WILLAMETTE BASIN
Fish Management Plan

Oregon Department of Fish & Wildlife

Willamette Basin Fish Management Plan

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INTRODUCTION

The *Willamette Basin Fish Management Plan* adopted in 1980 defined the objectives and established the priorities for managing the fish of the Willamette River Basin from July 1979 through July 1985. As our fisheries and aquatic habitats change and our knowledge of those resources increases, management plans must be flexible and also change. In 1986 the staff of the Department of Fish and Wildlife (ODFW) reviewed the plan and recommended appropriate changes, and the Commission adopted a revised plan. Administrative rules for the basin (Appendix B) were adopted in 1988.

This report contains the management objectives for the Willamette Basin, the problems that must be overcome to meet those objectives, and recommendations for solving those problems, which will guide fish management in the basin until subbasin plans have been completed. The Willamette Plan will be modified as necessary to be responsive to the changing needs of the resources and the public. Needed changes in the plan will be brought before the Commission when they become apparent.

A companion publication, *The Willamette Basin Fish Management Plan: Status and Progress 1979-85*, was also prepared as part of this review process. It includes background information on the species and habitat in the basin and discusses progress made on the objectives and problems of the previous plan.

The Willamette Basin

The Willamette River and its principal tributaries referred to in the plan are shown in Figure 1. For planning purposes, the Willamette Basin is generally divided into two parts: (1) the mainstem Willamette River and tributaries below Willamette Falls, primarily the Clackamas River, and (2) the mainstem and tributaries above Willamette Falls, which includes the major portion of the basin. Willamette Falls forms a convenient dividing line since the size of salmon and steelhead runs in the upper basin can be estimated by counting fish migrating through the fish passage facilities at Willamette Falls.

The previous plan contained specific objectives for the Clackamas subbasin. The revised plan contains general objectives for all tributaries below Willamette Falls, which in some cases are based on assumptions of expected production and harvest in the Clackamas subbasin. A separate management plan for the Clackamas subbasin currently being developed will include specific objectives for that subbasin.

Fisheries Management and Research in the Willamette Basin

As part of a philosophy of decentralized management, ODFW has divided the Willamette Basin into four districts with management biologists and offices in Clackamas, McMinnville, Salem, and Springfield (Figure 2). Biologists responsible for the Salmon and Steelhead Enhancement Program (STEP) in the basin are located in Clackamas and Salem. Administration is provided by staff at the Columbia Region Office in Clackamas, the Northwest Region office near Corvallis, and ODFW headquarters in Portland. Staff of the Columbia River Management Program, whose responsibilities include

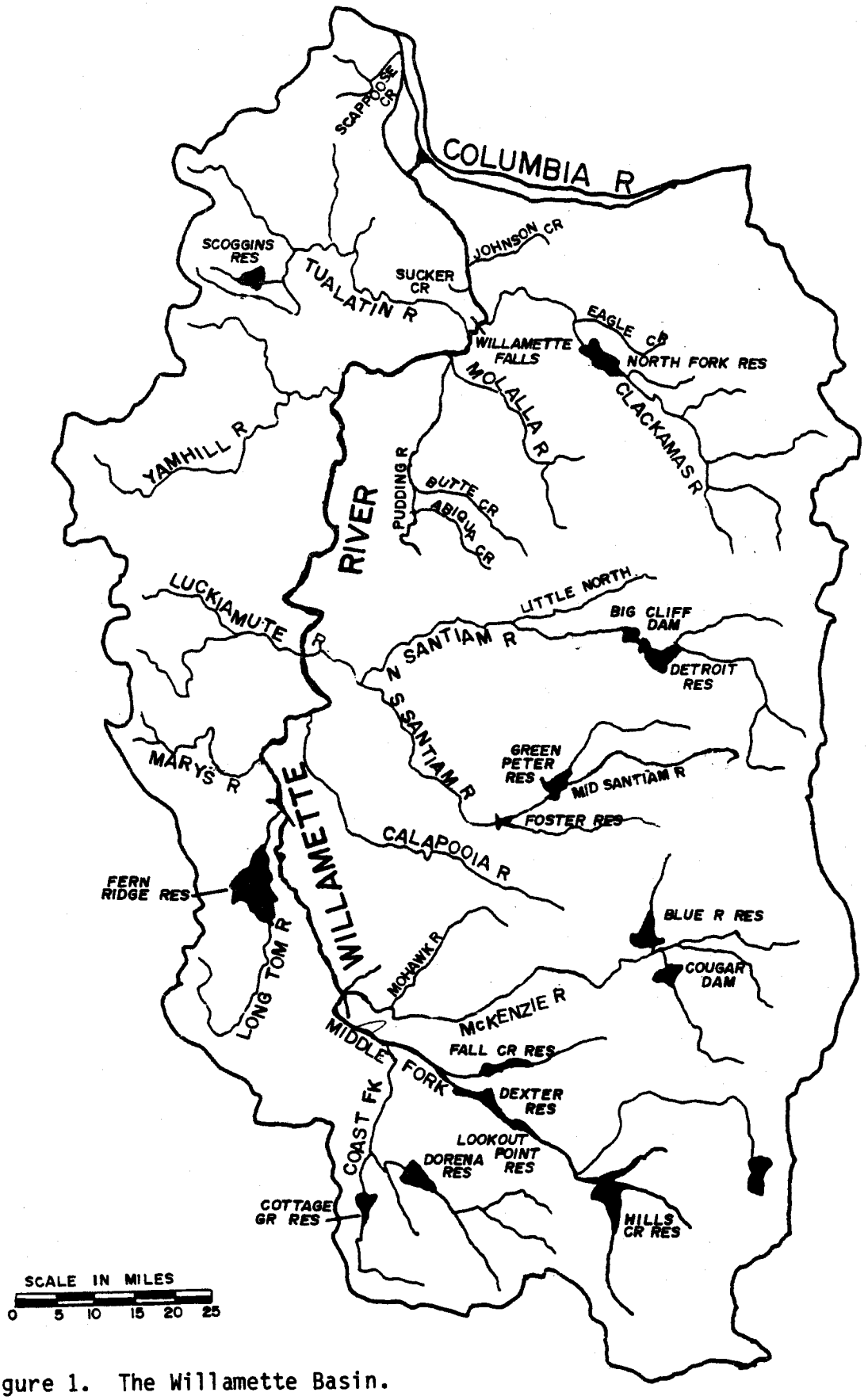


Figure 1. The Willamette Basin.

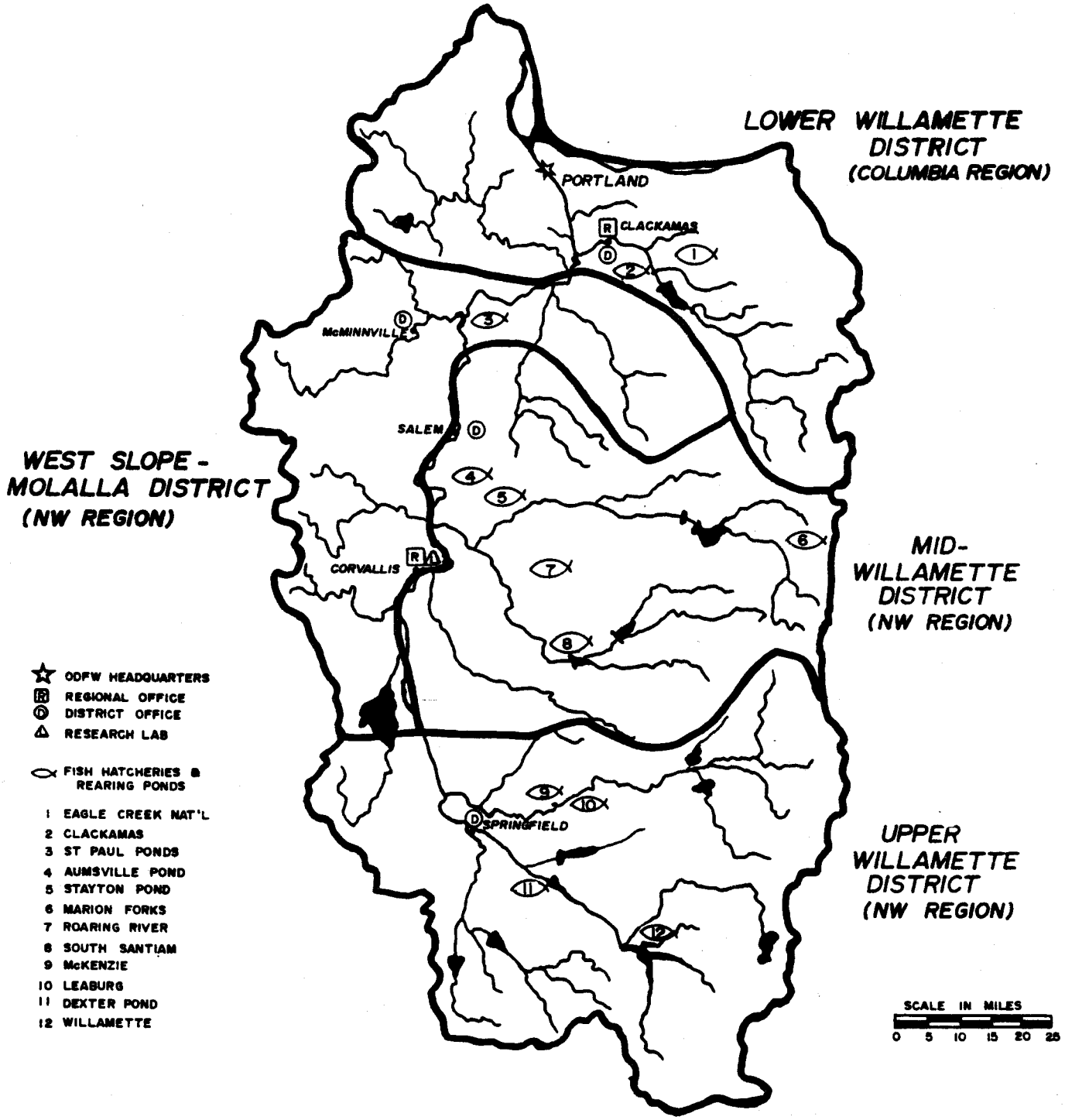
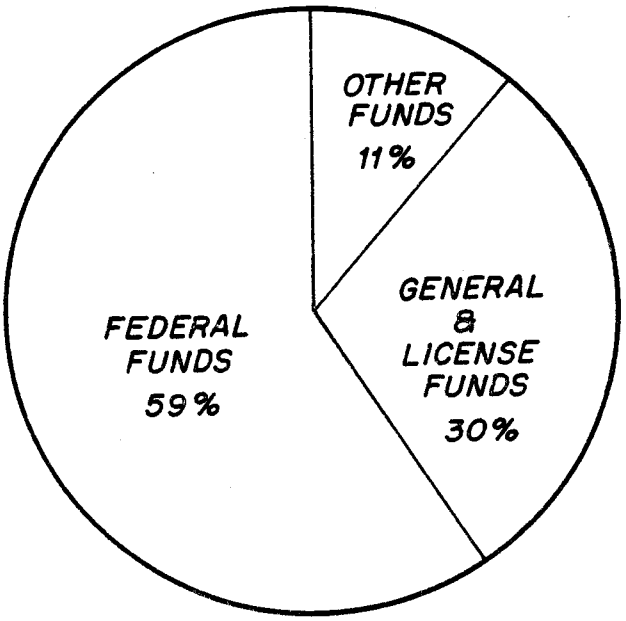


Figure 2. Fish management districts and hatchery facilities in the Willamette Basin.

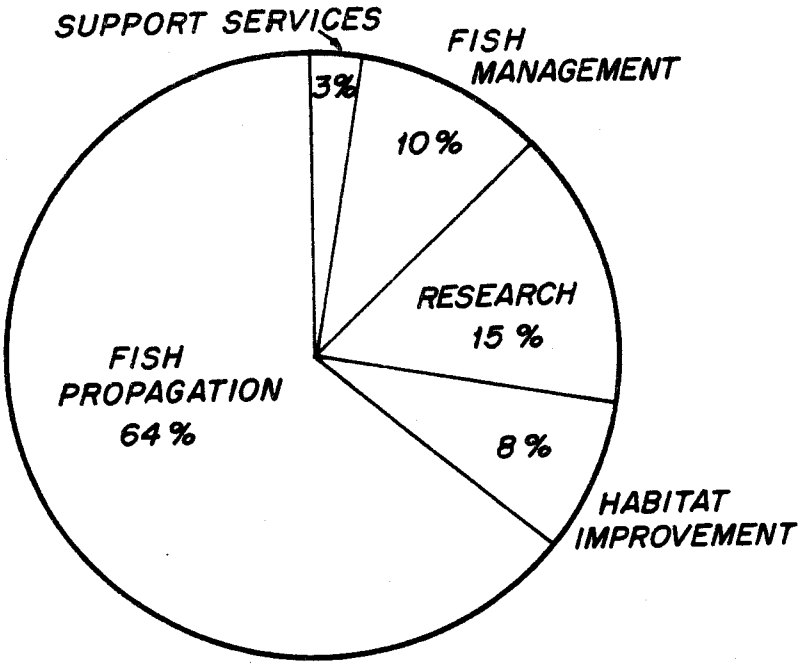
management of the commercial and recreational fisheries in the lower Columbia, lower Willamette, and lower Clackamas rivers, are located in Clackamas. The research laboratory and administrative offices of the Research and Development Section of ODFW are located in Corvallis.

