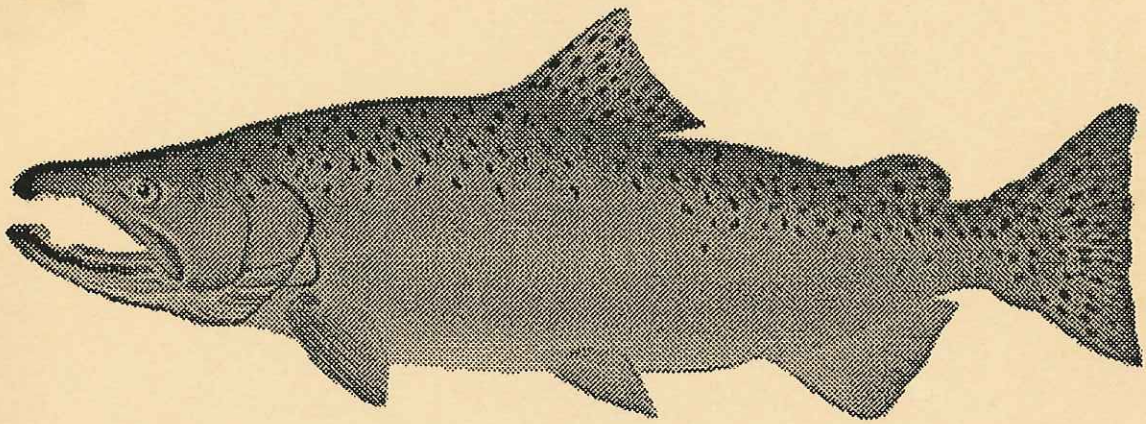
SALMON RIVER BASIN
FISH MANAGEMENT PLAN



Oregon Department of Fish and Wildlife

November 1997

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INTRODUCTION

The Fish Management Policy of the Oregon Department of Fish and Wildlife (ODFW) requires that management plans be prepared for each basin or management unit. The Salmon River Basin Fish Management Plan (hereafter referred to as the Salmon River Plan) was developed to direct management of the fish resources of the Salmon River basin. The scope of the plan includes the mainstem Salmon River and its tributaries and publicly accessible lakes, ponds and reservoirs in the basin.

The Salmon Plan is one of several Oregon mid-coast basin plans developed by ODFW. Other plans have been developed for the Siletz River, Yaquina River, Alsea River, Yachats River, and Siuslaw River basins and for small ocean tributary streams along the mid-coast.

ODFW is committed to the planning process as an integral part of all current and future management by the agency. Species plans for coho, coastal chinook, steelhead, trout and warmwater game fish have been adopted. These statewide plans guide the development of more localized plans for individual river basins and subbasins.

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

The Salmon River Plan was jointly developed by ODFW staff and a public steering committee. The steering committee included individuals who represented federal land management agencies, state and local government, private landowners, and fishing and conservation groups. The function of this committee was to help identify management direction and strategies for fish resources in the Salmon River Basin. The steering committee helped develop management policies, objectives and actions, and reviewed drafts of the plan. Salmon River Basin Steering Committee members were:

Member	Affiliation
Jerry Buxton	*Oregon Salmon Commission*
Jack Dunaway	*Oregon Department of Forestry*
Bob Gebhart	*Oregon Salmon Commission*
Thomas Gilg	*Mid-Willamette Fly Fishers*
Don Gonzales	*Siuslaw National Forest*
Ed Gory	*Landowner*
Bill Lackner	*Game Birds Unlimited*
Dick Patton	*Georgia-Pacific, Inc.*
Doug Pudwill	*River Guide*
Blanchard Smith	*Oceanside Properties*
Jim Stafford	*NW Steelheaders, Lincoln City Chapter*
Dave Stanard	*Siletz Moorage*
Jim Tate	*Dockside Charters*
Dave Wagner	*Devil's Lake Water Improvement District*
Chuck Willer	*Coast Range Association*

The plan is divided into sections that deal with habitat, ecological considerations, the major fish species or groups of species, and angling access. Each of these sections contains:

1. Background and Status–historical and current information on the topic of that section.

2. Management Considerations–important issues to consider in formulating management policies, objectives, and actions.

3. Policies–mandatory operating principles developed specifically for management activities in the basin related to that species or topic.

4. Objectives–what is intended to be accomplished.

5. Actions–means of achieving the objective.

Legal Considerations

Besides the statewide species plans, the Salmon River Plan must also conform to other established constraints such as federal acts (e.g., Wild and Scenic Rivers, Wilderness, Endangered Species), state statutes, administrative rules, memoranda of understanding and other policies. These include:

1. Legislation–Oregon Revised Statutes.

2. Oregon Administrative Rules (OAR)–Goals and policies for commercial and sport fishing regulations, fish management, and salmon hatchery operation, including the Wild Fish Management and Habitat Mitigation policies.

3. Procedures developed by ODFW–Manual for Fish Management (1977); A Department Guide for Introductions and Transfers of Finfish into Oregon Waters (1982).

4. Agreements with other agencies–e.g., U.S. Forest Service (USFS), Bureau of Land Management (BLM), and the state Water Resources Department (WRD).

The Oregon Plan

Subsequent to the initial writing of this plan, the State of Oregon began developing a plan for restoring salmon populations along the entire length of the Oregon coast. The culmination of this effort is called the Oregon Plan. The Salmon River Plan, for the most part, provides more basin specific direction for salmonid recovery efforts than found in the Oregon Plan. The Salmon River Plan, however, did require minor editing to make it consistent with the objectives and actions identified in the Oregon Plan. The wording of some objectives and actions may be different than what was developed with the steering committee, but the intent has remained the same. As new information is gathered and actions to address steelhead recovery are developed, objectives and actions in the Oregon Plan, and consequently the Salmon River Plan, will be revised.

SALMON RIVER BASIN MANAGEMENT OVERVIEW

Perhaps Oregon's best opportunity for recovery of productive native anadromous fish species exists in rivers and streams in the Oregon Coast Range, including the Salmon River Basin. These watersheds typically have vast contiguous expanses of streams that retain their inherent capacity to be very productive for an array of anadromous species. These streams have few dams, limited water withdrawals and large blocks of forested landscape. Most of this habitat has been impacted by human activities, but can be recovered through a combination of natural processes and well thought out artificial restoration projects. Viable wild populations of all native salmonid species except potentially coho are still present so the potential for utilization of existing and recovered habitat is high.

Fishery management in the Salmon River Basin will focus on multiple fish species and the restoration of habitat conditions that benefit the array of native fish (Lichatowich et al. 1995). This multi-species approach is taken because most Salmon River Basin stream reaches support co-existing populations of highly valued anadromous salmonids (coho and chinook salmon, steelhead and cutthroat trout) as well as a variety of non-salmonid species. Management actions including efforts to influence habitat conditions, release of hatchery fish, or angling regulations will unavoidably affect multiple fish species, not simply the single target fish species. Salmon River Basin fishery management will be based on the assumption that overall fish production and benefits will be maximized by creating conditions that are favorable for the array of fish species, and letting natural processes function to determine the production of individual species.

All salmonid species in the Salmon River Basin are at depressed levels with the exception of fall chinook and resident cutthroat trout (Table 1). The depressed status of Salmon River Basin fish stocks has resulted from human induced factors including habitat degradation, excessive harvest, and hatchery influence in combination with natural events such as droughts, floods and El Nino ocean conditions. As human induced factors are controlled and corrected, it is expected that fish abundance will increase substantially, but it is not possible to accurately forecast the shape recovery will take. In addition to the confounding effects of natural environmental variation, the recovery of individual fish species due to reduction in human impacts can only be loosely surmised. For this reason, this management plan will treat specific management targets for individual species as secondary to recovery of the entire basin and variety of fish species.

Table 1. Status of Salmon River Basin salmonid stocks.

Species	Status	Comments
Chum salmon	Depressed	Near southern edge of range of chum salmon; present in only a few tributaries in the lower basin.
Fall chinook	Healthy	Stable or increasing trend similar to other north and central coast fall chinook salmon stocks.
Coho salmon	Severely depressed	Multiple factors responsible for depressed status: hatchery strays, over-harvest, loss of habitat, El Nino ocean conditions.
Winter steelhead	Depressed	Multiple factors responsible for depressed status; limited inventory information.
Cutthroat trout	Searun depressed, Resident stable	Complex biology with multiple life history types.

Harvest management of wild fish will emphasize achieving adequate spawner escapement of all species to allow stocks to rebuild. Angling regulations will be designed to allow harvest of healthy species such as fall chinook while protecting sensitive species or stocks of concern such as chum salmon.

Hatchery fish will play a primary role in supplementing consumptive fisheries for some species. The hatchery fall chinook broodstock will be maintained to mimic native Salmon River stock. An option will be maintained to initiate a new hatchery steelhead program with native stock in the future. If this occurs, smolt acclimation and adult recapture facilities will be set up so returning hatchery fish that are not caught in fisheries can be removed from natural spawning areas. Impacts on natural fish assemblages will be reduced because hatchery fish will be genetically similar to native fish of the same species, and will not spread extensively to natural spawning areas. Increased survival of hatchery fish should be an added benefit from using native stocks and acclimation facilities in hatchery programs. Appendix table B-1 summarizes angling opportunities in Salmon River.

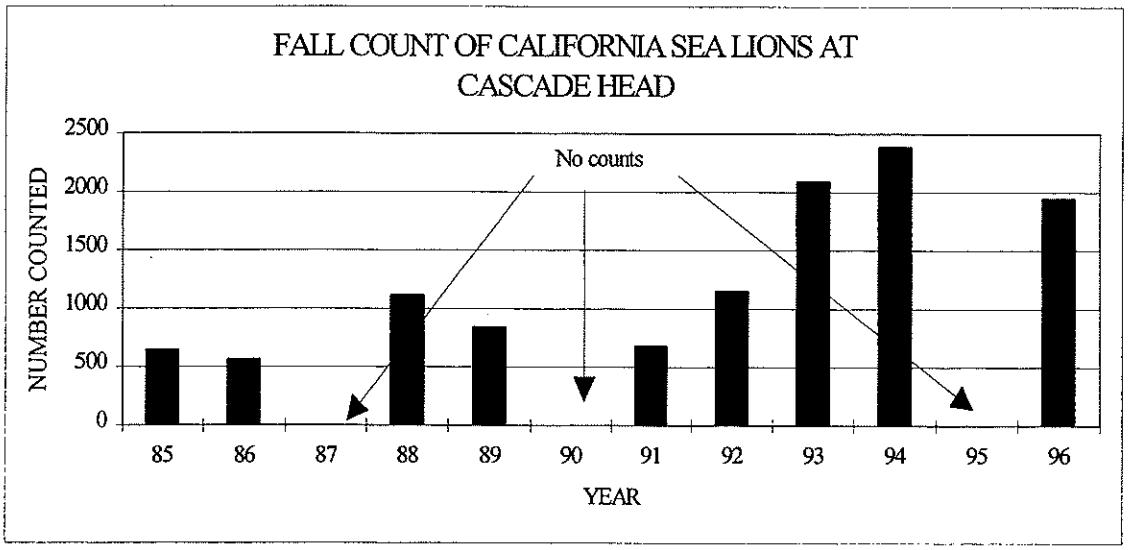
Habitat management will emphasize recovery of natural conditions on a watershed scale. Disturbance such as forest fires, landslides or other events that affect the

landscape and aquatic habitats are recognized as a part of the natural system. It is assumed that the variety of fish species in the Salmon River Basin has developed the capacity to adapt and thrive in the face of these disturbances. It is only when systematic and excessive disturbance creates conditions outside the range of natural variability that native fish stocks are not likely to persist. Priority for habitat restoration activities will be given to watershed characteristics that are outside the range of natural variability and that are important to fish production (see Appendix A).

