has identified this project as a BiOp project.	High Priority
30002	Optimization of FCRPS Impacts on Juvenile Salmonids: Restoration of Lower-Estuary and Plume Habitats	Oregon Health & Science University, OGI School of Science & Engineering	Columbia Estuary	y	y	y	y	na	na	y	y	y	n	y	y	y	y	y	Project would provide information to managers regarding the effects of flow on % habitat available (I.e., what % of habitat would be lost/gained during different flows below Bonneville Dam). Project could lead to the development of management schemes. NMFS has identified this project as a BiOp project.	High Priority
30004	Blind Slough Restoration Project - Brownsmead, Oregon	Columbia River Estuary Study Taskforce	Columbia Estuary	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	NMFS has identified this project as a BiOp project.	Recommended Action
30006	Effectiveness monitoring of the Chinook River estuary restoration project.	Sea Resources	Columbia Estuary	y	y	y	na	na	na	y	y	y	y	na	y	y	y	na	This project should be coordinated with other estuary assessment projects. Budget should be reviewed in line with other assessments funded in the estuary. NMFS has identified this project as a BiOp project.	High Priority

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
30007	An Acoustic Tracking Array for Studying Ocean Survival and Movements of Columbia River Salmon	Kintama Research Corporation	Columbia Estuary	y	y	y	na	na	na	y	y	y	y	na	n	y	n	na	Reviewers believe this proposal may be better suited for the Systemwide Province since this issue is not exclusive to the estuary. If the tracking could be scaled down to include the only the plume, then the project could be considered for review in the Estuary. The project sponsor should resubmit this project in the Mainstem and Systemwide Province.	Do Not Fund
30009	Coastal Cutthroat Movements in the Columbia River Estuary	United States Fish and Wildlife Service	Columbia Estuary																This project was funded by the USCOE and has therefore been withdrawn from this process.	withdrawn
30010	Canada-USA Shelf Salmon Survival Study	Fisheries & Oceans Canada Pacific Biological Station Nanaimo, B.C. CANADA V9R 5K6	Columbia Estuary	y	y	y	na	na	na	y	n	n	n	na	y	n	y	na	Reviewers suggest that it may be more appropriate to review this proposal through the Systemwide Province review since it has systemwide implications (i.e., looking at fish from throughout the system). The issues to be reviewed are not necessarily affected by the plume/estuary. The project sponsor should resubmit this proposal through the Mainstem and Systemwide Province. NMFS has identified this project as a BiOp project.	Do Not Fund

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
30011	Preserve and Restore Columbia River Estuary Islands to Enhance Juvenile Salmonid and Columbian White-tailed Deer Habitat.	U.S. Fish and Wildlife Service - Willapa National Wildlife Refuge and Satellites	Columbia Estuary	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	Crediting will be applied to Oregon since there are remaining credits in Oregon and not Washington. Information will be provided to CBFWA regarding what facility the credits will be applied to. NMFS has identified this project as a BiOp project. The project sponsor has offered several cost savings suggestions for this budget. In the budget, Section 5, Objective 3, task C could be removed for a savings of $15,000. Under Section 7, Objective 2, tasks A and B could be removed for an additional savings of $117,000. Finally, in the outyear based budget for Section 7, Objective 3 could be removed for an annual savings of $196,000. The budget has been modified to reflect these changes.	High Priority
30014	Map Subtidal Large Woody Debris and Other Habitat Features in Relation to Fish Distribution in the Lower Columbia River Estuary	Battelle Marine Sciences Laboratory	Columbia Estuary	y	y	y	na	na	na	y	n	y	y	y	n	y	y	na	withdrawn	withdrawn
30015	Lower Columbia River and Columbia River Estuary Ecosystem Monitoring and Data Management	Lower Columbia River Estuary Partnership	Columbia Estuary	y	y	y	y	na	na	na	y	y	na	na	y	y	y	na	Proposed work will focus on the mainstem, an area where management activities are absent. Efforts under this project should be well coordinated with other Basinwide data management efforts. NMFS has identified this project as a BiOp project.	High Priority