Management activities involve stocking fish, monitoring harvest and population abundance, protecting and improving habitat, coordinating with resource agencies and local governments, and responding to requests from the public. Research projects are investigating ways to enhance natural production of spring chinook and native winter steelhead, to improve hatchery production of spring chinook, and to reduce losses of salmon and steelhead at hydroelectric facilities on the McKenzie and South Santiam rivers and at Willamette Falls. There are eight hatcheries located in the basin (Figure 2) that produce spring chinook, winter and summer steelhead, coho, and rainbow and cutthroat trout. Ponds at other locations (Figure 2) are used for holding adult salmon and steelhead prior to spawning, for rearing fall chinook, or for producing warmwater species.

Funds for ODFW's fish management and research programs in the Willamette Basin are derived from federal sources, the state's general fund account, sale of licenses, and contracts and grants from other miscellaneous sources (Figure 3). During the July 1985-June 1987 budget period, this income totalled approximately $8.5 million (Table 1). Costs of hatchery production account for almost two-thirds of the expenditures (Figure 3).



FUNDING



EXPENDITURES

Figure 3. Funding sources and expenditures of ODFW for fisheries management and research in the Willamette Basin, July 1985-June 1987, by percentage.

Table 1. Income and expenditures[a] of ODFW for fisheries management and research in the Willamette Basin, July 1985-June 1987.

	Columbia Region	Northwest Region	Research Section	Total
Funding (source):				
State general fund and licenses	$ 354,000	$2,014,000	$ 153,000	$2,521,000
Federal grants and and contracts	894,000	3,106,000	979,000	4,998,000
Other[b]	715,000	19,000	215,000	949,000
Total	1,963,000	5,139,000	1,347,000	8,449,000
Expenditures:				
Fish propagation[c]	1,158,000	4,260,000	0	5,418,000
Fish management	454,000	346,000	0	800,000
Habitat improvement	287,000	376,000	0	663,000
Support services	64,000	157,000	58,000	279,000
Research	0	0	1,289,000	1,289,000
Total	1,963,000	5,139,000	1,347,000	8,449,000

[a] *Does not include costs of the Portland headquarters of ODFW for general administration of programs related to the Willamette Basin.*

[b] *Portland General Electric Company, Eugene Water and Electric Board, and the Port of Portland.*

[c] *Does not include costs for Eagle Creek National Fish Hatchery operated by the U.S. Fish and Wildlife Service.*

IMPLEMENTATION

Achieving the objectives of this plan within ODFW's budgetary and personnel limitations entails identifying priorities for effort and funds. The following six actions are considered the highest priorities to enhance fish production and management in the Willamette Basin:

1. Improvement of fish passage at Willamette Falls, particularly for salmon and steelhead juveniles migrating downstream through the Sullivan Hydroelectric Plant

2. Development of a basinwide program to insure that considerations for fish are incorporated into operating plans for dams, reservoirs, and other hydropower facilities

3. Reduction of habitat losses from land- and water-use practices

4. Protection and enhancement of natural production of native winter steelhead and native rainbow and cutthroat trout and their habitats

5. Continued improvements in the production and survival of hatchery-produced spring chinook

6. Determination of existing and potential natural production of spring chinook

The management priorities and their funding status for habitat, each of the species or species groups, angler access, and general management needs are listed in the following table. These priorities are ranked on the basis of (1) the importance of the problem or objective, (2) the likelihood that the problem can be solved or substantial progress can be made during the next 6 years, and (3) availability of funding.

Priority (plan objective, problem)	Requires action by other agencies	Currently funded	Requires additional funding	
			Short-term	Long-term
HABITAT				
1. Juvenile salmonid passage through the Sullivan power plant at Willamette Falls (Objective 1, Problem 1)	X	X		X
2. Adult salmonid passage at Willamette Falls (Objective 1, Problem 2)		X	X	

Priority (plan objective, problem)	Requires action by other agencies	Currently funded	Requires additional funding	
			Short-term	Long-term
3. Salmonid passage at other dams and diversions (Objective 1, Problem 3)	X	X		X
4. Stream alterations resulting from land-use practices (Objective 3, Problem 1)	X	X		X
5. Additional personnel for coordination with other resource agencies (Objective 4, Problem 1)				X
6. Protection of streamflows (Objective 2, Problems 1-3)	X			X
7. Reservoir operation (Objective 3, Problem 3)	X			X
8. Chemical pollution (Objective 3, Problem 2)	X			X
SPRING CHINOOK				
1. Increased survival of hatchery fish (Objective 1, Problem 3)		X		X
2. Fish passage at hydro-power projects (Objective 1, Problem 4)	X	X		X
3. Estimates of natural production (Objective 1, Problem 5)				X
4. Enhancement of natural production (Objective 1, Problem 9)	X			X
FALL CHINOOK				
1. Monitoring adult escapement (Objective 4)		X		

Priority (plan objective, problem)	Requires action by other agencies	Currently funded	Requires additional funding	
			Short-term	Long-term
2. Improvements at Stayton-Aumsville ponds (Objective 1, Problem 3)			X	
3. Development of a brood-stock collection facility (Objective 3)	X		X	
4. Development of run of bright fall chinook (Objective 2)	X			X
COHO				
1. Monitoring survival and contribution to the fisheries of presmolt releases (Objective 3)			X	
SOCKEYE AND KOKANEE				
No critical problems				
SUMMER STEELHEAD				
1. Low summer flows below Foster and Leaburg dams (Objective 2, Problem 3)	X			
WINTER STEELHEAD				
1. Habitat alterations from land- and water-use practices (Objective 2, Problem 1)	X			X
2. Impacts of Foster and Green Peter dams on wild production (Objective 2, Problem 3)	X	X		X

Priority (plan objective, problem)	Requires action by other agencies	Currently funded	Requires additional funding	
			Short-term	Long-term
3. Information on habitat requirements, life history characteristics, production capacity (Objective 2, Problem 2), and escapement needs for the native stock (Objective 2, Problem 5)				X
4. Estimates of wild and hatchery production (Objective 1, Problem 1)				X
SHAD				
No critical problems		X		
STURGEON				
1. Information on populations above Willamette Falls (Objective 2, Problem 1)			X	
RESIDENT TROUT				
1. Monitoring abundance and catch of wild trout (Objective 1, Problem 1				X
2. Measurement of production potential of streams (Objective 1, Problem 2)			X	
3. Redistribution of hatchery trout to waters with heavy angling pressure (Objective 3, Problem 2)		X		
4. Movement of hatchery trout out of targeted fishing areas (Objective 3, Problem 1)			X	
WHITEFISH				
No critical problems				

Priority (plan objective, problem)	Requires action by other agencies	Currently funded	Requires additional funding	
			Short-term	Long-term
WARMWATER GAME FISH				
1. Development of management plans for reservoirs (Objective 1)	X	X		
2. Agreement with USACE regarding resident fish concerns (Habitat Section Objective 3, Problem 3, Action 3.2)	X	X		
3. Shortage of fish for stocking (Objective 2, Problem 2)				X
MISCELLANEOUS SPECIES				
1. Protection and enhancement of the Oregon chub and sand roller (Objective 1)	X			
CRAYFISH				
No critical problems				
ANGLER ACCESS				
1. Reduced angling because of low flows below Foster and Leaburg dams (Objective 1, Problem 3)	X	X		
2. Private ownership of access areas (Objective 1, Problem 2)		X		
3. Determination of access needs (Objective 1, Problem 1)		X		
GENERAL MANAGEMENT NEEDS				
1. Subbasin plans			X	

Priority (plan objective, problem)	Requires action by other agencies	Currently funded	Requires additional funding	
			Short-term	Long-term
2. Economic evaluations of steelhead and trout management programs and fisheries (Objective 2, Problem 1)			X	
3. Angler survey (Objective 3, Problem 1)			X	

GOAL

The goal for managing the fish resources of the Willamette Basin is to

> Maintain optimum populations and distribution of the Basin's fish resources to provide the greatest recreational, commercial, economic, and nonconsumptive benefits to present and future generations of Oregon citizens.

MANAGEMENT GUIDELINES AND OBJECTIVES

General Guidelines

Management of the basin's fisheries must conform to the general constraints listed below. Guidelines developed specifically for individual species, habitat, and angler access in the basin are listed in their respective sections of the plan.

1. Legislation--Oregon Revised Statutes
   a. Chapters 496 through 501 (wildlife including game fish)
   b. Chapters 506 through 513 (commercial fish and fishing)

2. Administrative Rules
   a. Angling regulations and seasons (635-11-100 through 635-39-100)
   b. Commercial fish regulations and seasons (635-41-000 through 635-42-142)
   c. Goals and policies for fish management and salmon hatchery operation, including the Wild Fish Management Policy (635-07-500 through 635-07-830)
   d. Steelhead management (635-500-010 through 635-500-025)
   e. Trout management (635-500-100 through 635-500-115)
   f. Warmwater fish management (635-500-045 through 635-500-060)
   g. Administrative rules specific to the Willamette Basin are listed in Appendix B

3. Other management policies and procedures developed by ODFW staff
   a. Manual for Fish Management (1977)

b. A Department Guide for Introductions and Transfers of Finfish into Oregon Waters (1982)

4. Management plans

   a. Comprehensive Plan for Production and Management of Oregon's Anadromous Salmon and Trout (1981)

   b. The Coho Salmon Plan (1981)

   c. The Steelhead Plan (1986)

   d. The Trout Plan (1987)

   e. The Warmwater Fish Plan (1987)

5. Agreements with operators of hydropower facilities concerning fish passage

   a. Willamette Falls--Portland General Electric Company (PGE), Smurfit Newsprint Corporation, James River Corporation

   b. McKenzie River--Eugene Water and Electric Board (EWEB)

   c. Clackamas River--PGE

6. Other agreements

   a. Memoranda of Understanding with Bureau of Land Management and U.S. Forest Service describe cooperative activities for protecting and enhancing fish habitat on federal lands

   b. Contractual agreements with the National Marine Fisheries Service and U.S. Fish and Wildlife Service concerning Columbia River and ocean salmon fisheries, marine fish investigations, and hatchery production

   c. Annual contracts with the U.S. Army Corps of Engineers (USACE) to compensate for fish production lost as a result of USACE projects

   d. Other public and private groups covering a wide array of studies, manipulation of facilities, and fish production

7. Rules and regulations of other jurisdictions

   a. These include waste water discharge permits and water quality standards administered by the Department of Environmental Quality, forest practices rules administered by the Department of Forestry, statewide planning goals and guidelines established by the Land Conservation and Development Commission, and others

8. Other guidelines for the Willamette Basin

   a. Compensation must be provided for losses of production due to development and other man-made causes.

   b. Hatchery production will be evaluated to determine if benefits exceed costs.

   c. It is the general intent of the plan that numbers of hatchery fish stocked in the basin regardless of species and size will not be increased and that stream systems not currently receiving hatchery fish will not be stocked, with the following exceptions: (1) experimental programs where the number of fish released are relatively small and a planned and funded evaluation program exists, (2) rehabilitation programs for native species, (3) as provided for in subbasins plans adopted by the Commission in public hearing, and (4) special situations approved by the Commission in public hearing. Although the plan does not call for increases in releases of hatchery fish or major changes in their distribution, reduction of stocking programs for some species would have a major impact on fisheries. Stocking levels and areas will be addressed in subbasin plans.

Habitat

Guidelines

Guideline 1. **Although ODFW does not have regulatory authority over most activities that affect aquatic habitat, the agency will actively pursue and promote habitat protection and improvement necessary to achieve the goals and objectives for management of the basin's fish resources.**

Guideline 2. **The productive capacity of the basin will be maintained so that no net loss of natural fish production occurs.**

Guideline 3. **When loss of fish production as a result of habitat alteration is unavoidable, in-kind and in-place compensation for the species affected will be the first priority.**

Objectives

Objective 1. **Improve fish passage at Willamette Falls, dams, power projects, and where appropriate, at natural barriers.**

Assumptions and Rationale

1. Improvements in fish passage are necessary to meet the objectives for anadromous species in the basin.

2. Responsibility for improving fish passage at man-made facilities lies with the owners or operators of the facilities. Fish passage at natural barriers is provided and maintained by state and federal agencies, volunteer groups, and individuals.

Problems and Recommended Actions

Problem 1. Major losses of juvenile salmonids may occur as they migrate through the Sullivan power generating plant operated by PGE at Willamette Falls.

Action 1.1 Review the existing data to estimate loss of juveniles at the Sullivan Plant.