Individual species that are severely depressed will also be targeted for specific management activities to reduce the risk of extinction in the short term. This is necessary because recovery through a generalized watershed-multiple species approach will be gradual over an extended period of time. This may not be adequate to address immediate threats to the continued viability of severely depressed species such as coho salmon.

Marine mammal predation on Salmon River Basin anadromous fish is a widespread concern. Harbor seals and occasionally California sea lions are sometimes observed preying on salmonids, and increases in their abundance (Figure 1) correspond to declines in several species of anadromous fish. Current research is not available on marine mammal predation in the Salmon River Basin. Previous studies indicate that predation is not a major factor contributing to declines in salmon or steelhead abundance; however these studies are dated and may not be indicative of the current situation in the central Oregon Coast.

Figure 1. Trend in marine mammal abundance counted at Cascade Head.



Action to limit marine mammal predation is not likely at this time because of the Marine Mammal Protection Act. It would be very beneficial to have an understanding of

predation levels in mid coast basins. This would increase the chance that actions could be taken to limit predation if it was determined to have a significant negative affect on a depleted or listed salmonid stock. Understanding seal and sea lion predation would also be helpful in gaining perspective on the overall array of factors influencing anadromous fish abundance. The only action this plan will propose concerning marine mammal predation is initiation of a study to determine current predation levels in mid coast streams.

The following policies, objectives, and actions pertain to management of all fish species in the Salmon River Basin.

Policies

Policy 1. Fish management in the Salmon River Basin shall be directed at protecting and restoring self-sustaining populations of all fish native to the basin.

Policy 2. Management of individual fish populations and their habitat shall only be emphasized when remedial actions are needed to address critical stocks or species, or when a population is the cause of constraints placed on mixed-stock fisheries or land use activities.

Policy 3. Permanent natural barriers to fish migration shall not be altered to allow fish passage and fish will not be transplanted above these barriers.

Policy 4. Conservation objectives take priority over harvest objectives.

Policy5. Introduction of non-native fin fish species into flowing waters of the Salmon River Basin shall be prohibited.

Objectives

Objective 1. Restore and maintain productive populations of all species of salmonids native to the Salmon River Basin.

Assumptions and Rationale

1. Maximum production and the availability for harvest of valuable salmonid species will be achieved by focusing management on restoring and maintaining a functional ecosystem.

2. The Salmon River Basin has viable wild populations of all salmonids native to the basin except coho salmon.

3. Habitat within the Salmon River Basin is still largely suitable for production of native salmonids.

4. Focusing management on multiple species will be more efficient and have a higher probability of success than addressing single species.

5. The reaction of any single depressed fish population within the Salmon River Basin to management actions is difficult to predict. If an overall array of self-sustaining wild salmonids is restored, the relative abundance of individual species will be different from historic levels and largely unpredictable.

6. ODFW lacks resources for specific management of non-salmonid species. It is assumed that the needs of non-salmonid fish species in the Salmon River Basin that are not monitored will be provided for by maintaining and restoring the full compliment of indigenous salmonids.

Actions

1.1 Achieve the habitat objectives described in this plan.

1.2 Bring the level of hatchery fish in natural spawning areas of the Salmon River Basin to less than 10% of the total natural spawning population for each species, except for fall chinook, which will be maintained at 50% or less hatchery fish.

1.3 Control fish harvest in the Salmon River Basin for each species so that production is at levels approaching maximum potential.

1.4 Institute remedial recovery programs for fish species that are now severely depressed within the Salmon River Basin.

HABITAT

Basin Description

The Salmon River Basin is 77 square miles in size. It enters the Pacific Ocean north of Lincoln City (Figure 2). Table 2 gives the approximate amount of fish habitat in the Salmon River Basin.

Table 2. Salmon River Basin size and approximate amount of fish habitat. Preliminary draft analysis.

Basin Area	77 square miles
Estuary area at high tide	204 acres
Stream Habitat	
Large mainstem reaches: spawning by chinook only	7 miles
Medium size tributaries: coho and/or steelhead predominate	43.5 miles
Small tributaries: [a] cutthroat only in most cases	71 miles
Total	121.5 miles

[a] Estimates of small stream habitat were based on the Oregon Department of Forestry 1993 study of stream miles with fish in townships near Toledo and Seaside.

Land Use

Most of the land in the Salmon River Basin is in private ownership (Table 3). Federally owned land in the basin is located in US Forest Service (USFS) and Bureau of Land Management (BLM) ownership in upland areas removed from most major streams (Figure 2).

The dominant land use in the Oregon mid-coast is forestry (Table 4). Areas managed as forest contain, or are used to produce, coniferous and deciduous trees. Rural wood lots, land regenerating from cuts and burns, as well as mixed and pure stands of merchantable or non-merchantable timber are included.

Table 3. Land ownership in the Salmon River Basin.

Basin area (square miles)	Percent of total area			
	BLM	USFS	State	Private
76	9.3	17.3	1.9	71.5

Table 4. Land use in the Oregon mid-coast (Oregon Water Resources Department, 1980).

	Forest	Range	Non-irrigated agriculture	Irrigated agriculture	Urban	Water[a]	Other[b]
Total acres	1,392,765	33,093	21,745	1,249	10,966	14,199	25,510
% of total	92.9	2.2	1.4	0.1	0.7	1.0	1.7

[a] Includes natural and human-made lakes and impoundments.

[b] Includes highway interchanges, airstrips, cemeteries, and other developed areas not adjacent to urban centers.

Secondary uses of land in the Salmon River Basin include range, agriculture, and residential use. Range land includes areas characterized by grasses, shrubs, meadows, unimproved pasture and scattered trees. In the Salmon River Basin, areas managed for range are found primarily in floodplains bordering tidal sections of the stream.

Urban land use pertains to residential, commercial, and industrial developments, including airports, schools, parks, and golf courses. Urban development in the Salmon River Basin is found in or near the city of Lincoln City which has a population of about 6,335 (Center for Population Research and Census 1995). Extensive residential development also exists along the lower mainstem Salmon River and major tributaries including Slick Rock Creek, Bear Creek, and Panther Creek.

ODFW Role in Habitat Management

The ODFW plays an important role in habitat management by acting as fishery expert for land management agencies with control over land use decisions. The ODFW however, does not have regulatory control over land management activities affecting fish habitat.

The ODFW plays a lead role in advising on fish habitat needs in land management decisions developed by State of Oregon land management agencies

Figure 2 Land Ownership in the Salmon River Basin

OWNERSHIP
SALMON RIVER BASIN

- BLM
- USFS
- O & C Lands
- State Lands
- Bankhead & Jones Lands
- Indian Reservations

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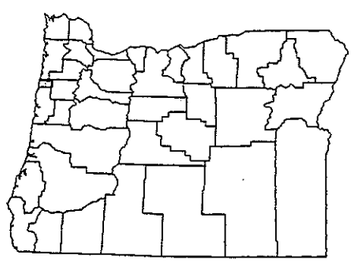
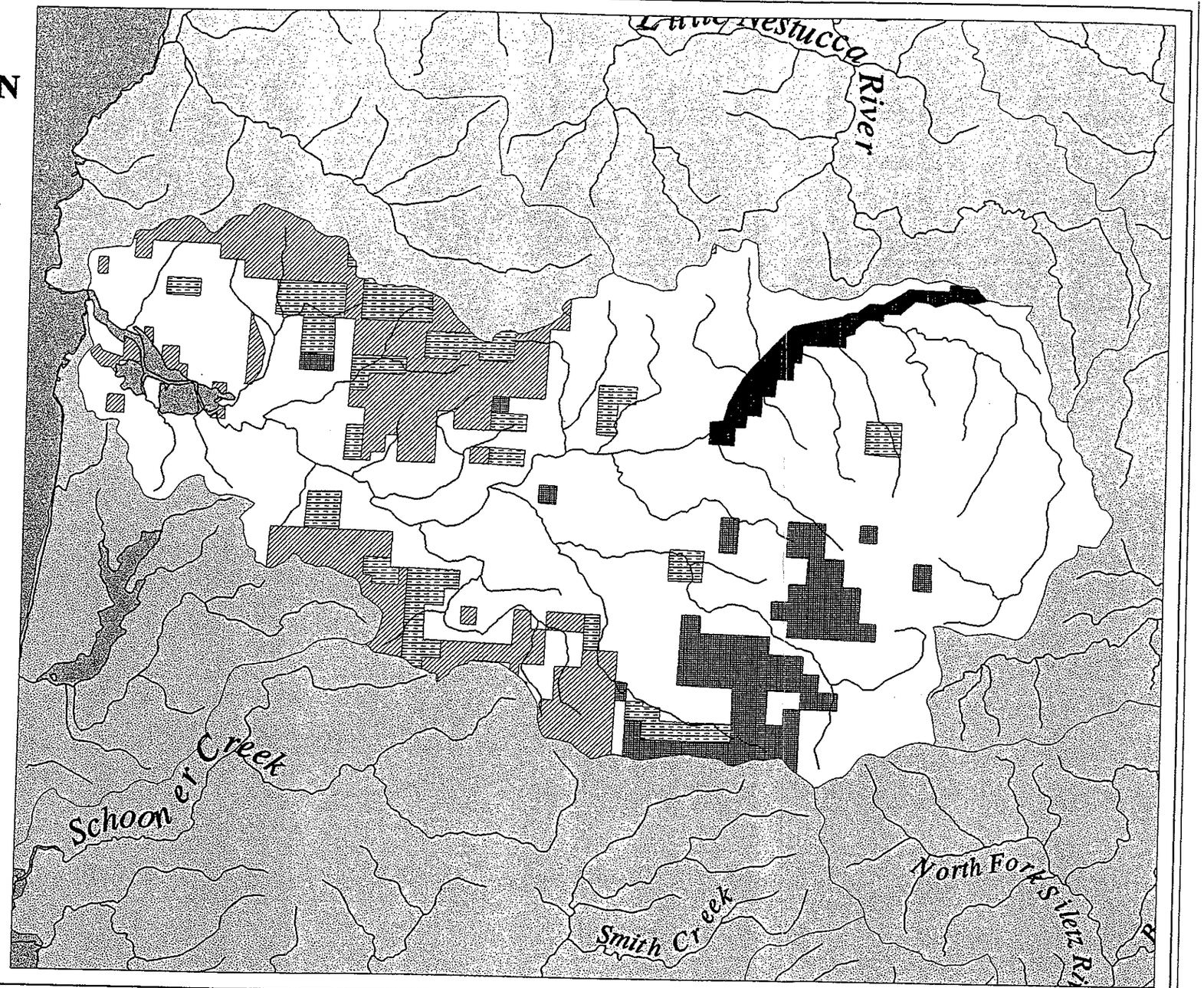
OREGON
Fish & Wildlife

Location





including the Oregon Department of Forestry, the Division of State Lands, the Oregon Water Resources Department, Department of Environmental Quality and the Department of Geology and Mineral Industries. ODFW also plays an advisory role in local and county land use planning activities. Overall activities within this category represent most of land management activities affecting fish habitat on privately owned lands in the Salmon River Basin.

Federal land management agencies have their own fishery biologists who play a lead role in providing consultation concerning fish habitat on federal lands. The ODFW consults with USFS and BLM staff in an advisory role and will work to coordinate direct fish management activities with the USFS and BLM habitat protection efforts on federal land.

The ODFW also works with landowners to implement cooperative fish habitat enhancement efforts in areas where there is a desire to do habitat improvement projects or where a deviation from specific legal standards is needed to address a particular situation.