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
30016	Implement the Habitat Restoration Program for the Columbia Estuary and Lower Columbia River	Lower Columbia River Estuary Partnership and Columbia River Estuary Study Taskforce	Columbia Estuary	y	y	y	n	y	y	y	y	y	y	y	n	y	n	y	Proposal represents two projects under one project number. NMFS has identified this project as a BiOp project.	Recommended Action
30017	Columbia River Tidewater assessment for Recovery Planning	University of Portland	Columbia Estuary	y	n	y	na	na	na	y	y	y	y	na	n	y	y	na	NMFS has identified this project as a BiOp project.	Recommended Action
30018	Salmonid Population and Habitat Monitoring in the Oregon Portion of the Columbia Estuary	Oregon Department of Fish and Wildlife	Columbia Estuary	y	y	y	na	y	na	y	y	y	y	na	y	y	y	na	The cost appears excessive. Could the budget be reduced? This level of effort should be well coordinated with other monitoring efforts throughout the Basin.	High Priority
199801400	Survival and Growth of Juvenile Salmonids in the Columbia River Plume	National Marine Fisheries Service	Columbia Estuary	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	NMFS has identified this project as a BiOp project.	High Priority
Elochoman																				
30003	Evaluation of Two Captive Rearing Methods for Assisting with Recovery of Naturally Spawning Populations of Steelhead and Coho Salmon	U.S. Fish & Wildlife Service, U.S. Department of the Interior	Elochoman	y	y	y	y	na	na	y	y	y	na	na	y	y	y	na	This project also has applications upstream of Bonneville and could be considered in the Mainstem and Systemwide Province if not funded here. NMFS has identified this project as a BiOp project.	High Priority

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T1	T2	T3	T4	T5	T6	T7	T8	M1	M2	M3	M4	M5	M6	M7		
30008	Instream evaluation of populations, migration timing, individual adult return rates, and wild-hatchery interactions of 3 naturally produced salmonids	United States Fish and Wildlife Service	Elochoman	y	y	y	y	na	na	y	y	y	na	na	y	y	y	na	This project may also be considered in the Mainstem and Systemwide Province. Some portions may be funded under that province. NMFS has identified this project as a BiOp project.	High Priority
30012	Compare Bacterial Fish Pathogen Populations in Hatchery Water and in Adjacent Creek Water and Evaluate Possibile Disease Transfer Between Them.	U.S. Fish & Wildlife Service	Elochoman	y	y	y	y	na	na		y	y	na	na	y	y	y	na	This project may be better evaluated in the Mainstem and Systemwide Province.	Recommended Action
30013	Role of Bacteria as Indicator Organisms for Watershed Assessment and in Determining Fish Pathogen Relationships with Fauna of Abernathy Creek	US Fish and Wildlife Service	Elochoman	y	y	y	y	na	na	y	y	n	na	na	y			na	This project should be considered under the innovative category (or in the Mainstem and Systemwide Province).	Recommended Action

ProjectID	Title	Sponsor	Subbasin	Technical Criteria								Management Criteria							Project Review Comments	CBFWA Category
				T 1	T 2	T 3	T 4	T 5	T 6	T 7	T 8	M 1	M 2	M 3	M 4	M 5	M 6	M 7		
Grays																				
30005	Grays River Watershed and Biological Assessment	Lower Columbia Fish Recovery Board, Pacific States Marine Fish Commission, Pacific Northwest National Laboratory	Grays	y	y	y	na	y	na	y	y	y	y	na	n	y	y	na	This project scope and budget should be considered along with all the chum salmon projects. NMFS has identified this project as a BiOp project.	High Priority

Appendix B. The CBFWA 3-Year Project Recommendations for the Lower Columbia and Columbia Estuary Provinces