Action 1.2 If existing data are insufficient to estimate losses, (1) plan and conduct a study that will adequately estimate losses, and (2) develop interim operating criteria for the Sullivan Plant that will reduce loss of downstream migrants until the study is completed and mitigation and compensation for losses can be resolved.

Action 1.3 In coordination with other fishery agencies, determine (1) unavoidable losses and required compensation (i.e., increases in wild and hatchery production to replace losses), and (2) avoidable losses and required mitigation (i.e., reduction in losses through changes

in power plant operation, passage facility improvements, etc.).

Action 1.4 Negotiate with Portland General Electric Company (PGE) to obtain compensation and mitigation.

Action 1.5 Evaluate the measures undertaken to insure that the compensation and mitigation levels agreed upon are being met.

Action 1.6 Assign an ODFW employe responsibility for overseeing the development and implementation of compensation and mitigation measures and coordination with other fishery agencies and PGE.

Problem 2. Some adult salmon and steelhead seeking upstream passage at Willamette Falls are delayed, stranded, injured, or killed.

Action 2.1 Assign an ODFW employe with the necessary authority and access to agency resources the responsibility for identifying upstream passage problems and facility deficiencies and for developing and implementing measures to improve passage.

Action 2.2 Develop plans, justifications, and cost estimates for passage improvements and construction of an adult trapping facility to determine passage efficiency; submit a proposal to appropriate funding agencies.

Action 2.3 Negotiate with USACE to regulate flow by releasing water from dams on tributaries to improve passage of adult salmonids in the mainstem Willamette River, especially at Willamette Falls.

Problem 3. Some migrating salmonids are delayed, injured, or killed in tributaries because of dams, water diversions, and other man-made obstacles.

Action 3.1 Continue research at Foster and Green Peter dams on the South Santiam River through 1988 to improve upstream and downstream passage. Develop long-term mitigation and compensation goals for Foster and Green Peter dams.

Action 3.2 Complete the study to determine effects of water temperature on the survival of spring chinook smolts released in the North Santiam River below Detroit Dam.

Action 3.3 Continue to negotiate with EWEB to (1) improve passage of downstream migrants in the Leaburg and Walterville canals, and (2) improve adult passage through increases in flow in mainstem reaches of the

McKenzie River dewatered by the Leaburg and Walterville diversions and through improvements in the facilities at Leaburg Dam and the Walterville Canal. A study is needed to measure smolt losses resulting from the Walterville diversion. (The McKenzie Subbasin Management Plan will address these actions in greater detail.)

Action 3.4 Continue negotiations with USACE to improve flows below Fall Creek Dam for adult spring chinook and winter steelhead migration. Downstream passage of winter steelhead juveniles at Fall Creek Dam remains a problem.

Action 3.5 Install a downstream migrant trap at Willamette Falls to help monitor smolt passage from upper tributaries.

Action 3.6 Seek funding from project operators for an ODFW employe to monitor and coordinate all fish passage at facilities on tributaries above Willamette Falls.

Action 3.7 Encourage dam operators to provide personnel at the projects to monitor and maintain fish passage facilities and operations.

Objective 2. Protect instream flows in the basin for fish production.

Assumptions and Rationale

1. Flow in many streams is insufficient at times for optimum fish production.

2. Establishment of minimum streamflows will maintain or increase fish production.

3. Improvements in streamflow will require the support and coordination of the regulatory agencies and water users.

4. Additional minimum streamflows can be established through the authority of minimum streamflow legislation (ORS 536.325).

Problems and Recommended Actions

Problem 1. Present water laws do not fully protect fish habitat.

Action 1.1 Support development of legislation to improve instream flows for fish production.

Problem 2. Many tributaries do not have minimum flows established to protect fish and aquatic life.

Action 2.1 Recommend additional locations for minimum streamflows to the Water Resources Department (WRD).

Problem 3. Water users do not always comply with established minimum streamflows.

Action 3.1 Encourage compliance with existing minimum flows and improve streamflow monitoring by documenting and reporting violations to WRD.

Action 3.2 Encourage citizens to participate in STEP's "adopt-a-stream" program, to monitor flows, and to support adoption of additional minimum flows.

Objective 3. Increase protection and improvement of stream and standing water habitat.

Assumptions and Rationale

1. High quality habitat is required for fish production.

2. Timber harvest, road construction, gravel removal, agriculture, urban expansion, and other human activities and forms of development have reduced and will continue to reduce the productivity of fish habitat.

Problems and Recommended Actions

Problem 1. Stream alterations resulting from land-use practices decrease spawning and rearing habitat for fish.

Action 1.1 Support increased enforcement of laws and regulations that protect fish habitat, and report violations to the enforcement agencies.

Action 1.2 In coordination with regulatory agencies, develop a monitoring program to determine if habitat protection recommendations made by ODFW and accepted by regulatory agencies are being followed.

Action 1.3 Restore degraded habitat through projects undertaken by ODFW including STEP and cooperative efforts with USFS, BLM, and the Fish and Wildlife Program of the Northwest Power Planning Council.

Action 1.4 Expand informational and educational programs to increase environmental concern and responsibility among Oregonians.

Action 1.5 Initiate and cooperate in studies to determine the impacts of habitat loss from stream alterations on fish populations.

Problem 2. Chemical pollutants in waste discharge and run-off from nonpoint pollution sources degrade stream habitat.

Action 2.1 Encourage increased efforts of the U.S. Environmental Protection Agency and the Department of Environmental Quality (ODEQ) to reduce chemical pollutants, particularly insecticides, that reduce fish production.

Action 2.2 Support and participate in interagency efforts to increase monitoring of chemical water pollutants.

Problem 3. Reservoir water management periodically reduces fish production in and below the impoundments.

Action 3.1 Work with USACE, EWEB, and PGE to test and implement schedules for releases of water from dams that will improve fish habitat. Priority projects are Cougar, Leaburg, Dexter, Fall Creek, Fern Ridge, Foster, Hills Creek, and Faraday dams.

Action 3.2 Develop fill and release schedules through coordination with dam operators and WRD to improve temperatures, reduce turbidity, reduce nitrogen levels, and minimize erosion below dams.

Action 3.3 Encourage USACE to complete the Willamette System Temperature Control Study.

Action 3.4 Negotiate a formal agreement with USACE that (1) recognizes the benefits of resident fish production in reservoirs and the long development time of warmwater fish populations, (2) prevents abrupt and unplanned drawdown of impoundments, (3) requires coordination among USACE, ODFW, and other appropriate state and federal agencies prior to drawdown, and (4) provides mitigation or compensation for losses of production.

Action 3.5 Develop reservoir management strategies to improve fish habitat in the reservoirs.

Objective 4. Increase coordination with agencies involved in natural resource planning and management.

Assumptions and Rationale

1. The management plans and activities of many other agencies affect fish habitat. The state agencies include the Department of Forestry, Water Resources Department, the Division of State Lands, the Land Conservation and Development Department and the Department of Transportation, and the Department of Environmental Quality.

2. The U.S. Forest Service and the Bureau of Land Management prepare management plans for all natural resources, including fish habitat, on public lands under their jurisdiction.

3. USACE manages numerous reservoirs in the basin that directly affect fish populations within and below the reservoirs. USACE also has responsibility for stream bank protection in the basin.

4. Cities, counties, and state agencies are required to follow approved land-use plans that contain requirements for protection of aquatic habitat.

5. Grant-in-aid agencies, such as the Agricultural Stabilization and Conservation Service, provide cost-share funds to landowners for conservation projects. These projects are guided by state and county plans.

Problems and Recommended Actions

Problem 1. ODFW does not have sufficient manpower to provide the necessary coordination with natural resource management agencies, such as the Department of Forestry, and to handle the increasing workload associated with other habitat programs, such as the Riparian Tax Incentive Program.

Action 1.1 Use of existing personnel will be evaluated and additional positions to provide more manpower will be considered during the planning process for the 1989-91 budget.

Problem 2. The Department of State Lands (DSL) does not have a comprehensive long-term plan for gravel removal in the basin.

Action 2.1 Urge DSL to develop long-range plans for gravel extraction that recognize the needs for fish habitat.

Problem 3. USACE and the Soil Conservation Service (SCS) do not have a comprehensive long-term plan for bank protection in the basin that will protect fish and wildlife habitat.

Action 3.1 Urge USACE and SCS to develop standards for bank protection that protect fish and wildlife habitat.

Spring Chinook

Guidelines

Guideline 1. Willamette spring chinook will be managed for production and harvest of hatchery and wild fish (option 1(b) of the Wild Fish Management Policy).

Objectives

Objective 1. Increase the average annual run size to 100,000 Willamette spring chinook (adults and jacks) entering the Columbia River.

Assumptions and Rationale

1. In 1987 the run was 94,000 fish, the largest run since 1953, when the run exceeded 100,000 fish.

2. Increased returns of adults will benefit Oregon's sport and commercial fisheries. The immediate effect will be increased catches in the sport fisheries of the lower Willamette River, Clackamas River, and the mainstem Willamette and tributaries above Willamette Falls. Catch in the commercial gillnet fishery in the lower Columbia River should also increase somewhat. However, harvest in the gillnet fishery is primarily limited by the closure of the spring season to protect less abundant upper Columbia River stocks of spring chinook, which also migrate through the lower Columbia at that time.

3. Increases in adult returns will result from habitat protection; increased protection of downstream migrants at hydroelectric facilities; increases in natural rearing and spawning via outplanting of hatchery stocks; adjustments in the size, time, and location of smolt releases; continuation of low prespawning mortalities in adult-holding ponds; and increases in hatchery production.

4. Habitat in the basin appears capable of supporting increased natural production.

Problems and Recommended Actions

Problem 1. Diseases reduce the survival of fish produced in hatcheries.

Action 1.1 Develop an improved program of disease prevention.

Action 1.2 Continue the monitoring programs for viruses and bacterial kidney disease at hatcheries.

Action 1.3 Investigate potential associations between anemias, blood viruses, and fungal and bacterial pathogens.

Action 1.4 Refine programs of antibiotic treatments.

Action 1.5 Where possible, shift hatchery production from disease-prone to disease-free stations.

Problem 2. Criteria developed from research on the timing of hatchery releases have not been adequately refined, and criteria for size of hatchery fish at release and the location of releases have not been fully implemented.

Action 2.1 Determine the most effective month for smolt releases.

Action 2.2 Until Action 2.1 is completed, target smolt production for one-third release in November at a minimum length of 150 mm and two-thirds release in March at 9 fish/pound.

Action 2.3 Truck a portion of the smolt production from upper Willamette facilities for release below Willamette Falls.

Action 2.4 Measure survival of smolts produced at Marion Forks Hatchery that are released outside of the North Santiam system.

Problem 3. Survival rates of fish produced at some hatcheries are low.

Action 3.1 Monitor survival rates by tagging representative groups of smolts at all hatcheries.

Action 3.2 Modify or eliminate hatchery programs with average survival rates (return to freshwater) less than 1%.

Action 3.3 Where practical, increase production at facilities that demonstrate high survival rates.

Problem 4. Survival of juveniles and adults is reduced at hydroelectric diversions and generating facilities.

This problem is addressed in the Habitat section (Objective 1, Problems 1-3).

Problem 5. There are no recent estimates of natural production.

Action 5.1 Determine the number and proportion of naturally produced chinook in the annual runs.

Problem 6. Major holding, spawning, and rearing areas have been blocked by dams.

Action 6.1 Apply new passage technology, as it develops, to reopen areas above dams to spawning and rearing of spring chinook.

Problem 7. Competition and interbreeding between wild and hatchery fish results from the annual release of millions of hatchery juveniles to compensate for loss of wild production.

Action 7.1 To reduce competition with wild juveniles, produce hatchery smolts that migrate quickly after release.

Action 7.2 Identify important tributaries for wild fish management in subbasin management plans.

Problem 8. Wild adults are overharvested in mixed-stock fisheries managed to crop more abundant hatchery fish.

Action 8.1 Determine how wild fish can be protected while hatchery fish are selectively harvested.

Problem 9. Few spring chinook are produced from some areas that appear to have adequate habitat.

Action 9.1 Investigate the life history characteristics of spring chinook and identify the factors limiting freshwater production, particularly the possible lack of adult holding areas.

Action 9.2 Determine if hatchery fish can be used to effectively stock underseeded habitat.

Objective 2. Provide the following annual runs above Willamette Falls based on the predicted size of the runs entering the Columbia River:

Preseason prediction of run size entering the Columbia River	Run Size guideline above Willamette Falls
Less than 70,000	30,000
70-79,999	30,500-35,000
80-89,999	35,500-40,000
90,000-100,000	40,500-45,000
Greater than 100,000	45,000

Between 70,000 and 100,000 fish, the target run size is adjusted such that for each 1,000 fish entering the Columbia River, the target run size above Willamette Falls increases by 500 fish.

Assumptions and Rationale

1. Approximately 30% of the fish passing Willamette Falls will return to hatcheries; 30% will be divided between upriver sport catch and spawning escapement; the remaining 40% of the Willamette Falls count will be unaccountable.