Goals for Habitat Conditions

A long-term goal for fish habitat within the Salmon River Basin is to return the watershed to natural conditions that allow fish production levels approaching those prior to human disturbance. This long-term goal recognizes that complete habitat recovery is not likely in some areas due to established allocation of land and water to other uses that are sometimes in conflict with providing complete habitat recovery. It also recognizes that the Salmon River Basin has very little fish habitat that is irreversibly lost so a high level of recovery is achievable. Progress toward this long-term goal can occur relatively quickly for some habitat attributes, but will take an extended time period for others.

The short-term goal for fish habitat within the Salmon River Basin is to reverse the declining condition of habitat so that measurable improvement can be achieved in key aspects of watershed conditions that are reflective of the basin's capacity to produce fish. These include:

1. Maintenance or, in a few instances, increases in stream flows during summer low flow periods.
2. Reduction in summer stream temperatures where artificial warming occurs.
3. Increased instream structure such as large woody debris, beaver dams, and other natural materials.
4. Decreased sediment input into the waterway.
5. Maintenance of water quality.
6. Restoration of natural fish passage conditions throughout the watershed.
7. Increased habitat area available to anadromous and resident fish.

Management to Achieve Goals

Actions in this plan will focus efforts on the short-term goal of achieving measurable improvements in watershed conditions that are reflective of the basin's capacity to produce fish. Consideration will be given to improving watershed conditions by protecting habitat from detrimental effects of land use, allowing natural recovery to progress, and undertaking specific targeted restoration projects where natural recovery is not likely to occur in a timely manner. Management issues and approaches for each aspect of watershed condition are as follows:

Instream Flows

Stream flow within the Salmon River Basin has been monitored sporadically. It is not known if flow regimes have changed significantly in recent times. Summer flows may be lower than in the past due to water withdrawals (Figures 3-5).

Peak flows during winter floods may increase if a watershed has extensive roads or cleared land. Intensified flood events will disrupt salmonid habitat by scouring spawning redds, and reducing channel stability. Concerns about increased winter peak flow from cleared lands have been addressed in part by limits on clear-cut sizes on state and private lands.

Figure 3. Annual mean flow for Salmon River at Otis.

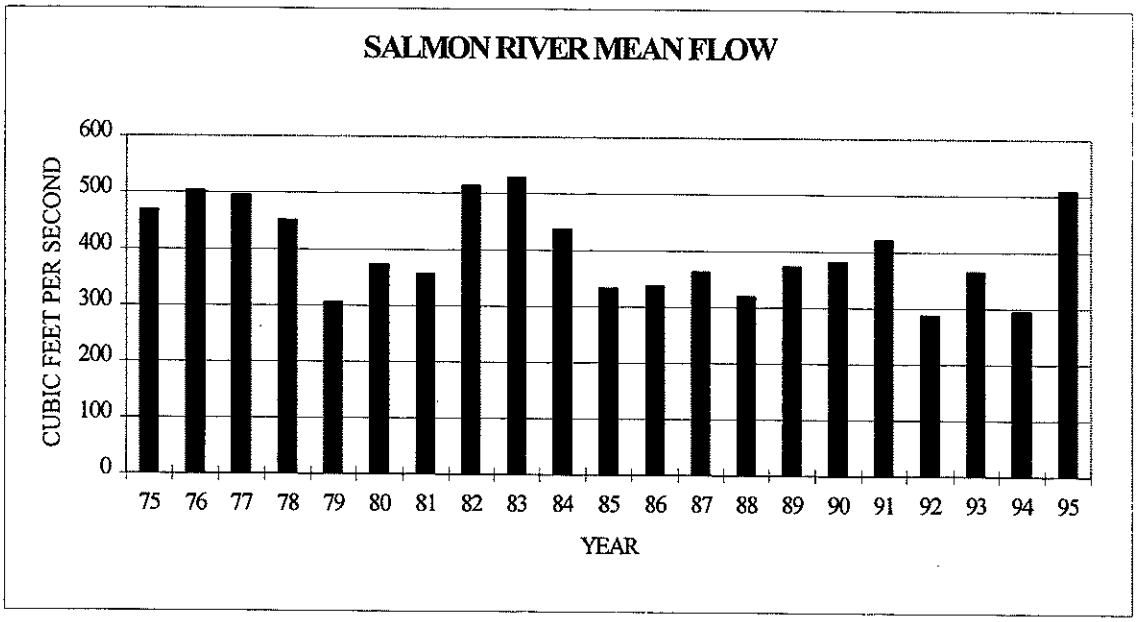


Figure 4. Annual maximum flow for Salmon River at Otis.

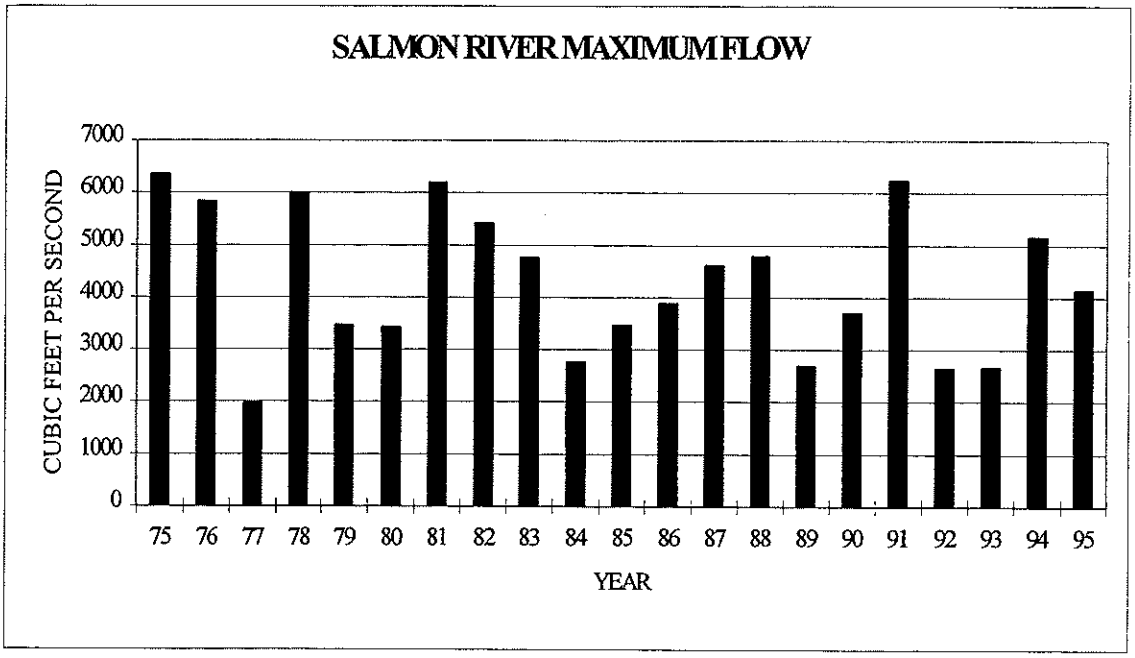
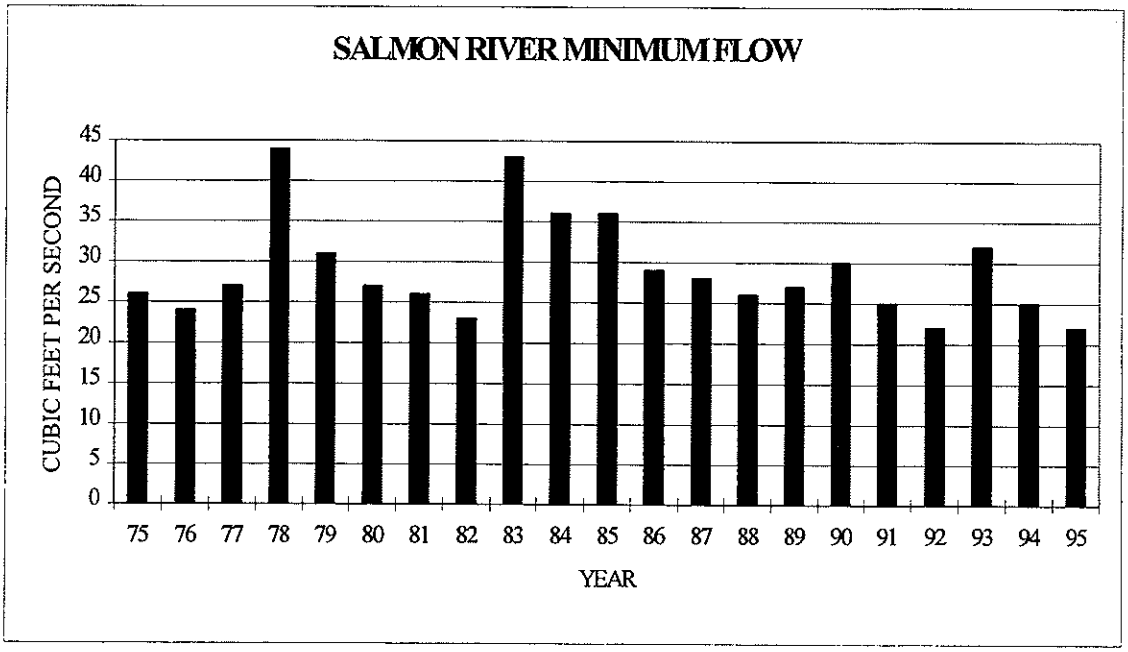


Figure 5. Annual minimum flow for Salmon River at Otis.



The mechanism for maintaining instream flows will be enforcement of ODFW instream water rights (Table 5). Potential for increased summer flow will be dependent on conservation efforts or shifting water users away from summer withdrawals and

toward use of water stored during winter high flow periods. The instream water rights do not have priority over some water uses. It is likely withdrawals will increase gradually unless the instream water right is modified to cap exempt withdrawals or existing water users are switched to the use of stored water.

In the Salmon River Basin, an additional 6 IWR applications have been filed with the Water Resources Department for consideration. These applications are listed in Table 6.

By law, the Water Resources Department is responsible for monitoring streamflows and regulating junior users in times of shortage. In reality, the Water Resources Department is currently not staffed at the field level with sufficient personnel to adequately monitor instream flows. If instream water rights are to be of value, ODFW district personnel will need to assist the Water Resources Department in prioritizing important sites to be monitored or procuring funding for additional staff.

Water Temperature

Altered stream temperatures can result from a variety of land use activities and can have major ramifications for salmonids. Altered water temperatures have been linked to changes in fish survival, growth, reproductive success, migration, interspecific competition, resistance to disease and parasites and overall system productivity (Boechler and McAllister 1992). Elevated temperatures during summer low flow periods are the principal concern identified in mid-coast rivers and streams.

Water temperatures have been monitored continually at Salmon River hatchery since the hatchery was constructed in the 1970's. Figure 6 shows maximum water temperature during July and August from 1977 - 1992. Almost all stream miles in the Salmon River have water temperatures that currently are suitable for salmonids.

Table 5. Instream water rights on the Salmon River from converted minimum perennial streamflows.

Location	Priority date	Exempt uses [a]	Summer minimum (cfs)
Salmon River			
Little Salmon River to Slick Rock Cr.	3-26-74	H, L	15
mouth to Slick Rock Cr.	3-26-74	H, L	30
mouth to old Hwy. 101 crossing	7-12-66	D, L	18
Slick Rock Cr. at mouth	3-26-74	H, L	5
Bear Cr. at mouth	3-26-74	H, L	2

[a] H = human consumption, D = domestic use, L = livestock use, M = municipal use.

Table 6. Instream water right applications in the Salmon Basin.