Lower Columbia Province

ProjectID	Title	Sponsor	Subbasin	Total of 2003	Total of 2004	Total of 2005
Columbia Lower						
31001	Artificial production facilities improvements to support Lower Columbia chum salmon reintroduction into the Chinook River	Sea Resources	Columbia Lower	$41,865		
31003	Distribution and life history characteristics of lampreys in tributaries of the lower Columbia River Basin	United States Fish and Wildlife Service	Columbia Lower	$173,281	$337,096	$353,950
31006	Protect Wood's Landing Chum Spawning Site	City of Vancouver	Columbia Lower	$765,810		
31014	Evaluate juvenile salmonid use of restored floodplain wetlands in the Lower Columbia River Estuary	Ducks Unlimited, Inc.	Columbia Lower	$150,000	$150,000	$150,000
31015	Sturgeon Lake/Dairy Creek Restoration	West Multnomah Soil & Water Conservation District	Columbia Lower	$121,000	$86,000	$23,000
31024	Protect, Enhance and Maintain Wetland, Riparian and Upland Habitat on the Shillapoo Wildlife Area	Washington Department of Fish and Wildlife	Columbia Lower	$0	$253,430	$261,880
31029	Clark County ESA Outreach Program	Clark County, Washington	Columbia Lower	$205,000	$304,000	$304,000
31031	Clatsop County Fisheries Restoration Project	Clatsop County's Clatsop Economic Development Council Fisheries Project (CEDC)	Columbia Lower	$455,250	$93,000	$93,000

ProjectID	Title	Sponsor	Subbasin	Total of 2003	Total of 2004	Total of 2005
31032	Develop a Well Water Supply System for the Hardy Creek Chum Salmon Spawning Channel	U.S. Fish and Wildlife Service (Columbia River Fisheries Program Office and Pierce National Wildlife Refuge	Columbia Lower	$69,800	$5,000	$5,000
31033	Restoration of Columbia River Floodplain Functions to Steigerwald Lake	U.S. Fish and Wildlife Service/Ridgefield Refuge Complex	Columbia Lower	$373,000	$384,000	$921,000
31034	Salmonid Population and Habitat Monitoring in the Oregon Portion of the Lower Columbia Province	Oregon Department of Fish and Wildlife	Columbia Lower	$532,648	$559,280	$587,244
199306000	Select Area Fishery Evaluation Project	Wash. Dept. of Fish & Wildlife, Oregon Dept. of Fish & Wildlife, and Clatsop County Economic Development Council	Columbia Lower	$2,290,844	$2,613,811	$2,129,510
200001200	Evaluate factors limiting Columbia River gorge chum salmon populations.	United States Fish and Wildlife Service	Columbia Lower	$255,212	$267,972	$281,371
200105300	Re-introduction of Lower Columbia River Chum Salmon into Duncan Creek	Pacific States Marine Fisheries Commission, Washington Department of Fish and Wildlife	Columbia Lower	$381,671	$321,823	$294,949
Cowlitz						
31005	Incorporating Pit Tag Technology to Evaluate and Monitor the Reintroduction Effort for Anadromous Salmonids in the Upper Cowlitz Watershed	Washington State Department of Fish and Wildlife	Cowlitz	$257,130	$211,900	$219,100
31017	Monitor and evaluate the success of hatchery salmonid reproduction for reintroduction of anadromous salmonids to the upper Cowlitz Basin	Washington Department of Fish and Wildlife	Cowlitz	$183,661	$237,200	$220,100
31020	Monitor Coweeman River Salmonid Populations	Washington Department of Fish and Wildlife	Cowlitz	$277,962	$182,851	$182,851