Problems and Recommended Actions

Problem 1. Errors in run-size predictions result in inappropriate target run sizes past Willamette Falls.

Action 1.1 Refine run-size estimation procedures; incorporate pounds of smolts released as a basis for estimation.

Problem 2. Counts of spring chinook at Willamette Falls do not correspond with combined estimates of catch, spawning escapement and returns to adult collection facilities.

Action 2.1 Determine if adults counted in the Willamette Falls ladder drop back below the Falls and reascend the ladder, thus inflating the passage counts.

Problem 3. Returns to some adult collection facilities exceed needs for broodstock.

Action 3.1 Where possible, delay opening adult collection facilities so that more fish can be harvested by anglers.

Action 3.2 Transport excess adults to spawning areas where escapement is inadequate.

Action 3.3 Determine the utility of transporting early returning adults downstream for recycling through sport fisheries.

Action 3.4 Where alternative uses are not possible, kill and sell excess adults and use proceeds to improve hatchery programs.

Objective 3. Apportion the harvest in the sport and commercial fisheries in lower Willamette and Columbia rivers according to the following guidelines:

1. **The commercial share will be 24% when expected runs are similar to 1981-86 (50,000-90,000).**

2. **The commercial share may increase to 30% when expected runs are greater than 90,000 fish.**

3. **At run sizes of less than 50,000 fish, the Columbia River Compact will determine the allocation in a public hearing.**

Assumptions and Rationale

1. The allowable catch in the lower Willamette and Columbia river fisheries equals the run entering the Columbia minus the escapement goal for the Clackamas River and the target run-size above Willamette Falls (Objective 2).

2. Sport catch represents the proportion of the harvest taken by sport anglers in the lower Columbia, lower Willamette, and Clackamas rivers.

3. Commercial catch represents the proportion of the harvest taken during the winter gill-net season.

4. Since 1981 the Columbia River Compact has allocated 24% of the harvest to the commercial fishery to crop the Willamette stock while limiting harvest of depressed upper Columbia River stocks of spring chinook salmon. During that period the annual run size averaged about 70,000 fish.

Problems and Recommended Actions

Problem 1. Imprecision in the procedures for estimating run size and catch will cause some fluctuations in the allocation proportions.

Action 1.1 Imprecision of the run size estimates is addressed in Objective 2, Problem 1.

Action 1.2 Continue to monitor catch in the fisheries as closely as possible.

Objective 4. Provide anglers above Willamette Falls with a potential harvest of 5,000 spring chinook.

Assumptions and Rationale

1. Return of salmon steelhead angling tags indicate a 10-year (1973-82) average annual catch of 2,800 spring chinook in areas above the Falls. No more than 4,400 fish were caught in any one year since 1963, even when the highest proposed run-size objective (45,000) for the upper Willamette Basin was achieved.

2. Delayed adult passage at Willamette Falls will occur infrequently.

Problems and Recommended Actions

Problem 1. Two factors limit the catchability and availability of spring chinook in upriver fisheries: (1) willingness of the Willamette spring chinook to take a bait or lures decreases with time in freshwater; and (2) peak passage timing at Willamette Falls appears genetically dictated to occur relatively late.

Action 1.1 Investigate regulation changes for areas above Willamette Falls that could increase upriver harvest (e.g., limits, season length, gear types, legal areas).

Action 1.2 Release smolts in locations that will concentrate adult returns in areas with heavy angler use or that are conducive to increased angling pressure.

Action 1.3 Publicize counts at Willamette Falls to indicate prime times for angling opportunities.

Fall Chinook

Guidelines

Guideline 1. **Fall chinook will be managed for production and harvest of hatchery fish (option 1(c) of the Wild Fish Management Policy).**

(Hatchery fish that return and spawn in the basin also contribute to production.)

Guideline 2. **Releases of juvenile fall chinook will be made only in waters where potentially detrimental interactions with other salmonid species are minimal.**

Objectives

Objective 1. **Continue the hatchery program at Stayton-Aumsville rearing ponds to maintain annual production of at least 5 million smolts.**

Assumptions and Rationale

1. Release of 5 million smolts will produce an average of 50,000 adults for harvest and escapement annually.

2. Tule fall chinook production from the Columbia basin hatcheries provides fish for the offshore and Columbia River fisheries. As a result of the U.S.-Canada Salmon Interception Treaty, maintaining production of tule stock for harvest in Canadian waters will result in reduced harvest of other less abundant or more important Oregon chinook salmon stocks. The Willamette fall chinook program produces chinook salmon for these fisheries very efficiently.

3. One million smolts will be annually released into Mill Creek in Salem.

4. Fall chinook that spawn in the basin are an incentive for water resource managers to provide adequate flows and good water quality during late summer and fall to meet the needs of these fish. This in turn provides better water conditions for other species in the basin.

5. Fall chinook spawn in the upper basin in gravel areas that are largely unused by other salmonids, thereby expanding the use of the basin for fish production.

Problems and Recommended Actions

Problem 1. Although this objective can be met with the present facilities, improvements at the Stayton-Aumsville ponds are needed to maintain or increase the survival of juveniles and the cost-effectiveness of the program.

Action 1.1 Make the necessary improvements at Stayton-Aumsville ponds.

Problem 2. Hatchery fish are not always released at the time and size or under conditions to maximize survival.

Action 2.1 Changes in the time, size, and location of release will be made on the basis of new information as it develops.

Objective 2. Develop a program to produce "bright" fall chinook to provide a high quality sport fish for anglers in the basin.

Assumptions and Rationale

1. The advanced maturity of the tule stock at river entry makes it a poor quality sport fish. Anglers in the Portland and Salem areas and those who fish the Santiam River system are interested in a brighter stock to improve the fall chinook fishery in the basin.

2. Stocks may be available that are compatible with management objectives.

3. Funding to fully carry out this objective is currently unavailable. Meeting production objectives for spring chinook and summer steelhead has a higher priority.

Problems and Recommended Actions

Problem 1. The best method to produce a run of bright fall chinook in the basin has not been determined.

Action 1.1 Conduct a feasibility study to determine the most suitable stock for introduction, release locations, production costs, and evaluation needed.

Objective 3. Develop a trapping facility to collect adult fall chinook for broodstock.

Assumptions and Rationale

1. All adults returning to the Willamette have been allowed to spawn naturally. Fall chinook returning to Bonneville Hatchery are used as the egg source for fry reared in the Stayton-Aumsville ponds. When shortages of eggs occur at Bonneville, it is difficult to supply fry for the Willamette program. Collecting broodstock in the basin would provide a consistent egg source for the Willamette program independent of the Columbia River hatcheries.

2. Willamette broodstock could also be used as a backup egg source to meet general tule production needs when shortfalls occur at other hatcheries.

3. An adult collection facility would expedite development of a bright fall chinook run.

Problems and Recommended Actions

Problem 1. The feasibility and costs of developing a trapping facility are unknown.

Action 1.1 Determine the feasibility and costs of developing a trapping facility.

Objective 4. Continue to monitor fall chinook catch and escapement.

(Specific data will include recoveries of coded-wire tagged fish in offshore and Columbia River fisheries, counts of fish passing Willamette Falls, and estimates of age composition and the proportion of hatchery and naturally produced fish in the run.)

Assumptions and Rationale

1. Catch and escapement data for Willamette fall chinook will be used as an indicator of compliance with the U.S.-Canada Salmon Interception Treaty.

2. Estimation of the naturally produced adults will provide a complete accounting of all fish from the program in the fisheries.

3. The U.S.-Canada Salmon Interception Treaty will provide funds to coded-wire tag fish released and to monitor catch and escapement.

Problems and Recommended Actions

Problem 1. The procedure for estimating the hatchery and naturally produced components of the run has not been completely developed.

Action 1.1 Determine the accuracy of the estimate of naturally produced fish, and redesign the sampling program to provide the best estimate at reasonable cost.

Guidelines

Guideline 1. **Coho will be managed for production and harvest of hatchery fish (option 1(c) of the Wild Fish Management Policy).**

Guideline 2. **Coho production above Willamette Falls will be limited to early-run hatchery stock to maximize returns to Oregon fisheries, to use a readily available egg source, and to minimize competition with native species.**

Guideline 3. **No smolts will be released above Willamette Falls except for experimental or mitigation purposes.**

Objectives

Objective 1. **Continue to release early-run hatchery stock in tributaries below Willamette Falls.**

Assumptions and Rationale

1. Lower Willamette tributaries, including the lower Clackamas River, rely primarily on releases of hatchery fish to maintain production.

2. Present levels of hatchery production of early-run stock will be maintained.

3. Sufficient numbers of fish are escaping the fisheries to meet the broodstock needs for hatchery production.

4. The Clackamas subbasin management plan will include specific guidelines and objectives for the early-run stock.

Problems and Recommended Actions

There are no management problems that will prevent attainment of this objective.

Objective 2. **Develop a program to enhance production and to maintain the genetic characteristics of the Clackamas late-run stock.**

Assumptions and Rationale

1. The Clackamas late-run stock is believed to be the only remaining native, wild coho stock of significant size in the Columbia River Basin.

2. Habitat in the upper Clackamas River system has sustained natural production, and habitat improvement projects are underway to increase production.

Problems and Recommended Actions

Management plans being developed for the late-run stock and the Clackamas subbasin will address the problems associated with this objective.

Objective 3. Determine the contribution of experimental releases of presmolts above Willamette Falls to offshore and Columbia River fisheries.

Assumptions and Rationale

1. Coho produced in the upper basin contribute almost exclusively to the offshore and Columbia River fisheries.

2. The contribution to those fisheries needs to be determined to evaluate the potential benefits and costs of a full-scale presmolt program in the basin.

3. Beginning with the 1987 brood, annual releases of 500,000 or less coded-wire tagged presmolts should provide a reasonably accurate estimate of fishery contribution and the habitat production capability.

4. STEP hatch-box projects using coho eggs will be phased out as soon as possible; eggs from other species, such as winter steelhead and spring chinook, may be substituted where suitable.

5. Smolt releases in the upper basin are not considered appropriate because of production costs, mortality at Willamette Falls, and the location of the fisheries.

Problems and Recommended Actions

There are no management problems that will prevent attainment of this objective.

Sockeye and Kokanee

Guidelines

Guideline 1. Only disease-free stocks of kokanee (e.g., Paulina Lake) may be released in the Willamette Basin.

Objectives

Objective 1. Allow no adult sockeye to pass above Foster Dam.

Assumptions and Rationale

1. Adult sockeye returning to the South Santiam system may transmit viruses to other species.

2. Diseased sockeye that pass above Foster Dam could contaminate the water supply for South Santiam Hatchery.

Problems and Recommended Actions

Problem 1. Some kokanee stocked in Green Peter Reservoir may migrate to the ocean and return as adult sockeye to Foster Dam.

Action 1.1 Compare electrophoretic patterns of the Paulina Lake stock of kokanee released in Green Peter and adult sockeye that return to Foster Dam.

Problem 2. Sockeye that return to Foster Dam may be infected with viruses.

Action 2.1 Continue monitoring the sockeye that return to Foster Dam for viruses.

Objective 2. Continue annual releases of kokanee in Detroit Reservoir.

Assumptions and Rationale

1. Kokanee provide a popular sport fishery in Detroit Reservoir.

2. Zooplankton supplies adequate forage for kokanee in Detroit Reservoir.

Problems and Recommended Actions

There are no management problems that will prevent attainment of this objective.

Summer Steelhead

Guidelines

Guideline 1. **Summer steelhead will be managed for production and harvest of hatchery fish (option 1c of the Wild Fish Policy). ODFW will continue to monitor the run for possible natural production.**

Guideline 2. **Summer steelhead smolts will be released into streams that have suitable adult holding habitat throughout the summer and where adults will provide optimum recreational opportunity.**

Guideline 3. **Only smolt-sized fish will be released to minimize competition with native salmonids.**

Guideline 4. **Broodstock will be collected May through October to maintain broad run-timing while reducing overlap in the run-timing of the native wild winter steelhead stock.**

Objectives

Objective 1. **Maintain an average annual run of 30,000 adult summer steelhead into the Willamette River.**

Assumptions and Rationale

1. The annual run during 1980-84 averaged about 25,000 fish, produced from an average annual release of 620,000 smolts.
2. Popular sport fisheries have developed in the Clackamas, North and South Santiam, McKenzie, and Middle Fork Willamette.
3. An average run of this magnitude is needed if anglers are to have a reasonable chance of catching fish in the streams where smolts are released.
4. The average run in the Clackamas River will be 8,000 fish.
5. Hatchery production of about 760,000 smolts at 5 fish/lb. will be required annually, based on an expected survival rate of about 4%.
6. Few wild adults have been identified in the basin.

Problems and Recommended Actions

There are no management problems that will prevent attainment of this objective.