Stream	Reach (river miles)	Date
Salmon River	9-25	11-19-91
	5-9	3-25-91
Salmon Creek	0-1.5	3-25-91
Deer Creek	0-2	3-25-91
Panther Creek	0-1.5	11-19-91
Bear Creek	0-3.5	3-25-91
Sulphur Creek	0-2	11-19-91

Water temperatures throughout the Salmon River will be monitored during the next few years using automated temperature recorders. Recent developments in technology have made this affordable. Continuous temperature monitoring devices that fit in a film canister now cost less than a hundred dollars. Temperature monitoring will complement existing records and will be used to pinpoint stream reaches where excessive warming is occurring. It will also be used to provide baseline information to evaluate effectiveness at providing cooler summer water temperatures in the future.

Research has determined that increased water temperatures result primarily from exposure of the water surface to the sun (Chamberlin et al 1991). Efforts to prevent excessive summer water temperature will focus on increasing stream shading. In forest lands, the buffer requirements designed to provide large woody debris recruitment should generally be effective at providing stream shading. Loss of stream shade from residential development will be addressed through enforcement of county setbacks that require a 50 foot setback of undisturbed vegetation along the waterway. Efforts will be made to bring residences that are not in compliance into compliance and all new development will be expected to be consistent with the 50 foot setback.

Agricultural lands appear to be where the most severe depletion of riparian shading has occurred. Efforts will be made to cooperatively work with landowners to increase stream side shading and to develop standards for agricultural lands that provide waterway protection that is consistent with other land uses in the basins.

Another probable cause of increased stream temperatures is channel widening that results from increased sediment deposition in the stream channel. Sediment deposition in the stream channel forces the flow toward the stream banks which erode, thereby resulting in a wider channel. This can be addressed by controlling the input of sediment into the drainage.

Water temperatures during the spring, winter, and fall have probably also been altered due to reduction in the riparian canopy. These alterations can impact fish by affecting life history characteristics such as egg incubation time. It will, however, be very difficult to understand and control these impacts, so in the Salmon River we will focus on providing riparian conditions needed to insulate against summer temperature increases and hope this is sufficient to address temperature alteration during other time periods.

Instream Structure

A primary factor that has reduced fish production in all coastal basins is the loss of instream habitat provided by large woody material. Instream large woody debris (LWD) is an essential habitat element for a number of reasons. LWD creates pools and backwater areas that provide slack water refuges during winter high flows and rearing habitat during the summer. LWD also provides nutrient input and traps sediment, including gravel required for spawning.

Instream structure has been lost because it was removed from stream channels to prevent fish passage problems following logging operations, to prevent jams that trigger floods, damage bridges, or interfere with boat traffic. Additionally, logging of large trees from riparian areas has cut off the primary source of continued recruitment of large woody structure to the stream channels. The situation is aggravated because riparian areas are now dominated by alder rather than conifers which provide a much better and more durable source of instream structure.

Figure 6. 1977 - 1996 maximum water temperature regime for July and August at Salmon River Hatchery.

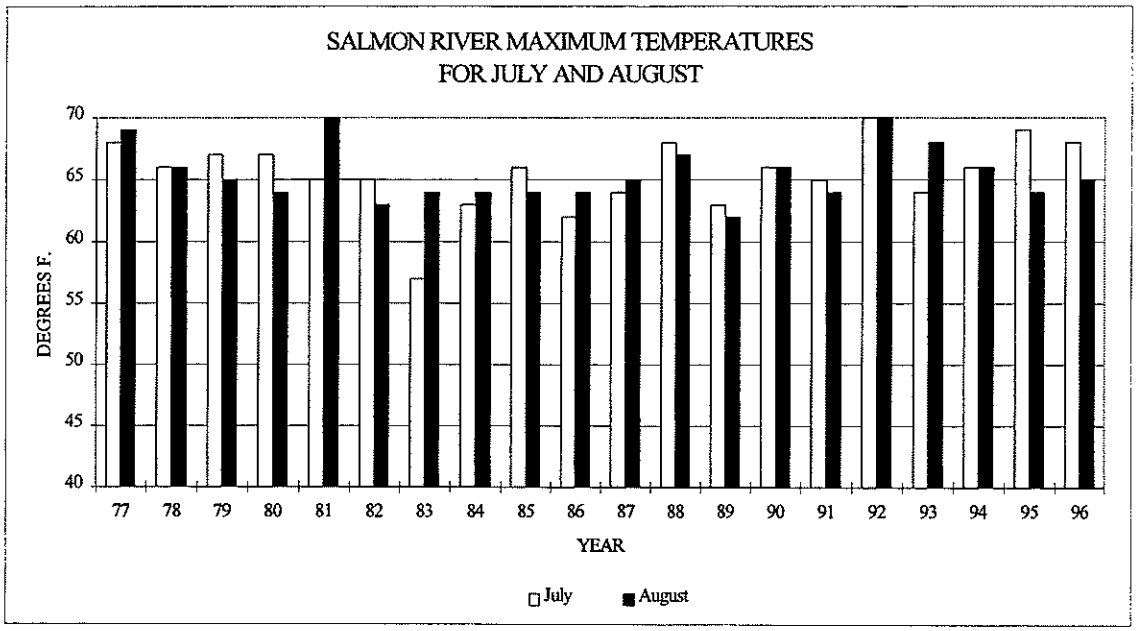


Table 7 shows reduced LWD volumes in commercial timberlands compared to wilderness areas over broad areas of western Oregon. Surveys in recent years have verified that LWD volume is very low in most areas.

A key action to increase LWD recruitment is the recent Oregon Forest Practices Act (FPA). The FPA should increase conifer retention in buffer strips several fold, which will ultimately provide more in stream LWD. Recovery will be slow, however, because most conifers in buffer strips are small or riparian zones are dominated by brush and hardwoods. The FPA will also provide flexibility to landowners to convert brush and alder dominated riparian zones to conifers which may result in better fish habitat in the long-term. Hardwoods do provide valuable LWD, but they decay quickly and are not large enough to set up in bigger tributaries.

At the local level, ODFW will request notification of all forestry activities on private or state land and provide comment on the importance of conifer retention in buffer strips bordering important streams for salmonids. The ODFW will also coordinate with Oregon Department of Forestry and private landowners to artificially place LWD in streams with high potential for salmonid production where logging operations are taking place. These cooperative efforts will be undertaken under the Stream Enhancement Initiative (SEI), a program to implement cooperative fishery improvement projects on private timberlands. This artificial structure placement will not be done as an alternative to natural recruitment of LWD, but will be undertaken to improve fish habitat in the interim until stream-side trees mature and are recruited naturally.

The ODFW will usually recommend that large trees (usually Sitka spruce) that fall into the river are left to improve fish habitat. Removal of these trees for firewood or to improve boat access will be discouraged. In tidewater areas where considerable boating occurs it will be recommended that trees are maneuvered to allow boat traffic, yet still provide habitat benefits.

The effectiveness of increasing instream channel complexity will be evaluated using ongoing habitat surveys by ODFW, private timber managers and the USFS. Measurements of vegetation in riparian areas will also be continued to see if conifers and other large trees are becoming more prevalent. This will provide a more immediate indication that we are moving in the desired direction.

Beaver dams provide a rapid fix to the deficiencies in protected pool habitat that is essential for over-winter survival of juvenile salmonids. Due to their beneficial influence on fish habitat, beaver populations will be encouraged. Some control may still be necessary where damage to road crossings is unavoidable or where plantation damage is severe. The ODFW will recommend that problems with beavers blocking culverts be addressed by modifying the road crossing rather than by trapping the beavers in areas utilized by important fish resources. The ODFW will also recommend that hardwood-to-conifer conversions are not undertaken in stream reaches where important fish populations are found and beaver activity is likely. ODFW will participate in cooperative beaver management planning with forest landowners. The number of pools created by beaver dams is included in most stream surveys.

Table 7. Large woody debris in managed and old-growth forest streams in the Oregon coast range (Boechler and McAllister 1992).

Stream	Large woody debris Frequency (number/mile)	Large woody debris Volume (m^3/mile)	Comments
Old-Growth			
Coos/Coquille tributaries	928	783	Ursitti (1990)
South Fork Drift Creek	-	1,475	Schwartz (1990)
Lobster Creek	317	-	Sedell et al. (1988)
Cummins Creek	352-405	-	Sedell et al. (1988)
Average	541	1,129	
Managed			
Clatskanie River	49	48	
Coast Creek	89	57	
Elliot Creek	112	145	
So. Fk. Wilson River	50	176	
Edwards Creek	80	256	
L. No. Fk. Wilson River	134	402	Good riparian
East Creek	168	485	Beaver activity
Devils Lake Fork	148	627	Debris jam
Deyoe Creek	275	886	Beaver activity
Knowles Creek	18-53	-	Sedell et al. (1988)
Lobster Creek	18-35	-	Sedell et al. (1988)
Average	122	342	

Sedimentation

Land use activities have generally increased the rate of erosion and sediment input into coastal waterways. In steep country, erosion can take the form of torrential landslides that scour stream channels and deliver large amounts of sediment in a single event. These slides destroy fish habitat in small streams. They create instability in spawning bars and channel widening with secondary erosion as sediment flows downstream. In gentle topography, large slides are less prevalent, but flushing rates are low. Surface erosion of fine sediments from roads and exposed soils can degrade spawning areas. The accumulation of sediment in pool habitats results in reduced egg-to-smolt survival.

Forestry related roads are the primary source of increased sediment input into waterways. It is essential that roads are managed so they do not induce slides or contribute to surface erosion if fish habitat is to be improved. The degree to which road-induced sediment has impacted salmonid habitat in the Salmon River Basin is not well understood. It may range from moderate to severe.

Erosion and increased sediment input from multiple sources spread throughout a watershed act in combination to impact fish habitats downstream (Chamberlin et al 1991). Regulatory mechanisms are currently not available to address these cumulative effects.

Monitoring to determine if sediment input is being effectively controlled is needed. The methods to do this are currently being developed. Measurement of sediment input from natural and artificial sources should be a top priority for funding.

Evaluation and correction of erosion problems resulting from road systems is an activity that would be beneficial if private forest landowners desire to do cooperative fish enhancement projects. Beneficial actions to reduce risk could include pulling back sidecast, replacing undersized or deteriorated culverts, water-barring cat roads, and putting non-essential roads to bed.

The ODFW generally discourages in-water work because such work frequently impacts fish and wildlife habitat, degrades water quality, and interferes with water-oriented recreation. The ODFW also recognizes that some in-water projects are necessary to meet human needs and that many activities can be conducted with minimal disturbance to the environment.

The ODFW has recommended time periods for in-water work that will result in the least damage to fish and wildlife. Preferred time periods may vary from year to year due to changes in climatic conditions and streamflows. The type of activity and method of operation may also influence the preferred work period. The recommended time period for in-water work in a particular area in the Salmon River Basin is available from the ODFW District office in Newport.

Water Quality

Fish habitat in the Salmon River Basin can be influenced by factors such as chemical spills, herbicide spraying and the use of fertilizers. In some cases, a clear link has not been established between the water quality variable and impacts to fish production. Impacts of water quality problems on fish production in the Salmon River Basin will be controlled by existing water quality laws.

The ODFW will work with the Oregon DEQ to refine tolerances for potential water quality contaminants that could impact aquatic productivity. The ODFW will also

work with the DEQ and other agencies to monitor water quality to assure that standards are met.

Fish Passage

There are no major areas of the Salmon River that are inaccessible to anadromous fish due to artificial blockages. Impassable culverts prevent anadromous fish from reaching a percentage of the small streams. Obstructions to the movement of juveniles is more frequent because of their reduced ability to pass culverts during high flows. Juvenile steelhead, coho and cutthroat all have seasonal upstream migration patterns, therefore juvenile passage problems may reduce overall production. The Oregon Forest Practices Act requires that all new stream crossings be maintained so they are passable by both adult and juvenile salmonids.