ProjectID	Title	Sponsor	Subbasin	Total of 2003	Total of 2004	Total of 2005
31023	Stream Gaging Installation and Operations in the Lewis, Salmon/Washougal, and Gray/Elochoman Subbasins	Department of Ecology	Cowlitz	$395,000	$198,000	
Lewis						
31022	Establish a Water Cleanup Plan (temperature TMDL) for the East Fork of the Lewis subbasin	Department of Ecology	Lewis	$118,000	$50,000	
31027	Movements and Survival of Juvenile and Adult Bull Trout	United States Fish and Wildlife Service	Lewis	$207,585	$140,729	$147,765
200001400	Evaluate habitat use and population dynamics of lampreys in Cedar Creek	U. S. Fish and Wildlife Service	Lewis	$197,742	$207,629	$218,011
Sandy						
199902500	Sandy River Delta Riparian Forest, Wetlands, and Anadromous Estuary Restoration	US Forest Service, Columbia River Gorge National Scenic Area	Sandy	$162,000	$132,000	$912,000
Willamette						
31002	Wildlife Habitat Protection, Lower McKenzie Watershed (Jaqua)	The Nature Conservancy	Willamette	$2,321,025	$215,000	$282,125
31004	Salmon Carcass Enrichment -- Willamette (Clackamas) & Sandy Subbasins	U.S. Forest Service, Mt. Hood National Forest	Willamette	$509,858	$535,351	$562,118
31007	Distribution and seasonal habitat use of ESA-listed salmonid species in City of Portland tributary streams	City of Portland, Endangered Species Act Program	Willamette	$62,000	$62,000	
31010	Re-open Off-channel Habitat for Lower Columbia ESU	City of Portland, Endangered Species Act Program	Willamette	$449,000	$35,000	$35,000
31011	Renaturalize Functional Floodplain Habitat within the Portland Reach of the Lower Willamette River	ZRZ Realty Company (a Zidell Company); City of Portland, Endangered Species Act Program	Willamette	$524,500	$105,500	$96,500

ProjectID	Title	Sponsor	Subbasin	Total of 2003	Total of 2004	Total of 2005
31012	Leveraging Conservation Easements for Fish and Wildlife in the Willamette Basin	Cascade Pacific Resource Conservation and Development, Inc.	Willamette	$68,090	$90,300	$80,090
31013	Investigate Re-establishing Anadromous Fish Populations Above man-made Barriers	Oregon Department of Fish and Wildlife	Willamette	$221,977	$230,690	$267,665
31016	Calapooia River Flow Acquisition and Fish Passage Assessment	Oregon Department of Fish and Wildlife	Willamette	$53,500	$55,500	$1,500
31018	Willamette Basin Riparian Project	Marion Soil and Water Conservation District	Willamette	$784,765	$767,996	$788,674
31019	Fish Passage Assessment and Prioritization Program	Washington County Department of Land Use and Transportation, Operations Division	Willamette	$72,432	$16,125	$29,250
31021	Reduction of gravel road sediment production & interruption of sediment delivery to streams	Washington County Department of Land Use and Transportation, Operations Division	Willamette	$238,436	$119,068	$94,068
31025	Construct Fish Screen and Fish Passage Improvements at Lebanon Diversion Dam on South Santiam River	City of Albany, Oregon	Willamette	$420,000	$2,800,000	$108,000
31028	Replace Upper and Lower Bennett Dam Fish Ladders in the North Santiam River at Geren Island (Stayton Island)	City of Salem, Oregon, a municipal corporation	Willamette	$200,000	$200,000	
31030	Santiam Water Control District Fish Screen and Passage Project	Santiam Water Control District	Willamette	$350,000		
199107800	Burlington Bottoms Wildlife Mitigation Project	Oregon Department of Fish and Wildlife	Willamette	$110,000	$97,540	$100,445
199205900	Amazon Basin/Eugene Wetlands Phase Two	The Nature Conservancy	Willamette	$60,650	$322,500	$324,600
199206800	Implement Willamette Basin Mitigation Program	Oregon Department of Fish and Wildlife	Willamette	$1,567,500	$1,589,600	$1,673,800

ProjectID	Title	Sponsor	Subbasin	Total of 2003	Total of 2004	Total of 2005
199405300	Middle Fork Willamette River Bull Trout Re-introduction and Basinwide Monitoring	Oregon Department of Fish and Wildlife	Willamette	$159,400	$172,400	$179,600
199607000	McKenzie River Focus Watershed Program Coordination and Habitat Restoration	McKenzie River Focus Watershed	Willamette	$325,000	$357,000	$389,000
200001600	Protect and Enhance Tualatin River National Wildlife Refuge Additions	US Fish and Wildlife Service (Tualatin River National Wildlife Refuge), US Geological Survey	Willamette	$256,000	$345,100	$91,000