Objective 2. **Increase the average annual run of summer steelhead above Willamette Falls to 22,000 fish.**

Assumptions and Rationale

1. The run has reached more than 27,000 fish since 1984.

2. About 600,000 smolts will be allocated for release each year above Willamette Falls. The expected survival rate from hatchery smolt to adult is 3.6%, the average survival of adults returning from 1979 through 1986.

3. Increases in survival are expected from improvement in downstream migrant passage at existing hydroelectric projects, such as the Sullivan Plant and Leaburg Dam; previous improvements in hatchery rearing and release strategies; and recent changes in the opening date of trout season on some streams to reduce the harvest of smolts.

Problems and Recommended Actions

Problem 1. Angling opportunities and harvest are restricted by reduced summer flows on the South Santiam River below Foster Dam and on the McKenzie River where flows are diverted into the Leaburg and Walterville canals.

Action 1.1 Negotiate with USACE and EWEB to increase flows.

Problem 2. Adult returns and catch resulting from recent introductions of summer steelhead into the Molalla and Middle Fork Willamette rivers need to be monitored to determine the success of the programs.

Action 1.1 Monitor catch through analyses of creel surveys and returns of salmon-steelhead angling tags.

Action 1.2 Determine distribution of fish through adult surveys.

Objective 3. Collect 1,700 adults annually for hatchery broodstock.

Assumptions and Rationale

1. These fish are needed to maintain annual hatchery production at the proposed level.

2. Brood fish are collected at Foster Dam and McKenzie Hatchery and can be collected at Leaburg, North Fork, Dexter, and Minto dams, if needed.

Problems and Recommended Actions

Problem 1. Adult returns to the collection facility at Foster Dam exceed hatchery needs for broodstock.

Action 1.1 Release a larger portion of the smolt allocation for the South Santiam River in lower reaches of the river.

Action 1.2 Continue to truck adults trapped at Foster Dam to downstream release sites for recycling through the fishery.

Action 1.3 Negotiate with USACE to maintain a minimum release of 800 cfs from Foster Dam through July to increase harvest of fish in the South Santiam River.

Winter Steelhead

Guidelines

Guideline 1. **Management of native late-run wild stocks will be emphasized.**

Guideline 2. **The following streams will be managed for wild production (option 1(a) of the Wild Fish Management Policy): Abiqua Creek, Butte Creek, Pudding River, Thomas Creek, Crabtree Creek, Wiley Creek, Calapooia River, Fall Creek above Fall Creek Dam. Other streams may be designated for wild winter steelhead management in subbasin plans.**

Guideline 3. **Releases of hatchery fish will be continued to compensate for the construction of Scoggins Dam.**

Objectives

Objective 1. **Increase the average annual run size to 33,000 winter steelhead into the Willamette River.**

Assumptions and Rationale

1. The total run will consist of 14,000 fish destined for the lower Willamette River and tributaries below Willamette Falls, primarily the Clackamas River, and 19,000 fish above the Falls. Specific run-size objectives for winter steelhead stocks in the Clackamas River will be included in the Clackamas subbasin plan.

2. Wild fish make up a substantial proportion of the run and are becoming increasingly valued by anglers. The genetic characteristics of the native wild stocks make them particularly well suited to the habitat conditions in the basin where they evolved.

3. The late run timing of the native Willamette stocks provides a fishery in late winter and early spring when most of the other winter steelhead runs in Oregon have ended.

4. Hatchery production is needed to meet the demand for popular sport fisheries close to highly populated areas and to compensate for lost production above high dams.

5. Recent changes in hatchery practices, proposed passage improvements at hydroelectric projects, and habitat improvement projects will increase production.

Problems and Recommended Actions

Problem 1. Current estimates of wild and hatchery adult production are needed.

Action 1.1 Monitor the wild and hatchery components of the run at Willamette Falls.

Objective 2. Increase the average annual run of wild, late-run (15 February-15 May) winter steelhead above Willamette Falls to 12,000 fish.

Assumptions and Rationale

1. The estimated sizes of wild runs have been as high as 15,500 fish since 1970-71.

2. Habitat in the basin has (or will have after improvements) the capacity to produce enough smolts for an adult run of this size.

3. Existing habitat must be protected to meet this objective.

Problems and Recommended Actions

Problem 1. Land- and water-use practices in the basin may alter habitat and decrease production.

Action 1.1 Actions to protect and enhance habitat, which are outlined in the Habitat Section of this plan, generally address this problem and must be diligently pursued.

Problem 2. Information on the habitat requirements of the native stock are inadequate to provide specific guidelines for habitat protection and enhancement and to accurately estimate the production capacity of the basin.

Action 2.1 Investigate the life history characteristics and determine the habitat requirements of adults and juveniles.

Problem 3. Smolt passage is inadequate at Foster and Green Peter dams on the South Santiam River and at Fall Creek dam on Fall Creek, and adult passage is inadequate at Green Peter Dam and below Fall Creek Dam.

Action 3.1 Continue research at Foster and Green Peter dams on the South Santiam River until 1988 to improve upstream and downstream passage. Develop long-term mitigation and compensation goals for Foster and Green Peter dams.

Action 3.2 Continue negotiating with the USACE to improve flows for adult migration below Fall Creek Dam. Downstream passage of juveniles at Fall Creek Dam remains a problem.

Problem 4. Introduced early-run (Big Creek and early Eagle Creek) stocks may compete with the native stocks, particularly juveniles.

Action 4.1 In streams where native stocks occur:

A. Release early-run stock only in streams where they have previously been introduced.

B. Release only smolt-sized early run fish where early-run stock are released.

Problem 5. Wild steelhead can be overharvested if abundant hatchery fish occur at the same time in the same area. This is a concern with (1) late-run winter steelhead and early returning hatchery summer steelhead, and (2) wild and hatchery winter steelhead (Big Creek, Eagle Creek, and Willamette stocks).

Action 5.1 Determine spawning escapement objectives for wild, late-run Willamette winter steelhead stocks.

Action 5.2 Develop methods to monitor spawning escapement.

Action 5.3 If the escapement objective are not met, develop methods to selectively harvest hatchery fish (e.g., fin-marking hatchery fish for identification) or change hatchery release locations.

Objective 3. Maintain an average annual run of 2,000 hatchery, late-run winter steelhead above Willamette Falls.

Assumptions and Rationale

1. Hatchery production provides partial compensation for lost wild production above Detroit Dam.

2. The numbers of fish released will be adjusted depending on survival rates to provide the target run size.

3. An increase in the run size objective for hatchery late-run winter steelhead may decrease wild production and increase the difficulty of managing some streams exclusively for wild fish.

Problems and Recommended Actions

Problem 1. The low rate of survival to adults of hatchery smolts limits the efficiency and cost-effectiveness of the hatchery program.

Action 1.1 Investigate changing the smolt production schedule to reduce precociousness and increase size at release.

Objective 4. Maintain an average annual run of 5,000 early-run (November through February 15) winter steelhead above Willamette Falls.

Assumptions and Rationale

1. This run is composed primarily of returns of releases of Big Creek hatchery stock. About 23% of the run are naturally produced.

2. Up to 115,000 Big Creek smolts will be released per year, based on a survival rate of 3.4%, the average survival for releases made during 1978-83. The number of smolts released will be reduced depending on the number of early-run stock released from STEP hatchboxes so that adult production from smolt and fry releases does not exceed the run-size objective.

Problems and Recommended Actions

There are no management problems that will prevent attainment of this objective.

Shad

Guidelines

Guideline 1. Shad will be managed for sport angling.

Objectives

Objective 1. Increase public awareness of the sport angling opportunities for shad.

Assumptions and Rationale

1. Substantial runs of shad enter the Willamette and can be harvested below the Falls.

2. Shad populations can withstand greater harvest.

Problems and Recommended Actions

Problem 1. Bank angling opportunities are limited.

Action 1.2 Improve bank angling opportunities.

Objective 2. Determine the catch and angling effort of the sport fishery.

Assumptions and Rationale

1. Sufficient data on the shad fishery is collected in conjunction with present sampling programs for other species.

Problems and Recommended Actions

There are no management problems that will prevent attainment of this objective.

Sturgeon

Guidelines

Guideline 1. The white sturgeon population below Willamette Falls will be maintained by natural production.

Objectives

Objective 1. Determine the sport catch and distribution of angling effort below Willamette Falls.

Assumptions and Rationale

1. The present sampling program provides adequate data to estimate the catch and effort.

Problems and Recommended Actions

There are no management problems that will prevent attainment of this objective.

Objective 2. Determine the catch, angling effort, and age and size composition of the sturgeon populations above Willamette Falls.

Assumptions and Rationale

1. Several fisheries have developed above Willamette Falls, and little information regarding these fisheries is available.

2. Catch data from returns of sturgeon tags will be available beginning in 1987.

Problems and Recommended Actions

Problem 1. Little is known about the distribution, age and size composition, and sport catch of, or the angling effort for sturgeon above Willamette Falls.

Action 1.1 Estimate sport catch and effort above Willamette Falls by conducting angler surveys and analyzing returns of sturgeon punchcards.

Action 1.2 Begin biological sampling to determine distribution, age, growth, and relative abundance of sturgeon above Willamette Falls.

Resident Trout

Guidelines

Guideline 1. **Production of yearling hatchery trout will not be increased above the current level (approximately 1.1 million fish).**

Guideline 2. **Yearling trout will not be stocked in streams or sections of streams that are not currently stocked.**

Guideline 3. **Except for experimental purposes, stocking of yearling trout will be discontinued or modified where the return to the angler is consistently less than 40% of the number released.**

Guideline 4. **The incidental catch of wild and hatchery salmon and steelhead smolts in the trout fishery will be reviewed during the preparation of subbasin plans. Subbasin plans will determine acceptable levels of smolt harvest and, if needed, specify actions to reduce harvest to acceptable levels.**

Guideline 5. **Increases in demand for trout angling will be directed away from more popular streams to standing water bodies and less popular streams.**

Objectives

Objective 1. **Manage wild rainbow, cutthroat, and bull trout populations to maintain production potential and genetic integrity.**

Assumptions and Rationale

1. Wild populations of trout are a valuable resource that reproduce naturally; and through their diversified gene pool, they are able to adapt to changing selective pressures.

2. The basin supports native stocks of migratory (potamodromous) cutthroat trout, resident cutthroat trout in tributaries, rainbow trout, and bull trout.

3. Protection and enhancement of wild trout populations will be achieved principally through habitat protection and improvement (see the Habitat Section), restricted use of hatchery fish, and angling regulations.

4. Because potamodromous cutthroat populations are dependent on the mainstem of the Willamette River for part of their life cycle, special consideration will be given to the identification and protection of mainstem habitat.

5. Subbasin plans will designate some streams in the basin for wild fish management and will determine stocking levels and areas of hatchery trout.

Problems and Recommended Actions

Problem 1. The population trends and harvest of wild trout in the basin and factors limiting their production are largely unknown.

Action 1.1 Monitor abundance and catch of wild trout in selected streams.

Problem 2. The production potential of many wild trout streams has not been determined.

Action 2.1 Develop a program to measure the production potential of representative streams in the basin.

Problem 3. Trout stocks in the basin have not been identified.

Action 3.1 Identify trout stocks in the basin by comparing electrophoretic patterns and physical and life history characteristics.

Problem 4. Releases of hatchery trout and other species can reduce wild trout production.

Action 4.1 When stocking programs are evaluated, the advantages of stocking hatchery trout must clearly outweigh impacts on wild trout production.

Objective 2. Increase public awareness of the values of and the need to protect wild trout and the angling possibilities in the basin, and increase angler involvement in wild trout management.

Assumptions and Rationale

1. The general public has become accustomed to angling for hatchery trout, and many anglers are not aware of the values of wild trout, areas to fish for wild trout, opportunities for involvement in the protection and enhancement of wild trout (e.g., STEP), and the need for management strategies that may differ considerably from those designed for hatchery trout.

Problems and Recommended Actions

There are no management problems that will prevent attainment of this objective.

Objective 3. Provide additional angling opportunities and redistribute angler pressure by the use of hatchery fish.

Assumptions and Rationale

1. The consumptive demand for wild trout is greater than the supply of wild fish in some fishing areas and in streams close to population centers.

2. Yearling trout stocked to provide an early season fishery in lakes supporting warmwater fisheries may encourage trout anglers to pursue warmwater species.

3. The size composition and density of trout populations in standing waters, especially high lakes, can be controlled by the stocking rates and angling regulations.

4. Some owners of private trout waters are willing to allow public angling.

Problems and Recommended Actions

Problem 1. About 20% of the hatchery fish released move downstream out of targeted fishing areas.

Action 1.1 Continue studies to minimize the migratory behavior of hatchery trout.

Problem 2. Angling pressure on many waters, particularly near urban areas, is greater than the supply of hatchery trout.

Action 2.1 Shift the allocation of hatchery trout from streams where the catch is consistently less than 40% of the number released to standing water bodies, especially near urban areas.

Problem 3. The extent of trout waters owned and controlled by private parties and their associated public angling opportunities are not well known.

Action 3.1 Inventory privately controlled trout waters and determine their potential for public angling.