Passage problems at culverts or other structures can be addressed through the SEI program, cooperative efforts on non-forest lands, or by evoking fish passage laws that require passage at all artificial structures be maintained.

Existing fish ladders on streams in the Salmon Basin are listed in Table 8. The ODFW will periodically check these ladders to assure they are functioning properly.

Table 8. Fish ladders on streams in the Salmon River Basin.

Location	Name	Type	Height (ft.)	Year built
Salmon River				
Deer Creek	Deer Creek Fwy. & Sills	Weir	10	1987
Slick Rock Creek				
Trout Creek	Trout Creek Falls	Rock cut	10	1963

Water diversions can also impact fish that are removed from the stream along with the diverted water. Large water diversions that are now active in the Salmon River Basin are adequately screened to prevent loss of fish. ODFW will continue to work with the Oregon Water Resources Department (WRD) and those responsible for water diversions to assure that adequate screening is maintained or installed on these and other diversions that may occur in the future.

Aquatic Habitat Area

Habitat area can be reduced by channelization, diking or by filling. Major areas of loss are diked estuarine areas and sloughs in floodplains used for agriculture. These areas are very productive and contribute to the ability of juvenile salmonids to survive

winter flow conditions. Estuarine losses can sometimes be remedied by breaching dikes, which is now being considered in the Salmon River Estuary. Further loss of habitat area from diking and filling is now controlled by laws on filling wetlands and waterways.

Aerial photos can be used to evaluate changes in aquatic habitat area over time. The availability of historic aerial photos and time schedules for future photos has not been investigated.

Policies

Policy 1. The Department shall actively pursue and promote habitat protection and improvement necessary to achieve the objectives for management of the basin's aquatic resources.

Policy 2. The Department shall coordinate with and advise landowners and management agencies of the Salmon River Basin.

Policy 3. Habitat protection shall be emphasized over habitat restoration and enhancement.

Policy 4. Potential losses of fish production from habitat alteration shall be prevented or reduced to the extent possible.

Objectives

Objective 1. Maintain or increase instream flows during summer low flow periods in the Salmon River Basin.

Assumptions and Rationale

1. Adequate instream flows are necessary for fish passage, spawning, and rearing.
2. The ODFW acts as an advisory agency to the WRD, which is responsible for water use regulations.
3. The WRD will have primary responsibility to measure stream flows.

Actions

1.1 Evaluate stream flows by using flow monitoring at Otis.

1.2 Follow through on securing IWR's from existing applications and apply for instream water rights on additional streams which exhibit high fish and wildlife values.

1.3 Attempt to acquire instream water rights that are abandoned.

1.4 Request the WRD to monitor water diversions and strictly enforce ODFW's instream water rights.

1.5 Track the cumulative volume of water withdrawals in the Salmon River Basin in cooperation with WRD.

1.6 Recommend that new irrigation rights or extended domestic rights not use summer flows below instream water rights.

1.7 Support reservoir storage as an alternative to existing water withdrawals.

Objective 2. Reduce summer water temperatures where artificial warming occurs that is detrimental to fish.

Assumptions and Rationale

1. Water quality concerns in the basin are primarily related to high water temperatures.

2. Lack of shading from riparian vegetation has increased water temperatures in the basin.

3. Water temperatures can be monitored using automated temperature recorders that are affordable.

4. Temperature monitoring will complement existing records and will be used to pinpoint stream reaches where excessive warming is occurring.

5. Temperature monitoring will provide a baseline to evaluate effectiveness at providing cooler summer water temperatures in the future.

Actions

2.1 Implement a comprehensive program to measure stream temperatures throughout the basin in collaboration with private landowners and other agencies.

2.2 Monitor stream temperatures on a long term basis in key areas.

2.3 Encourage riparian shading in forested lands where beneficial reductions in stream temperature will result.

2.4 Increase riparian shading in agricultural lands by working cooperatively with landowners and other agencies to increase stream-side shading.

2.5 Work with regulatory agencies and the counties to give emphasis to increase riparian shading along important fish production streams in residential or developed areas through enforcement of county setbacks which require 50 feet of undisturbed vegetation.

2.6 Recommend actions that will result in the reduction of inputs of sediments into stream channels which result in channel widening and greater exposure of the stream channel to warming.

2.7 Collaborate to share stream temperature data public and private entities.

Objective 3. Increase instream channel complexity in the Salmon River Basin.

Assumptions and Rationale

1. Instream channel complexity in freshwater is necessary for restoring productive populations of coho salmon, winter steelhead, and cutthroat trout.
2. Instream channel complexity has been severely reduced from historic levels.
3. Instream structure will induce retention and accumulations of gravel suitable for spawning.
4. Estuarine channel complexity is beneficial to all anadromous salmonids in the basin.

Actions

3.1 Measure instream levels of natural channel complexity and vegetation in the streamside riparian zone in collaboration with other agencies and landowners.

3.2 Recommend that existing trees in buffer strips that are likely to be recruited to stream channels as large woody debris be maintained during comment on land use activities.

3.3 Identify areas with high potential for benefiting from artificial input of LWD.

3.4 Coordinate with Oregon Department of Forestry and private landowners to artificially place LWD in streams on state and private forest lands.

3.5 Encourage beaver populations in stream reaches where beaver dams benefit fish habitat.

3.6 Re-establish conifers in riparian areas where it is possible to do so without removing existing alder and softwood species or trapping beavers to the extent that other beneficial values from the buffer strip are compromised.

3.7 Promote retention of LWD in the estuary.

Objective 4. Reduce artificially accelerated erosion rates and inputs of sediments into waterways in the Salmon River Basin.

Assumptions and Rationale

1. The principal source of artificially induced sediment input is from the road system.

2. Sedimentation of spawning and rearing habitat reduces fish production.

Actions

4.1 Identify standardized methods to measure and monitor sedimentation rates in stream channels in collaboration with other agencies and landowners.

4.2 Measure and monitor sedimentation rates in stream channels.

4.3 Consider cumulative sediment input when providing recommendations on land use activities.

4.4 Make recommendations to correct road system problems that contribute to increased erosion and sedimentation of waterways.

4.5 Report all mass failures on state or private forest lands to ODF and review the ODF report on failures as a basis to improve understanding of mechanisms causing failures. Develop methods to report and summarize mass failures on other landownerships.

4.6 When anomalously turbid water is observed, investigate causative factors and correct if feasible.

Objective 5. Prevent chemical contaminants from degrading fish habitat in the Salmon River Basin.

Assumptions and Rationale

1. The Oregon Forest Practices Act "Application of Chemical" rules are adequate to protect fishery habitat from detrimental impacts during herbicide applications on forest lands.

2. The Salmon River Basin Fish Management Plan will not be a forum to refine standards for chemical applications on forest lands.

Actions

5.1 Recommend that land management agencies or private landowners measure water quality parameters that are important to fish in areas where problems may occur.

5.2 Work in a consulting capacity with DEQ to enforce existing chemical application rules and water quality standards where detrimental impacts to fishery resources are a concern.

Objective 6. Restore natural fish passage conditions in the Salmon River Basin.

Assumptions and Rationale

1. The fish assemblage in the Salmon River Basin will be the most productive if natural passage conditions exist in the basin.

2. Natural barriers to fish migration will not be altered.

Actions

6.1 Inventory culverts and other artificial obstructions that impede passage of juvenile and adult fish in collaboration with other agencies and landowners.

6.2 Pursue measures to correct passage problems associated with culverts, dams, tide gates, and other artificial obstructions where benefits exceed costs.

Objective 7. Increase habitat area available to fish in the Salmon River Basin.

Assumptions and Rationale

1. Fish habitat can be lost due to channelization, diking or filling of natural waterways.

Actions

7.1 Evaluate historic, existing, and future aquatic habitat areas based on stream surveys, aerial photographs, etc.

7.2 Identify high priority habitats (spawning areas, etc.) which should be protected from waterway alterations.

7.3 Make recommendations to prevent channelization of streams and rivers.

7.4 Make recommendations to prevent the diking and filling of wetlands and estuaries.

7.5 Pursue measures to restore historic habitat areas lost due to channelization or diking where fishery benefits will occur. Support USFS efforts to restore diked tidelands.

Objective 8. Coordinate with other agencies and landowners to implement habitat protection and restoration activities.

Assumptions and Rationale

1. The ODFW has authority for direct fish management activities, but must coordinate with land managers to integrate fish management activities with habitat management.

2. Most mid-coast basins have land management responsibility that is controlled by multiple jurisdictions.
3. Watershed Councils provide a forum for coordination of activities.

Actions

8.1 Communicate with land management entities so habitat and fish management activities are integrated.

8.2 Participate in and provide technical assistance to Watershed Councils within the Salmon River Basin.

CHUM SALMON

Background

Chum salmon are native to the Salmon River Basin. Historically, the distribution of chum salmon along the Pacific coast has ranged from the Sacramento River in California north to the Arctic Ocean (Groot and Margolis 1991). Currently, the central Oregon coast is the southern extent of self-sustaining chum populations. Small numbers of chum occur in the mainstem of the Salmon River and in a few tributary streams in the lower basin, most notably Salmon Creek and Bear Creek (Table 9, Figure 7).

Table 9. Salmon River Basin chum salmon observations during 1985-96.

Survey Area	Salmon R.[@] (2.0)**	Salmon Cr. (2.0)	Deer Cr. (1.4)	Willis Cr. (0.6)	Lower Bear Cr. (2.0)
1958	---	14	---	---	---
1959	---	2	---	---	---
1975	---	0	1	0	15
1976	13	1	0	---	2
1977	0	4	27	0	4
1985	0	15	6	5	22
1986	1	47	0	9	49
1987	16	1	0	0	3
1988*	NA	NA	NA	NA	NA
1989	4	0	0	---	3
1990	0	5	1	4	2
1991	2	---	---	---	12
1992	10	23	1	---	25
1993	5	0	0	---	1
1994	2	5	1	---	4
1995	2	3	2	---	5
1996	0	1	0	---	1

* 1988 survey data is not available.
[@] Survey is from the hatchery to Panther Cr.
** Numbers in parenthesis are survey distance in miles.

There are no hatchery releases of chum salmon in the Salmon River Basin.

Status

Chum salmon are listed by the State of Oregon as a sensitive species because of small run sizes and statewide declines in abundance.

Records from commercial net fisheries in the Salmon River Basin from 1923 to 1940 report an average of about 184 chum landed per year. Chum commercial catch records for 1923 to 1940 show declining harvest levels as one moves south along the Oregon coast (Figure 8).

Life History Characteristics and Habitat Needs

Adults generally return to spawn from October to December (Henry 1954). Chum salmon are not very adept at passing barriers. Maintaining easy upstream passage for adults is essential.

Chum salmon spawn in lower portions of stream systems. Erosion in the basin often contributes sediment that is deposited or creates instability on gravel bars used by spawning chum.

Juvenile chum salmon rear only a very short period of time in freshwater before migrating downstream into the brackish water of the estuary. Estuarine rearing areas include shallow side channels, many of which have been lost due to dikes and tidegates. Juveniles smolt and migrate to the ocean in late spring or early summer.

Habitat Restoration Activities

Because of the limited distribution and sensitive status of chum salmon, habitat restoration efforts targeted at tributary streams containing chum are a priority in the Salmon River Basin. Proposed habitat restoration activities include:

1. Survey all road crossings that could be blockages to adult migration and correct those that may be a problem. This action should be targeted at streams where chum are now present or streams in immediate proximity to present chum runs where re-colonization would be likely if passage were improved. This is a priority because chum salmon are the weakest migrators of all anadromous fish on the central coast.