Columbia Estuary Province

ProjectID	Title	Sponsor	Subbasin	Total of 2003	Total of 2004	Total of 2005
Columbia Estuary						
30001	Historic habitat opportunities and food-web linkages of juvenile salmon in the Columbia River estuary: Implications for managing flows and restoration	Northwest Fisheries Science Center, National Marine Fisheries Service	Columbia Estuary	$597,559	$675,000	$606,000
30002	Optimization of FCRPS Impacts on Juvenile Salmonids: Restoration of Lower-Estuary and Plume Habitats	Oregon Health & Science University, OGI School of Science & Engineering	Columbia Estuary	$435,192	$355,705	$415,428
30004	Blind Slough Restoration Project - Brownsmead, Oregon	Columbia River Estuary Study Taskforce	Columbia Estuary	$173,550	$5,000	$5,000
30006	Effectiveness monitoring of the Chinook River estuary restoration project.	Sea Resources	Columbia Estuary	$124,804	$80,000	$80,000
30007	An Acoustic Tracking Array for Studying Ocean Survival and Movements of Columbia River Salmon	Kintama Research Corporation	Columbia Estuary	$2,930,535	$1,739,250	$1,739,250
30009	Coastal Cutthroat Movements in the Columbia River Estuary	United States Fish and Wildlife Service	Columbia Estuary			

ProjectID	Title	Sponsor	Subbasin	Total of 2003	Total of 2004	Total of 2005
30010	Canada-USA Shelf Salmon Survival Study	Fisheries & Oceans Canada Pacific Biological Station Nanaimo, B.C. CANADA V9R 5K6	Columbia Estuary	$418,800	$418,800	$418,800
30011	Preserve and Restore Columbia River Estuary Islands to Enhance Juvenile Salmonid and Columbian White-tailed Deer Habitat.	U.S. Fish and Wildlife Service - Willapa National Wildlife Refuge and Satellites	Columbia Estuary	$585,437	$199,250	$40,000
30014	Map Subtidal Large Woody Debris and Other Habitat Features in Relation to Fish Distribution in the Lower Columbia River Estuary	Battelle Marine Sciences Laboratory	Columbia Estuary			
30015	Lower Columbia River and Columbia River Estuary Ecosystem Monitoring and Data Management	Lower Columbia River Estuary Partnership	Columbia Estuary	$472,000	$1,024,000	$849,000
30016	Implement the Habitat Restoration Program for the Columbia Estuary and Lower Columbia River	Lower Columbia River Estuary Partnership and Columbia River Estuary Study Taskforce	Columbia Estuary	$5,236,200	$5,100,000	$5,100,000
30017	Columbia River Tidewater assessment for Recovery Planning	University of Portland	Columbia Estuary	$137,338		
30018	Salmonid Population and Habitat Monitoring in the Oregon Portion of the Columbia Estuary	Oregon Department of Fish and Wildlife	Columbia Estuary	$528,913	$555,359	$583,126
199801400	Survival and Growth of Juvenile Salmonids in the Columbia River Plume	National Marine Fisheries Service	Columbia Estuary	$2,092,855	$2,376,199	$2,090,000
Elochoman						
30003	Evaluation of Two Captive Rearing Methods for Assisting with Recovery of Naturally Spawning Populations of Steelhead and Coho Salmon	U.S. Fish & Wildlife Service, U.S. Department of the Interior	Elochoman	$446,101	$687,800	$309,050

ProjectID	Title	Sponsor	Subbasin	Total of 2003	Total of 2004	Total of 2005
30008	Instream evaluation of populations, migration timing, individual adult return rates, and wild-hatchery interactions of 3 naturally produced salmonids	United States Fish and Wildlife Service	Elochoman	$238,740	$340,645	$291,218
30012	Compare Bacterial Fish Pathogen Populations in Hatchery Water and in Adjacent Creek Water and Evaluate Possibile Disease Transfer Between Them.	U.S. Fish & Wildlife Service	Elochoman	$71,678	$34,487	
30013	Role of Bacteria as Indicator Organisms for Watershed Assessment and in Determining Fish Pathogen Relationships with Fauna of Abernathy Creek	US Fish and Wildlife Service	Elochoman	$71,100	$58,440	$60,150
Grays						
30005	Grays River Watershed and Biological Assessment	Lower Columbia Fish Recovery Board, Pacific States Marine Fish Commission, Pacific Northwest National Laboratory	Grays	$474,734	$325,348	$365,348