Whitefish

Objectives

Objective 1. Increase angler awareness of the excellent sporting and eating qualities of whitefish and publicize fishing locations.

Assumptions and Rationale

1. Whitefish can sustain increased harvest.

2. Sport fishing can be increased through increased public information and promotion.

Problems and Recommended Actions

There are no management problems that will prevent attainment of this objective.

Warmwater Game Fish

Guidelines

Guideline 1. Management of largemouth and smallmouth bass and channel catfish will be emphasized.

Guideline 2. Introduction and enhancement of warmwater species will be integrated with management of salmonids.

Guideline 3. Warmwater species will be introduced or enhanced only in waters with suitable habitat.

Objectives

Objective 1. Develop plans for managing warmwater species in reservoirs in the basin.

Assumptions and Rationale

1. The public desires more and better warmwater angling in reservoirs.

2. Reservoirs have been managed primarily for salmonid production. Conditions in some reservoirs have changed since their construction so that they can now produce both warmwater species and salmonids.

3. Production of warmwater species may conflict with salmonid production in some situations.

Problems and Recommended Actions

Problem 1. Management objectives for warmwater species in some reservoirs in the basin have not been determined.

Action 1.1 Systematically review the management of warmwater species in reservoirs and develop management objectives and recommendations.

Objective 2. Improve warmwater fish production and angling opportunities.

Assumptions and Rationale

1. Angling for warmwater game fish is becoming increasingly popular and present opportunities do not satisfy the demand.

2. Populations of warmwater game fish in some reservoirs could sustain additional harvest and provide a substantial increase in angling opportunity.

3. Angling opportunities can be increased through fish introductions, increased production of existing populations, habitat enhancement, improved access, and regulation changes.

Problems and Recommended Actions

Problem 1. Biological information on warmwater species is not adequate to achieve the optimum production.

Action 1.1 Continue or increase sampling to determine relative abundance, distribution, size and age structure, and ecological characteristics of warmwater game fish.

Action 1.2 Determine where suitable habitat exists for production of warmwater game fish production.

Problem 2. Supplies of warmwater game fish for stocking are insufficient.

Action 2.1 Transfer juvenile production from the St. Paul ponds, which have cool water temperatures that restrict production, to areas that are more suited for production of warmwater fish.

Action 2.2 Until juvenile production ponds are relocated, continue to intensively manage the St. Paul ponds to obtain maximum production of fingerlings.

Action 2.3 Locate noncommercial sources of fingerlings for stocking. Two possibilities are (1) trapping wild fish from public waters and (2) obtaining fish from private ponds through reciprocal agreements between ODFW and private pond owners, whereby ODFW will stock their ponds in return for use of subsequent surplus production of fingerlings for stocking other waters.

Action 2.4 Locate reliable commercial sources of warmwater fish and secure funding to purchase and transport fish to supplement production from ODFW facilities and noncommercial sources.

Problem 3. The St. Louis ponds do not produce the quality or quantity of angling that the public and ODFW had anticipated.

Action 3.1 Revise angling objectives, which were set prior to opening of the ponds, to reflect the actual production potential of the ponds.

Action 3.2 Increase fish production and angling opportunities in the ponds by fertilization, chemical rehabilitation, introduction of hybrid sunfishes, and other techniques.

Problem 4. Habitat for warmwater species, particularly bass, in many reservoirs is poor because of preimpoundment land clearing and reservoir operation.

Action 4.1 Identify habitat deficiencies and determine what measures can be taken to improve habitat.

Action 4.2 In cooperation with other agencies, encourage planting vegetation in the drawdown zones of reservoirs, where recommended in reservoir management plans.

Action 4.3 Work with the planners of any new reservoirs to assure that an ample quantity of woody structure is left in the impoundment.

Problem 5. Extreme drawdown of reservoirs below their conservation pool results in massive loss of warmwater game fish both within and downstream of the reservoir.

Action 5.1 This problem is addressed in the Habitat Section (Objective 3, Action 3.4).

Problem 6. Structures to provide bank angling are lacking in many public waters.

Action 6.1 Develop fish-attracting structures, such as artificial reefs and weed beds, where appropriate.

Action 6.2 Install fishing piers or other structures to allow public access to areas where fish concentrate.

Problem 7. Cottage Grove Reservoir could provide additional bass fishing, but the fish contain excessive levels of mercury.

Action 7.1 This problem is addressed in the Cottage Grove Reservoir mini-plan.

Objective 3. Increase public awareness of warmwater angling opportunities in the basin.

Assumptions and Rationale

1. ODFW's weekly fishing report can be used to provide current information to attract anglers during times of good fishing.

2. Publications, such as the "Guide to Warmwater Angling in the Portland Metropolitan Area," can direct people to angling opportunities in specific areas.

Problems and Recommended Actions

Problem 1. There is insufficient information available on warmwater fishing opportunities.

Action 1.1 Develop and circulate an angling calendar to highlight seasonal angling opportunities for warmwater game fish.

Action 1.2 Publish additional fishing guides for warmwater game fish.

Action 1.3 Improve the weekly fishing reports with regards to warmwater species.

Miscellaneous Species

Objectives

Objective 1. Protect and enhance nongame endemic fishes that occur in small numbers or have limited distribution.

Assumptions and Rationale

1. Two species of concern are the Oregon chub and the sand roller. The Oregon chub, which has been found only in the Middle Fork Willamette and Umpqua rivers, is currently on the state list of protected species and has been proposed for federal protection through the Endangered Species Act. The abundance of the sand roller is also suspected to be low.

2. Protection of critical habitat is necessary to avoid further declines in abundance and distribution.

3. Oregon State University is conducting studies that will provide information on the Oregon chub.

Problems and Recommended Actions

Problem 1. Additional information is needed on the abundance, distribution, life history, and habitat of the Oregon chub and sand roller.

Action 1.1 In cooperation with Oregon State University and other resource agencies, seek additional funds to conduct studies to provide the necessary information to develop and implement management plans for these species.

Crayfish

Objectives

Objective 1. Assess the population status and commercial harvest of crayfish in larger streams.

Assumptions and Rationale

1. Present catch information is reported only by date and county.
2. Information should be collected for the most heavily fished waters.
3. Data can be collected at reasonable cost from commercial fishermen.

Problems and Recommended Actions

Problem 1. The present data collection system is insufficient to provide accurate information on the catch by location.

Action 1.1 Require commercial harvesters to use a logbook to record effort and catch for all crayfish harvest.

Problem 2. There is no crayfish management plan for the state.

Action 2.1 Support efforts to prepare a state-wide crayfish management plan.

Problem 3. Biological information on crayfish is insufficient for management.

Action 3.1 Conduct biological sampling to determine size and age composition and relative abundance of crayfish.

Angler Access

Guidelines

Guideline 1. ODFW will seek to provide angling access to allow public use of the basin's fish populations, to provide a diversity of angling opportunities, and to encourage dispersion of angling effort.

Objectives

Objective 1. Increase angling access, particularly for bank angling, to public and privately controlled waters.

Assumptions and Rationale

1. The amount and types of angling access are inadequate in some areas for present and projected angling pressure. Opportunities for bank anglers are more limited than for boat anglers.

2. Many prime fishing waters are not used because the adjoining property is privately owned.

3. To protect the landowner and encourage greater public use of fish and wildlife on private lands, state statute limits landowner liability where the public is allowed access to private property for recreation.

Problems and Recommended Actions

Problem 1. Angling access needs and opportunities have not been fully determined.

Action 1.1 Update the master list of access needs in the basin.

Action 1.2 Review the present access sites and determine the requirements to make these sites fully usable. Determine priorities for funding.

Action 1.3 Continue to inventory private waters that contain game fish.

Problem 2. Public use of many desirable fishing waters is restricted by private ownership.

Action 2.1 Provide assistance to private landowners in managing private ponds open to public use.

Action 2.2 Explore the possibility of entering into contractual agreements to maintain privately owned fishing access areas in exchange for public access.

Action 2.3 Promote the concept of "angling by permission" where access cannot be obtained through other means.

Problem 3. Angling opportunities are reduced by low flows below Foster Dam on the South Santiam River and on the McKenzie River below Leaburg Dam where mainstem flow is diverted into the Leaburg and Walterville canals and by high flows below Dexter Dam on the Middle Fork Willamette River.

Action 3.1 Negotiate with USACE and EWEB to provide flows to improve opportunities and conditions for angling below Foster, Leaburg, and Dexter dams.

General Management Needs

Objective 1. Prepare management plans for subbasins in the Willamette Basin.

Assumptions and Rationale

1. The Willamette Basin Fish Management Plan provides general direction for management of the basin's fish resources. More specific objectives and strategies for solving management problems in the subbasins are also needed. Subbasin plans will be the basis for coherent, systematic management in the subbasins and coordinated management throughout the basin.

2. Management plans have been prepared for the McKenzie River subbasin, the North Fork of the Middle Fork Willamette River, Lost Lake, Big Lake, Detroit Reservoir, Lookout Point Reservoir, Gold Lake, Cottage Grove Reservoir, Dorena Reservoir, Marion Lake and Hagg Reservoir.

Problems and Recommended Actions

Problem 1. Management plans need to be prepared for additional subbasins.

Action 1.1 Prepare subbasin management plans according to the following schedule:

Subbasin	Expected year of plan adoption
Clackamas	1988
Molalla	1989
Calapooia	1989
Santiam	1990
Westside (Yamhill, Luckiamute, Marys and Long Tom)	1991
Tualatin	1992
Middle Fork Willamette	1992
Mainstem Willamette	1993

Objective 2. Determine the contribution of the basin's fish resources and fisheries to the state's economy.

Assumptions and Rationale

1. The economic values of Oregon's fish management programs need to be considered in resource management.

2. ODFW's resources can best be allocated if the costs and benefits of its programs are known.

Problems and Recommended Actions

Problem 1. The economic value of ODFW's fish management programs are not known.

Action 1.1 Conduct economic evaluations of the summer and winter steelhead programs.

Action 1.2 Conduct an economic evaluation of the resident trout program.

Objective 3. Survey anglers to determine their angling preferences, catch, and fishing effort.

Assumptions and Rationale

1. Management programs are designed in part to satisfy angler preferences and demand.

2. Angler demand, preferences, catch, and effort change over time.

Problems and Recommended Actions

Problem 1. The last statewide survey, completed in 1978, is outdated.

Action 1.1 Conduct a statewide angler survey from which information specific to the Willamette Basin will be available.

APPENDIX A. Fish species occurring in the Willamette Basin.[a]

Common Name	Scientific Name
Bullhead Catfishes	**Family Ictaluridae**
*Yellow bullhead	Ictalurus natalis
*Brown bullhead	Ictalurus nebulosus
*Black bullhead	Ictalurus melas
*Channel catfish	Ictalurus punctatus
Lampreys	**Family Petromyzontidae**
Western brook lamprey	Lampetra richardsoni
Pacific lamprey	Lampetra tridentata
Herrings	**Family Clupeidae**
*American shad	Alosa sapidissima
Livebearers	**Family Poeciliidae**
*Mosquitofish	Gambusia affinis
Minnows	**Family Cyprinidae**
Chiselmouth	Acrocheilus alutaceus
*Goldfish	Carassius auratus
*Common carp	Cyprinus carpio
Oregon chub	Hybopsis crameri
Peamouth	Mylocheilus caurinus
*Fathead minnow	Pimephales promelas
Northern squawfish	Ptychocheilus oregonensis
Longnose dace	Rhinichthys cataractae
Leopard dace	Rhinichthys falcatus
Speckled dace	Rhinichthys osculus nubilus
Redside shiner	Richardsonius balteatus
Tench	Tinca tinca
Perches	**Family Percidae**
*Yellow perch	Perca flavescens
*Walleye	Stizostedion vitreum vitreum
Sculpins	**Family Cottidae**
Prickly sculpin	Cottus asper
Mottled sculpin	Cottus bairdi
Paiute sculpin	Cottus beldingi
Shorthead sculpin	Cottus confusus
Reticulate sculpin	Cottus perplexus
Torrent sculpin	Cottus rhotheus
Sticklebacks	**Family Gasterosteidae**
Threespine stickleback	Gasterosteus aculeatus

APPENDIX A (continued)

Common Name	Scientific Name
Sturgeons	**Family Acipenseridae**
White sturgeon	Acipenser transmontanus
Suckers	**Family Catostomidae**
Largescale sucker	Catostomus macrocheilus
Mountain sucker	Catostomus platyrhynchus
Sunfishes	**Family Centrarchidae**
*Green sunfish	Lepomis cyanellus
*Pumpkinseed	Lepomis gibbosus
*Warmouth	Lepomis gulosus
*Bluegill	Lepomis macrochirus
*Redear sunfish	Lepomis microlophus
*Smallmouth bass	Micropterus dolomieui
*Largemouth bass	Micropterus salmoides
*White crappie	Pomoxis annularis
*Black crappie	Pomoxis nigromaculatus
Trouts	**Family Salmonidae**
Coho salmon	Oncorhynchus kisutch
*Sockeye salmon	Oncorhynchus nerka nerka
*Kokanee	Oncorhynchus nerka kennerlyi
Chinook salmon	Oncorhynchus tshawytscha
Mountain whitefish	Prosopium williamsoni
Coastal cutthroat trout	Salmo clarki clarki
Steelhead (sea run rainbow)	Salmo gairdneri gairdneri
Rainbow trout (resident)	Salmo gairdneri
*Brown trout	Salmo trutta
*Brook trout	Salvelinus fontinalis
Bull trout	Salvelinus confluentus
*Lake trout	Salvelinus namaycush
Trout-perches	**Family Percopsidae**
Sand roller	Percopsis transmontana
Amphibians	**Family Amphibia**
*Bullfrog[b]	Rana catesbeiana

[a] *Compiled by Carl Bond, R.E. Dimick, and ODFW.*
[b] *Classified as a game fish species by state statute.*

APPENDIX B. Oregon Administrative Rules for fish management in the Willamette Basin

General Fish Management Policies

635-500-205 (1) Compensation must be provided for losses of production due to development and other man-made causes.