2. Identify and correct sources of accelerated sediment input into tributary systems that are important for chum salmon.

3. It is recommended that ODFW advise landowners of chum populations and recommend provisions that will protect and restore their habitat. This is especially important in

Figure 7 Distribution of Chum Salmon in the Salmon River Basin

CHUM DISTRIBUTION SALMON RIVER BASIN

Spawning & Rearing

Rearing Only

Migration Routes & Fish Presence

Fish Hatchery

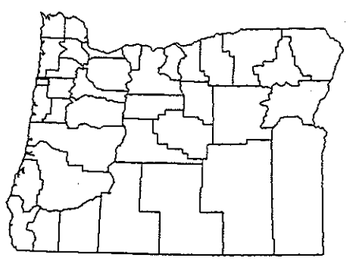
Barrier to Migration

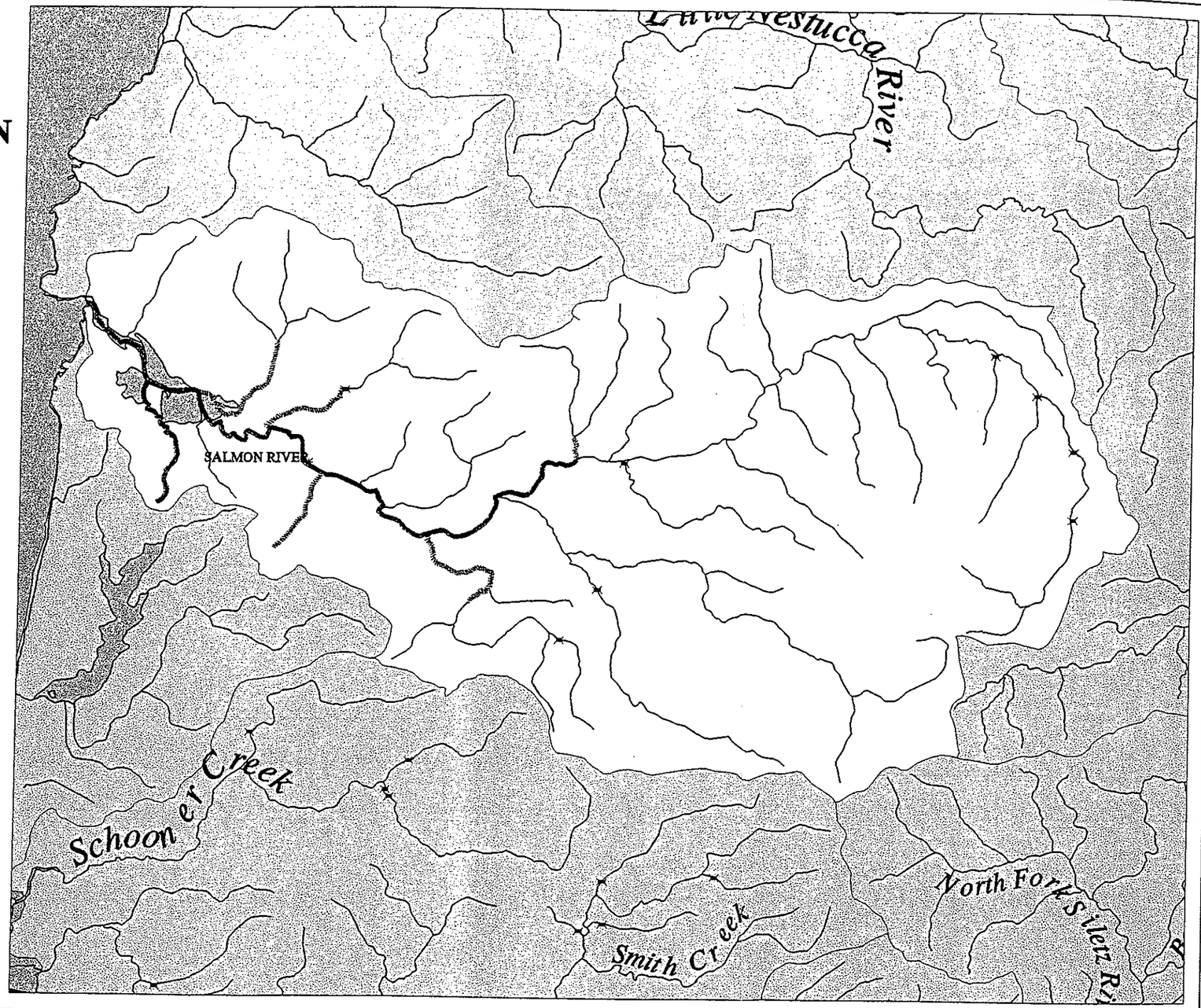
MI

0 1 2 3 4

OREGON Fish & Wildlife

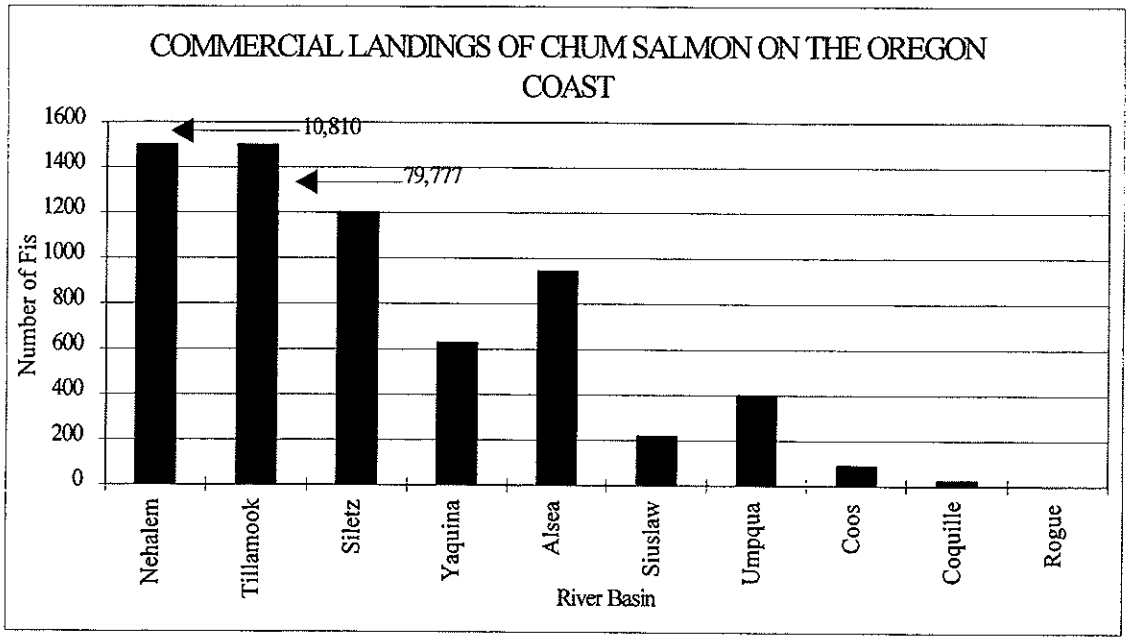
Location





regard to the Salmon River estuary where the removal of dikes may provide additional rearing areas for juvenile chum salmon and access to additional small tributaries.

Figure 8. Average chum salmon landings reported in 1923-40 commercial fisheries within Oregon Coastal River systems.



Angling and Harvest

All angling for chum salmon is prohibited in the Salmon River Basin.

Management Considerations

Chum salmon in the Salmon River Basin will be managed for wild production only. Chum salmon are listed as a sensitive species statewide. Land management activities that may threaten Salmon River Basin chum salmon will be avoided where possible. Protection of chum habitat focuses on maintaining upstream passage for adults, preventing siltation in drainage areas upstream from spawning grounds, and protecting or restoring estuarine rearing areas for juveniles. Achieving habitat objectives outlined in the Habitat chapter will generally provide the habitat for chum salmon. Habitat restoration priorities include correction of passage problems, reduction of sedimentation, and removal of dikes in the Salmon River estuary. In-river fisheries for chum will remain closed.

Policies

Policy 1. Salmon River Basin shall be managed for natural production of chum salmon only except for hatchery releases designed specifically to assist in the recovery of the wild population.

Objectives

Objective 1. Achieve an annual chum salmon spawning escapement of at least 300 adults.

Assumptions and Rationale

1. A minimum of 300 adults are needed to maintain genetic fitness in the population.

2. Fish populations at the edge of their species range have an increased risk of extinction.

3. Accomplishing habitat protection and restoration objectives will provide the habitat necessary to support chum salmon populations.

4. Targeted habitat protection and restoration directed at streams where in past years chum salmon populations have been present will help assure the continued viability of Salmon Basin chum salmon.

Actions

1.1 Conduct chum salmon spawning surveys annually in Lower Bear Creek and Salmon Creek to monitor trends in escapement.

1.2 Conduct exploratory surveys to look for other Salmon River tributaries with consistent chum returns.

1.3 Maintain closure of all angling for chum salmon unless run size increases substantially above current levels.

1.4 Advise landowners of chum population and recommend provisions that will protect their habitat.

FALL CHINOOK SALMON

Background

Fall chinook are native to the Salmon River Basin. Important spawning habitat for fall chinook is found in the Salmon River mainstem, Bear Creek, and Slick Rock Creek (Figure 9, Mullen 1979). Juvenile rearing occurs primarily in the lower Salmon River mainstem and estuary.

A hatchery fall chinook program has been in place since the late 1970's. In recent years, fall chinook in the Salmon River Basin are about 40% natural and 60% hatchery.

Status

Most fall chinook stocks on the central and north Oregon coast appear to be healthy.

Total returns of fall chinook, including both wild and hatchery fish, have ranged from about 2,700 to 7,800 adults and jacks during 1986-95 (Figure10). The return in 1976, which consisted of wild fish only, was about 1,100 (Mullen, 1979).

Life History Characteristics and Habitat Needs

Adults return to the Salmon River Basin primarily from August through November. Peak spawning occurs during November.

Juvenile fall chinook rear for a short time in the vicinity of spawning, but spend the most time in the lower mainstem and estuary. Juveniles enter the ocean in their first year of life from mid-summer through October.

The healthy status of fall chinook indicates that habitat requirements for this species are currently being provided. Concern exists that timber management activity in the upper drainage could create siltation and land slides which reduce gravel bar quality and stability in spawning areas used by fall chinook. Care is needed to assure that land use activities do not result in cumulative impacts to spawning habitat.

Hatchery Production

Salmon River Hatchery began releasing fall chinook into the Salmon River in 1977 to supplement ocean and in-river fisheries. Annual smolt releases have fluctuated

between 48,650 and 219,069 (Table 10). They have stabilized at a current target of 200,000 smolts per year. Smolts are released in mid August at a size of 14 fish per pound. All smolts are marked with an adipose fin clip and coded wire tag.

Table 10. Hatchery releases and returns of fall chinook from Salmon River Hatchery

Brood	Releases			Returns	
Year	Fry	Fingerlings	Smolt	Adults	Jacks
1976*			50179	56	43
1977*			49582	28	17
1978*			176731	186	138
1979*			218521	208	370
1980	35117		219069	296	133
1981			214536	194	67
1982			213155	232	90
1983			20824	257	20
1984			205858	284	88
1985			182151	138	191
1986			141845	393	64
1987		32689	200781	2059	53
1988			202126	1403	70
1989			211483	755	101
1990			195786	189	17
1991			193186	858	81
1992			205179	345	89
1993			206574	640	7
1994			205215	910	98
1995			186780	380	66
1996				839	28

* Hatchery stock comprised of wild brood.