(2) Hatchery production will be evaluated to determine if benefits exceed costs.

(3) It is the general intent of the Willamette Basin Fish Management Plan that numbers of hatchery fish stocked in the basin regardless of species and size will not be increased and that stream systems not currently receiving hatchery fish will not be stocked, with the following exceptions:

(a) Experimental programs where the number of fish released are relatively small and a planned and funded evaluation program exists;

(b) Rehabilitation programs for native species;

(c) As provided for in subbasin plans adopted by the Commission in public hearing; and

(d) Special situations approved by the Commission in public hearing.

(4) Although the plan does not call for increases in releases of hatchery fish or major changes in their distribution, reduction of stocking programs for some species will have a major impact on fisheries. Stocking levels and areas will be addressed in subbasin plans.

Habitat Objectives

635-500-206 (1) The following policies apply to the Willamette River Basin:

(a) Although the Department does not have regulatory authority over most activities that affect aquatic habitat, the agency will actively pursue and promote habitat protection and improvement necessary to achieve the goals and objectives for management of the basin's fish resources.

(b) The productive capacity of the basin will be maintained so that no net loss of natural fish production occurs.

(c) When loss of fish production as a result of habitat alteration is unavoidable, in-kind and in-place compensation for the species affected will be the first priority.

(2) In accordance with these policies, it is the objective of the Department to:

(a) Improve fish passage at Willamette Falls, dams, power projects and, where appropriate, at natural barriers.

(b) Protect instream flows in the basin for fish production.

(c) Increase protection and improvement of stream and standing water habitat.

(d) Increase coordination with agencies involved in natural resource planning and management.

Spring Chinook

635-500-207 (1) The following policies apply to spring chinook in the Willamette Basin:

(a) Willamette spring chinook will be managed for production and harvest of hatchery and wild fish (Option 1 (b) of the Wild Fish Management Policy).

(2) In accordance with this policy, it is the objective of the Department to:

(a) Increase the average annual run size to 100,000 Willamette spring chinook (adults and jacks) entering the Columbia River.

(b) Provide the following annual runs above Willamette Falls based on the predicted size of the runs entering the Columbia River:

Preseason Prediction of Run Size Entering the Columbia River	Run Size Guideline Above Willamette Falls
Less Than 70,000	30,000
70-79,999	30,500-35,000
80-89,999	35,500-40,000
90,000 and more	40,500-45,000
Greater than 100,000	45,000

Between 70,000 and 100,000 fish, the target run size is adjusted such that for each 1,000 fish entering the Columbia River, the target run size above Willamette Falls increases by 500 fish.

(c) Apportion the harvest in the sport and commercial fisheries in the lower Willamette and Columbia rivers according to the following guidelines:

(A) The commercial share shall be 24% when expected runs are similar to 1981-86 (50,000-90,000).

(B) The commercial share may increase to 30% on expected runs greater than 90,000 fish.

(C) At run sizes of less than 50,000 fish the Columbia River Compact will determine the allocation in a public hearing.

(d) Provide anglers above Willamette Falls with a potential harvest of 5,000 spring chinook.

Fall Chinook

635-500-208 (1) The following policies apply to fall chinook in the Willamette Basin:

(a) Fall Chinook will be managed in the Willamette Basin for production and harvest of hatchery fish (Option 1 (c) of the Wild Fish Management Policy).

(b) Releases of juvenile fall chinook will be made only in waters where potentially detrimental interactions with other salmonid species are minimal.

(2) In accordance with these policies, it is the objective of the Department to:

(a) Continue the hatchery program at Stayton-Aumsville Rearing Ponds to maintain annual production of at least 5 million smolts.

(b) Develop a program to produce "bright" fall chinook to provide a high quality sport fish for anglers in the basin.

(c) Develop a trapping facility to collect fall chinook for brood stock.

(d) Continue to monitor fall chinook catch and escapement.

Coho

635-500-209 (1) The following policies apply to coho in the Willamette Basin:

(a) Coho will be managed in the Willamette Basin for production and harvest of hatchery fish (Option 1 (c) of the Wild Fish Management Policy).

(b) Coho production above Willamette Falls will be limited to early run hatchery stock to maximize returns to Oregon fisheries, to use a readily available egg source, and to minimize competition with native species.

(c) No smolts will be released above Willamette Falls except for experimental or mitigation purposes.

(2) In accordance with these policies, it is the objective of the Department to:

(a) Continue to release early-run hatchery stock in tributaries below Willamette Falls.

(b) Develop a program to enhance production and to maintain the genetic characteristics of the Clackamas late-run stock.

(c) Determine the contribution of experimental releases of presmolts above Willamette Falls to offshore and Columbia River fisheries.

Sockeye and Kokanee

635-500-210 Only disease free stocks of kokanee may be released in the Willamette Basin. In accordance with this policy, it is the objective of the Department to:

(1) Allow no adult sockeye to pass above Foster Dam.

(2) Continue annual releases of kokanee in Detroit Reservoir.

Summer Steelhead

635-500-211 (1) The following policies apply to summer steelhead in the Willamette River Basin:

(a) Summer steelhead in the Willamette Basin will be managed for production and harvest of hatchery fish (Option 1 (c) of the Wild Fish Policy). The Department will continue to monitor the run for possible natural production.

(b) Summer steelhead smolts will be released into streams that have suitable adult holding habitat throughout the summer and where adults will provide optimum recreational opportunity.

(c) Only smolt-sized fish will be released to minimize competition with native salmonids.

(d) Brood stock will be collected May through October to maintain broad run-timing while reducing overlap in the run-timing of the native wild winter steelhead stock.

(2) In accordance with these policies, it is the objective of the Department to:

(a) Maintain an average annual run of 30,000 adult summer steelhead into the Willamette River.

(b) Increase the average annual run of summer steelhead above Willamette Falls to 22,000 fish.

(c) Collect 1,700 adults annually for hatchery brood stock.

Winter Steelhead

635-500-212 (1) The following policies apply to winter steelhead in the Willamette River Basin:

(a) Management of native late-run wild stocks will be emphasized.

(b) The following streams will be managed for wild production (Option 1 (a) of the Wild Fish Management Policy): Abiqua Creek, Butte Creek, Pudding River, Thomas Creek, Crabtree Creek, Wiley Creek, Calapooia River, Fall Creek above Fall Creek Dam. Other streams may be designated for wild winter steelhead management in subbasin plans.

(c) Releases of hatchery fish will be continued to compensate for the construction of Scoggins Dam.

(2) In accordance with these policies, it is the objective of the Department to:

(a) Increase the average annual run size to 33,000 winter steelhead into the Willamette River.

(b) Increase the average annual run of wild, late-run (15 February-15 May) winter steelhead above Willamette Falls to 12,000 fish.

(c) Maintain an average annual run of 2,000 hatchery, late-run winter steelhead above Willamette Falls.

(d) Maintain an average annual run of 5,000 early-run (November through February 15) winter steelhead above Willamette Falls.

Shad

635-500-213 Shad shall be managed for sport angling. In accordance with this policy, it is the objective of the Department to:

(1) Increase public awareness of the sport angling opportunities for shad.

(2) Determine the catch and angling effort of the sport fishery.

Sturgeon

635-500-214 The white sturgeon population below Willamette Falls will be maintained by natural production. In accordance with this policy, it is the objective of the Department to:

(1) Determine the sport catch and distribution of angling effort below Willamette Falls.

(2) Determine the catch, angling effort, and age and size composition of the sturgeon populations above Willamette Falls.

Resident Trout

635-500-215 (1) The following policies apply to trout in the Willamette River Basin:

(a) Production of yearling hatchery trout will not be increased above the current level (approximately 1.1 million fish).

(b) Yearling trout will not be stocked in streams or sections of streams that are not currently stocked.

(c) Except for experimental purposes, stocking of yearling trout will be discontinued or modified where the return to the angler is consistently less than 40% of the number released.

(d) The incidental catch of wild and hatchery salmon and steelhead smolts in the trout fishery will be reviewed during the preparation of subbasin plans. Subbasin plans will determine acceptable levels of smolt harvest and, if needed, specify actions to reduce harvest to acceptable levels.

(e) Increases in demands for trout angling will be directed away from more popular streams to standing water bodies and less popular streams.

(2) In accordance with these policies, it is the objective of the Department to:

(a) Manage wild rainbow, cutthroat, and bull trout populations to maintain production potential and genetic integrity.

(b) Increase public awareness of the values of and the need to protect wild trout and the angling possibilities in the basin, and increase angler involvement in wild trout management.

(c) Provide additional angling opportunities and redistribute angler pressure by the use of hatchery fish.

White Fish and Miscellaneous Species

635-500-216 (1) It is the objective of the Department to:

(a) Increase angler awareness of the excellent sporting and eating qualities of white fish and publicize fishing locations.

(b) Protect and enhance nongame endemic fishes that occur in small numbers or have limited distribution.

Warmwater Game Fish

635-500-217 (1) The following policies apply to warmwater game fish in the Willamette River Basin:

(a) Management of largemouth and smallmouth bass and channel catfish will be emphasized.

(b) Introduction and enhancement of warmwater species will be integrated with management of salmonids.

(c) Warmwater species will be introduced or enhanced only in waters with suitable habitat.

(2) In accordance with these policies, it is the objective of the Department to:

(a) Develop plans for managing warmwater species in reservoirs in the basin.

(b) Improve warmwater fish production and angling opportunities.

(c) Increase public awareness of warmwater angling opportunities in the basin.

Crayfish

635-500-218 It is the objective of the Department to assess the population status and commercial harvest of crayfish in larger streams of the Willamette Basin.

Adopted 1-20-88; effective 1-20-88.

Appendix C. Measures of the Fish and Wildlife Program at the Northwest Power Planning Council that specifically pertain to the Willamette Basin.

Section 400 - Salmon and Steelhead Downstream Passage: Measures 403(c): Tributary Passage

The Sullivan Plant

(2) The FERC shall require Portland General Electric Company (PGE) to conduct studies to evaluate the juvenile bypass system and screening at the Sullivan Plan.

Background. PGE owns and operates a powerhouse, the Sullivan Plan, at Willamette Falls on the Willamette River. The plant diverts 5,000 cfs from the river into the hydroelectric turbines, and during low flows most of the water from the river passes through the turbines. PGE has taken several measures to correct existing problems, including shutting down the powerhouse during low flows and installing bypass screening. Further studies are needed to evaluate the effectiveness of these measures.

Foster Dam

(3) The Corps of Engineers shall evaluate existing studies and investigate alternative methods of providing adequate downstream fish passage at Foster Dam.

Background. Foster Dam is a low-head dam on the South Santiam River. when it was constructed, it was expected that downstream migrants would pass successfully through the turbines or under the spillway gates. Juvenile spring chinook and sockeye have been successful in passing the dam, but native winter steelhead have not. From 1973 to 1981, annual runs of steelhead declined from an estimated 1,900 adults to fewer than 500.

Leaburg Canal

(4) FERC shall require the Eugene Water and Electric Board (EWEB) to construct the best available juvenile bypass facility at its Leaburg Canal power project.

Background. Substantial populations of juvenile salmon and steelhead migrate through the portions of the McKenzie River affected by the Leaburg project. Studies have shown significant mortalities associated with turbine passage. EWEB has agreed to provide a bypass system.

Walterville Canal

(5) FERC shall require the Eugene Water and Electric Board (EWEB) to conduct studies to determine the best available method of providing a permanent bypass system for juvenile migrants at the Walterville Canal power project.

Background. Walterville Canal is operated by the EWEB in conjunction with Leaburg Canal. The problems encountered by juvenile migrants at this project are essentially the same as those at Leaburg. However, studies to determine the best method to alleviate the situation at Walterville have not been completed.

Section 600 - Salmon and Steelhead Upstream Migration: Measure 603(a): Flow and Spill Criteria.