Ocean contribution of Salmon River fall chinook is to ocean fisheries off Canada and Alaska, which is similar to other central and north Oregon coast fall chinook stocks. This stock was chosen as an indicator group to represent all north migrating Oregon coastal fall chinook in ocean harvest management under the US–Canada Treaty on salmon fisheries because of its similarity to other north migrating chinook stocks, the presence of a hatchery and the small size of the Salmon River Basin. Due to its use as an indicator stock, estimates have been made for all chinook returning to the Salmon River system since 1986 (Figure 10). Compared to other hatcheries, survival of fall chinook smolts from Salmon River Hatchery has been good.

The majority of the naturally spawning chinook have been of hatchery origin in recent years (Figure 11). For this reason the current hatchery program does not comply with the Wild Fish Management Policy.

Figure 9. Distribution of Fall Chinook Salmon in the Salmon River Basin

FALL CHINOOK DISTRIBUTION SALMON RIVER BASIN

Spawning & Rearing

Rearing Only

Migration Routes & Fish Presence

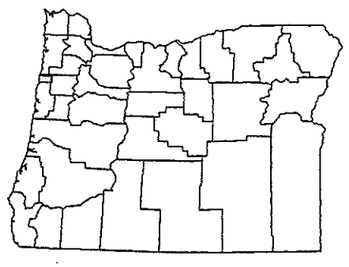
Fish Hatchery

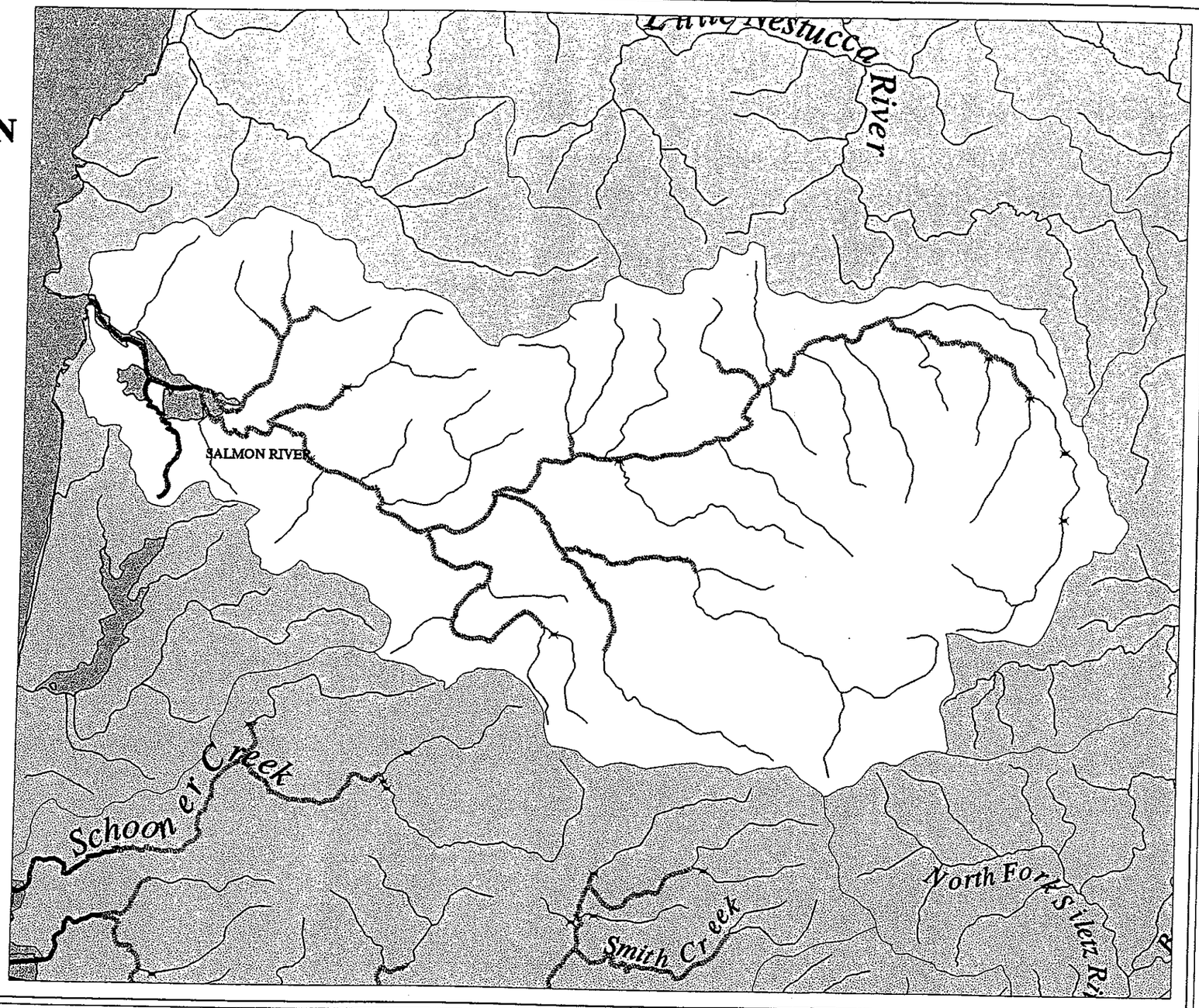
Barrier to Migration

MI
0 1 2 3 4

OREGON
Fish & Wildlife

Location





Angling and Harvest

About one-third of all chinook returning to the Salmon River are harvested in the sport fishery. The in-river recreational catch of fall chinook has averaged 1,255 adults, including jacks, annually since 1986 (Table 11).

Figure 10. Estimates for all fall chinook returning to the Salmon River system. Includes angler harvest, hatchery returns and spawning escapement.

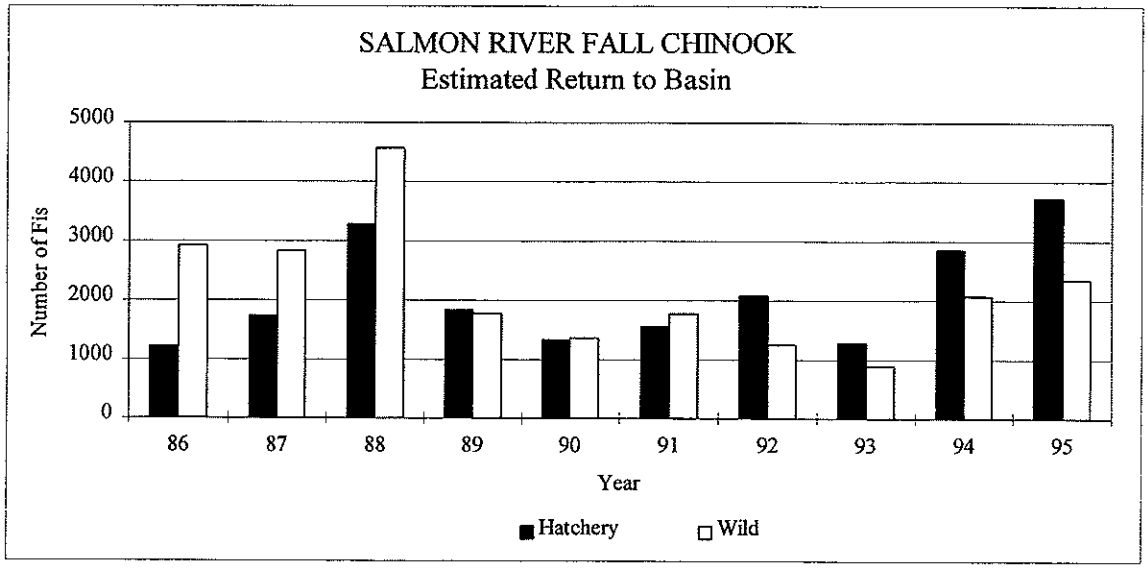


Figure 11. Estimates of hatchery and naturally produced fall chinook spawning in Salmon River.

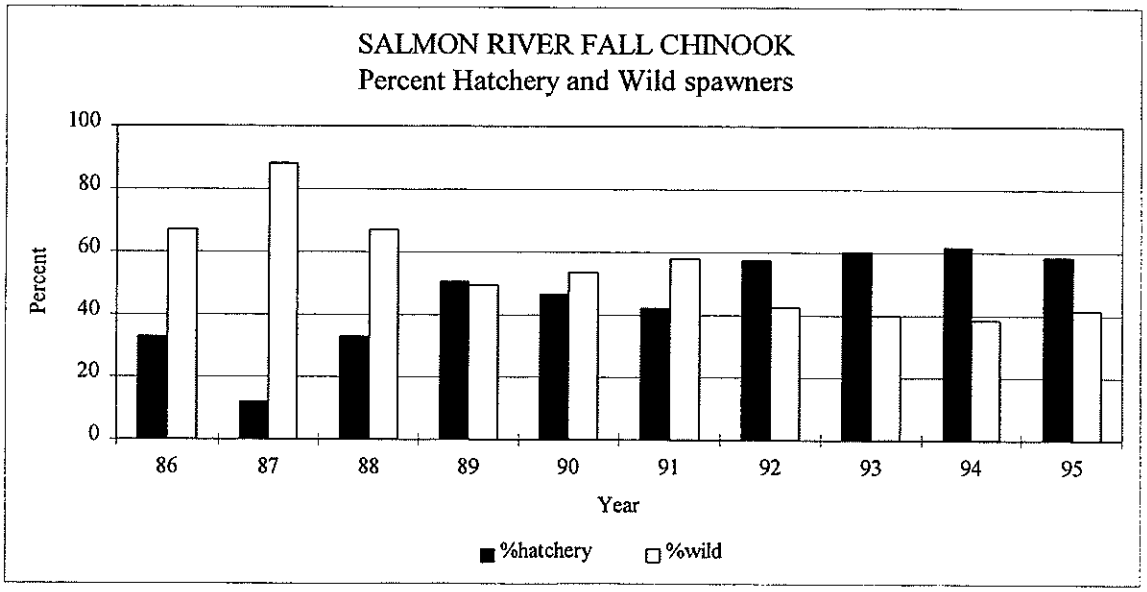


Table 11. Catch and fishing effort in the Salmon River sport fisheries based on creel surveys.

Year	Angler hours	Chinook adults	Chinook jacks
Pre-Hatchery			
1976	7,567	160	66
1977	7,966	128	90
1978	7,470	154	176[a]
Average	7,668	147	111
Post Hatchery			
1986	39,911	1,076	363
1987	58,218	1,383	48
1988	78,663	2,053	41
1989	64,114	1,043	209
1990	45,058	780	72
1991	58,500	1,202	123
1992	31,788	667	169
1993	35,116	790	22
1994	42,797	1356	131
1995	54,475	1608	297
1996	74,374	1703	70
Average	53,001	1,242	140

[a] Return of hatchery jacks are included beginning in 1978.

Management Considerations

Fall chinook salmon in the Salmon River Basin will be managed for wild and hatchery production. The hatchery program and/or fishing regulations will be modified to reduce the proportion of hatchery spawners in the wild from 60% to 50% or less. The hatchery broodstock will be managed to mimic wild fish largely by using a higher proportion of wild fish. This will help assure a vigorous hatchery strain which will help maintain good hatchery returns in the long run and allow continuation of the intense chinook fishery in Salmon River. Use of Salmon River stock as an indicator of Oregon Coastal Fall Chinook in British Columbia and Alaska fisheries will continue.

Policies

Policy 1. Fall chinook in the Salmon River Basin shall be managed for wild and hatchery production.

Objectives

Objective 1. Achieve an average annual spawning escapement of 1,000 naturally produced fall chinook spawners.

Assumptions and Rationale

1. The Salmon River Basin is producing fall chinook smolts at levels approaching the full capacity of the habitat. Natural production can be expected to increase only slightly if at all in the near future.