Green Peter Dam

(4) The Corps of Engineers shall conduct studies to determine the effect of fluctuating flows at Green Peter on the maintenance of steelhead runs in the South and Middle Santiam rivers. The studies shall include:

(A) An evaluation of the effect of maximum and minimum or combinations of flows on adult steelhead movement;

(B) Monitoring of steelhead movement in Green Peter and Foster reservoirs to determine whether delays in migration are occurring in the reservoirs; and

(C) An assessment of spawning and rearing areas above Green Peter Reservoir to determine if alterations have occurred which affect spawning and rearing.

Background. Since the completion of the Green Peter Dam/Foster Dam complex on the South and Middle Santiam river in 1969, there has been a decrease in the number of native winter steelhead in the upper South Fork and Middle Fork of the Santiam River. In 1979 and 1980, no adults returned to the Green Peter dam adult trap,and in 1981 only 13 adults returned. Research is necessary to determine solutions for the decreasing runs to the Middle Santiam River.

Measure 603 (c): Adult Passage Improvements at Tributary Projects

Willamette Falls

(1) Bonneville and the Portland General Electric Company (PGE) as required by the FERC shall jointly install, operate and maintain an adult trapping facility in the Willamette Falls fishway. Funding for the facility shall be in the same proportion as the original ratio of federal-to-PGE funding of the adult fishway.

Background. The fishway at Willamette Falls provides entrance to the upper Willamette Basin for fish destined for upriver areas. Currently up to 50 percent of the annual spring chinook counted at Willamette Falls cannot be accounted for at upstream locations. The ability to trap adult fish will permit the collection of biological data for improved management. It is estimated that 10 percent in adults returning to the upper Willamette River.

Clackamas River dams

(2) The fish and wildlife agencies and Portland General Electric Company (PGE) shall work cooperatively to investigate and resolve adult fish passage problems associated with Portland General Electric Company's (PGE) Clackamas River hydroelectric dams.

Background. The fish and wildlife agencies maintain that the fishways located at the three PGE dams on the Clackamas River have not been effective and adult fish are delayed in moving upstream. PGE believes that the delay of adult fish is not due to the ineffectiveness of its fish ladders, but is caused by the Oregon Department of Fish and Wildlife's smolt release program. Summer steelhead smolts that normally would be released above PGE's North Fork project are released into the North Fork ladder to keep the fish from being caught by trout fishermen. Spring chinook smolts are released at the Clackamas Hatchery immediately below River Mill Dam.

Section 700 - Salmon and Steelhead Wild, Natural and Artificial Propagation: Measures 703(a): Suitable Flows

Willamette Basin projects

(6) In consultation with the fish and wildlife agencies, the Bureau of Reclamation and the Corps of Engineers shall continue studies to establish flow guidelines for the spawning, incubation, and rearing of salmon and steelhead in the Willamette Basin. The Corps shall report the results of these studies to the Council annually.

(7) Based on the results of the required studies, the fish and wildlife agencies and the Corps of Engineers shall propose to the Council flow guidelines to be incorporated into the operation of dams in the Willamette Basin.

(8) Upon approval of flow guidelines by the Council, the federal project operators and regulators shall operate their projects in accordance with those guidelines. In the meantime, they shall meet the established minimum flows.

Background. Over the past several years, the Corps of Engineers has coordinated most reservoir operations in the Willamette Basin with state and federal fisheries agencies. The Corps has, for the most part, accepted those agencies' proposals for flow guidelines, but maintains that certain agency proposals are unacceptable because they require more storage than is available. The Corps also asserts that there are conflicting flows in the proposed guidelines, and that studies are necessary to determine the effects on the entire Willamette system. The purpose of the study period is to resolve these differences.

McKenzie River

(11) Upon approval by the Council, the FERC shall require the Eugene Water and Electric Board (EWEB) to fund a study of the lower McKenzie River to determine the flows required for the spawning, incubation, and rearing of salmon and steelhead.

Background. The McKenzie River is the most important producer of spring chinook salmon in the Willamette Basin. The EWEB hydroelectric facilities at Leaburg and Walterville divert water from the mainstem river. The overall river flow is not affected by this non-consumptive use of water. Two sections of the river, between the intakes and return canals, receive significantly reduced flows during certain periods. Studies to date by the fish and wildlife agencies indicate that greater flows are required to maintain natural propagation of anadromous fish.

Measures 703(b): Temperature Control

Detroit Dam

(1) The Corps of Engineers shall continue to investigate the feasibility of installing devices to control the temperature of the water discharged from Detroit Dam. The Corps shall report study progress to the Council annually and shall make recommendations to the Council at the conclusion of the study.

Background. Studies conducted by the fish and wildlife agencies and tribes indicate that delays occur in adult migration in the north fork of the Santiam River below Detroit Dam due to the low temperatures of the water released from the dam.

Cougar and Blue River dams

(2) The Corps shall continue to investigate the feasibility of installing devices to control the temperature of water discharged from Cougar and Blue River dams. The Corps shall report study progress to the Council annually and shall make recommendations to the Council at the conclusion of the study.

Background. Data on stream temperature reveal that the operation of the Cougar and Blue River dams lowers the spring and summer water temperatures of the South Fork of the McKenzie River, the Blue River, and the mainstem McKenzie near Vida. The lower water temperatures int he spring can affect natural propagation of anadromous fish.

Measures 703(d) - Habitat Improvement and Passage Restoration

(1) Bonneville shall fund habitat and tributary passage projects as provided in action item 4.2. Upon Council approval of system plans provided for in Section 205: System Planning, Bonneville shall fund habitat and passage restoration or improvement measures in those plans, including those measures identified in the plans that are listed in Appendix A Table: Planning Inventory of Enhancement Projects.

Section 1400: action item 4.2

Consult with the project sponsors to determine whether the following projects are needed in the immediate future. If they are, complete them by 1991. [Sections 205, 703(c) (1), 803(b)-Table 2, and Appendix A Table.]

Subbasin	Bonneville Project Number	Title
COLUMBIA RIVER BASIN BELOW BONNEVILLE DAM:		
Willamette Subbasin	84-011	- Collawash Falls Passage - Fish Creek, Wash Creek Habitat Improvement - Fish Creek Evaluation - Hot Springs Fork Passage and Habitat Improvement - Oak Grove Habitat Improvement

Measures 703(h): Intergration of Natural and Hatchery Propagation

Supplementing natural stocks

(2) Bonneville shall provide funds to study the best method of supplementing natural stocks of spring chinook with hatchery stocks in the Willamette River. Based on the results of the study, the fish and wildlife agencies and tribes will develop a program for planting hatchery-reared chinook stocks. Bonneville shall fund this program upon approval by the Council.

Section 900 - Resident Fish and Wildlife

Measures 903(c): Temperature Control

The Bureau of Reclamation, the Corps of Engineers, and other project operators, in consultation with the Council, tribes, and fish and wildlife agencies, shall use storage, where existing structures allow, to maintain water temperature within those ranges which are best for fish habitat.

Measures 903(e): Additional Mitigation and Enhancement Measures

(9) The Corps shall fund additional test vegetation planting at Hills Creek Reservoir and evaluation of its results. Based on the results of these test, Bonneville shall fund a feasibility study to identify which hydroelectric projects in the basin would benefit from such revegetation improvements. Results of this feasibility study and recommendations for protection, mitigation, and enhancement opportunities may be submitted to the Council.

Appendix A Table
Planning Inventory of Enhancement Projects

Subbasin and Project Site	Problem	Solutions (Enhancement Projects)	Species Benefited
WILLAMETTE RIVER			
Collowash Falls	Adult/juvenile passage	Provide passage	Chinook, coho, steelhead
Little Falls Creek Falls	Adult/juvenile passage	Provide passage	Chinook, steelhead
Willamette River	Adult passage	Adult trap facility	Chinook
Clackamas River	Rearing habitat Adult holding habitat Spawning habitat	Feasibility study Riparian revegetation Improve rearing habitat/construct pools Gravel restoration	Chinook, coho, steelhead
Fish Creek	Adult/juvenile passage Channel degradation/ bank instability	Feasibility study Channel rehabilitation	Coho, steelhead
Wash Creek	Adult/juvenile passage Riparian degradation Channel degradation/ bank instability Road construction	Feasibility study Riparian revegetation Provide passage	Steelhead
Upper Clackamas River	Rearing habitat Adult holding habitat Spawning habitat	Feasibility study Riparian revegetation Improve rearing habitat/construct pools Gravel restoration	Chinook, coho, steelhead
Oak Grove Fork	Rearing habitat Adult holding habitat	Environmental assessment report Feasibility study Improve rearing habitat/construct pools Gravel restoration Off-channel development	Chinook, coho, steelhead
Mag Creek	Rearing habitat Adult holding habitat		Coho, steelhead
Hunter Creek	Rearing habitat Adult/juvenile passage Channel degradation/ bank instability	Riparian revegetation Provide passage Improve rearing habitat/construct pools	Coho, steelhead

Appendix A Table

Subbasin and Project Site	Problem	Solutions (Enhancement Projects)	Species Benefited
Lowe Creek	Rearing habitat	Riparian revegetation Improve rearing habitat/construct pools	Coho, steelhead
Fall Creek	Rearing habitat	Gravel restoration	Coho, steelhead
North Fork Clackamas River	Rearing habitat Spawning habitat Water temperature Adult/juvenile passage Channel degradation/ bank instability	Feasibility study Riparian revegetation Provide passage Improve rearing habitat/construct pools Gravel restoration	Chinook, coho, steelhead
Hot Springs Fork	Rearing habitat Adult holding Water temperature Adult/juvenile passage Channel degradation/ bank instability	Feasibility study Riparian revegetation Bank stabilization Provide passage Improve rearing habitat/construct pools	Chinook, coho, steelhead
Pansy Creek	Rearing habitat Spawning habitat Water temperature Adult/juvenile passage Channel degradation/ bank instability	Feasibility study Riparian revegetation Bank stabilization Provide passage Improve rearing habitat/construct pools Gravel restoration	Steelhead
Hugh Creek	Spawning habitat Water temperature Adult/juvenile passage	Riparian revegetation Bank stabilization Provide passage Gravel restoration	Steelhead
Nohorn Creek	Rearing habitat Water temperature Adult/juvenile passage Channel degradation/ bank instability	Feasibility study Riparian revegetation Bank stabilization Provide passage Improve rearing habitat/construct pools	Steelhead

Appendix A Table

Subbasin and Project Site	Problem	Solutions (Enhancement Projects)	Species Benefited
Roaring River	Adult holding habitat Spawning habitat Adult/juvenile passage	Feasibility study Improve rearing habitat/construct pools Gravel restoration Off-channel development	Chinook, coho, steelehad
Collowash River	Rearing habitat Adult holding habitat Water temperature Channel degradation/ bank instability	Feasibility study Riparian revegetation Bank stabilization Improve rearing habitat/construct pools	Chinook, coho, steelhead
East Fork Collowash River	Adult/juvenile passage	Feasibility study	Coho, steelhead
South Fork Clackamas River	Rearing habitat Adult/juvenile passage	Feasibility study Gravel restoration	Chinook, coho, steelhead
Lower Clackamas River	Spawning habitat	Gravel restoration	Chinook, coho, steelhead
Cub Creek	Spawning habitat Adult/juvenile passage	Provide passage Gravel restoration	Steelhead
Pinhead Creek	Rearing habitat	Improve rearing habitat/construct pools	Coho, steelhead
Buckeye Creek	Adult/juvenile passage	Provide passage	Coho, steelhead
Squirrel Creek	Adult/juvenile passage	Feasibility study Provide passage	Steelhead
Tag/Tar Creeks	Adult/juvenile passage	Provide passage	Coho, steelhead
Blister Creek	Adult/juvenile passage	Feasibility study	Steelhad
Calico Creek	Adult/juvenile passage	Feasibility study	Steelhead
Elk Lake Creek	Adult/juvenile pasage	Feasibility study Provide passage	Coho, steelhead
Dickey Creek	Adult/juvenile passage	Feasibility study	Coho, steelhead

Appendix A Table

Subbasin and Project Site	Problem	Solutions (Enhancement Projects)	Species Benefited
Memaloose creek	Adult/juvenile passage	Feasibility study Provide passage	Coho, steelhead
Pick Creek	Adult/juvenile passage	Provide passage	Coho, steelehad
Skin Creek	Adult/juvenile passage	Provide passage	Steelhead
Thunder Creek	Adult/juvenile passage	Provide passage	Steelhead
Trout Creek	Adult/juvenile passage	Feasibility study Provide passage	Steelhead
Whale Creek	Adult/juvenile passage	Provide passage	Steelhead
Whetstone Creek	Adult/juvenile passage	Feasibility study Provide passage	Steelhdad
Whiskey Creek	Adult/juvenile passage	Feasibility study Provide passage	Steelhead
McKenzie River			
Cougar Dam	Adult/juvenile passage	Construct adult collector Reservoir rearing	Chinook, sockeye
Blue River Dam	Adult/juvenile passage	Construct adult collector Reservoir rearing	Chinook
Mohawk River	Logging activities	Improve rearing habitat/construct pools Provide passage Off-channel development	Steelhead