2. The average return of naturally produced chinook has averaged about 1,000 from 1990-1994.

3. The escapement objective is based on the assumption that ocean survival of fall chinook smolts will be similar to past years averages.

4. The escapement objective is based on the assumption that the harvest of fall chinook in ocean and freshwater fisheries will remain similar to recent years.

5. Accomplishment of watershed habitat protection objectives will be successful.

6. Estuarine habitat is critical to fall chinook production in the Salmon River Basin.

Actions

1.1 Monitor fall chinook escapement by continuing a subset of spawning surveys conducted for the indicator stock program.

1.2 Propose more conservative angling regulations within the Salmon River Basin during the bi-annual regulation process if escapement shows a consistent downward trend, or if ocean chinook fisheries off Canada and Alaska intensify appreciably.

1.3 Continue an annual release of hatchery fall chinook smolts from Salmon River Hatchery.

1.4 Implement emergency angling regulation modifications if anomalous environmental conditions such as an extended drought make fish excessively vulnerable. Prior to implementation of emergency regulations hold a public meeting in Lincoln City to take public input on options.

Objective 2. Achieve 40,000 angler hours of effort and an average annual catch of 1,000 fall chinook in the in-river fishery.

Assumptions and Rationale

1. Favorable conditions for fall chinook production will continue.

2. Fishing effort and catch in Salmon River will be reduced by 20% from the 1986-93 period due to efforts to reduce hatchery fish to 50% or less of natural spawners.

Actions

2.1 Continue an annual release of hatchery fall chinook smolts from Salmon River Hatchery.

2.2 Develop a program to bring the Salmon River Hatchery fall chinook program into Wild Fish Management Policy compliance within two years of adoption of this plan. Within that program consider:

1. Refinement of broodstock selection at the hatchery so hatchery fish mimic wild fish.
2. Selective fisheries for fin clipped hatchery chinook.
3. Retaining and removing surplus hatchery chinook at the hatchery.
4. Making modifications to the Salmon River Hatchery fish ladder to draw more hatchery chinook into the hatchery.
5. Reducing hatchery chinook release numbers.
6. Monitoring to assess results.

Objective 3. Maintain the fall chinook hatchery program to provide a representative indicator stock of Oregon coastal fall chinook contributing to northern fisheries.

Assumptions and Rationale

1. Salmon River fall chinook contribute to ocean fisheries located off Canada and Alaska, similar to other north and central Oregon coast fall chinook.

2. Salmon River is a relatively small drainage with a hatchery.

3. An indicator stock program has been in place since 1986.

Actions

3.1 Continue an annual release of hatchery fall chinook smolts from Salmon River Hatchery.

3.2 Operate the hatchery to facilitate the indicator stock program as long as it does not conflict with measures to protect wild chinook.

COHO SALMON

Background

Coho salmon are native to the Salmon River and historically were widely distributed in low and medium gradient streams throughout the basin (Figure 12). Salmon River Hatchery produces coho that are released into the basin.

Status

Wild coho are currently a major concern because they are severely depressed along the entire Oregon coast. Within Salmon River, it is uncertain if a self-sustaining wild run still exists.

Historically, Salmon River did not support substantial commercial fisheries for coho salmon (Figure 13). There are also no long-term trend surveys for coho salmon spawning escapement.

In 1976, prior to the initial releases from Salmon River Hatchery, the basin had an estimated wild coho run of 1,500 adults to the 43 miles of identified coho spawning habitat within the system (Mullen, 1979). Current escapement of wild coho to the Salmon River is very depressed.

Salmon River naturally spawning coho salmon have been comprised of an estimated 91 % hatchery-origin fish and 9 % natural-origin fish from 1990-96 (Table 12). Naturally produced coho that spawn later in the year than the stray hatchery coho have not been observed in the Salmon River in recent years.

Life History Characteristics and Habitat Needs

Coho salmon return to spawn in the Salmon River Basin in the fall and winter. Spawning occurs in low and medium gradient tributary streams in November through mid-December. Salmon River coho differ from coho in other coastal drainages and coho in Salmon River prior to the hatchery in that spawning does not occur after mid-December. This is thought to occur because of heavy influence of hatchery strays and the absence of a self-sustaining wild run.

Figure 12 Distribution of Coho Salmon in the Salmon River Basin

COHO DISTRIBUTION SALMON RIVER BASIN

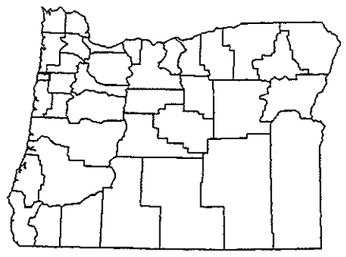
- Spawning & Rearing
- Rearing Only
- Migration Routes & Fish Presence
- Fish Hatchery
- Barrier to Migration

MI

0 1 2 3 4

OREGON Fish & Wildlife

Location



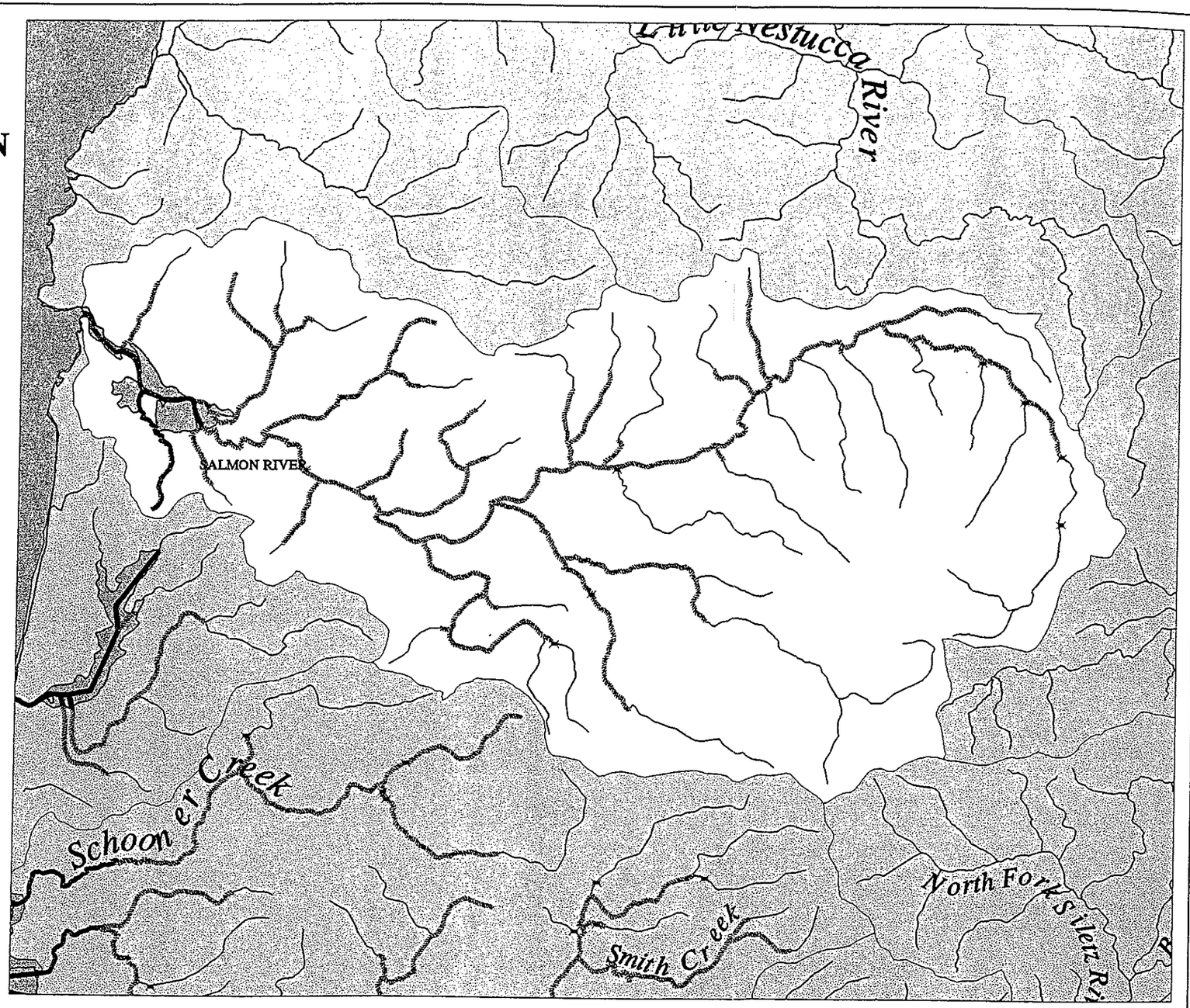


Figure 13. Number of fish harvested in commercial fisheries on the Salmon River from 1923 to 1946 (Mullen 1981).

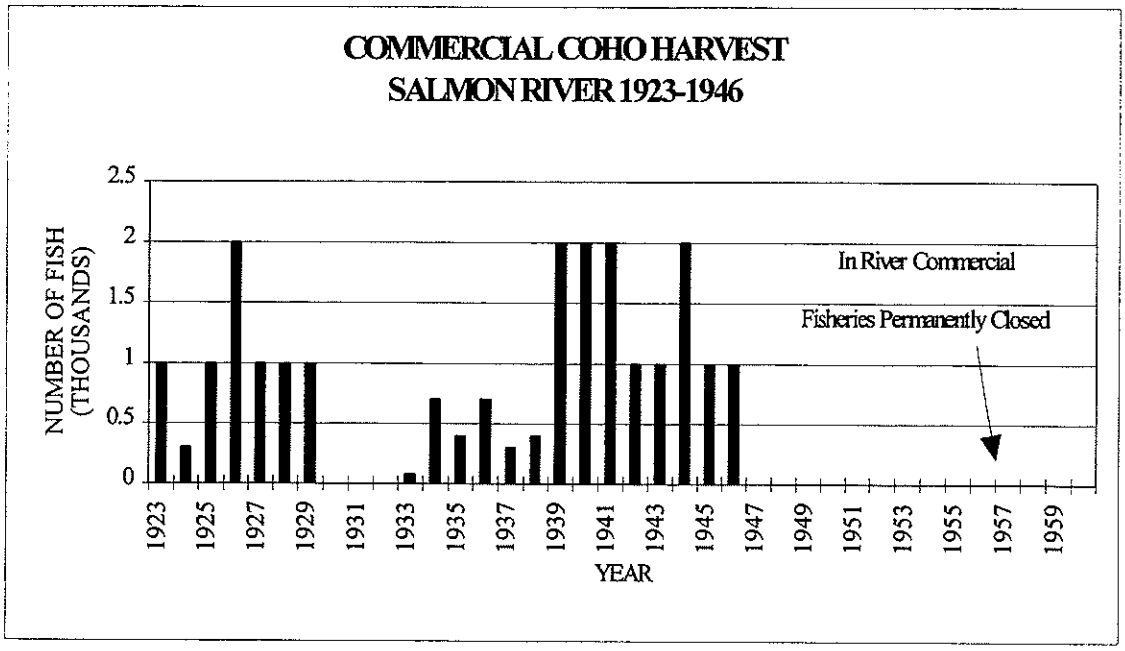


Table 12. Origin of adult coho recovered in natural spawning areas in the Salmon River Basin based on analysis of scale samples.

	Number of fish			
Year	Natural	Public hatchery	Private hatchery	% natural
1986	31	15	64	28
1987	26	20	66	23
1988	45	33	25	44
1989	2	1	0	67
1990	4	32	11	12
1991	11	50	2	17
1992	11	44	0	20
1993	5	77	0	6
1994	30	285	0	9.5
1995	15	76	0	16.5
1996	12	280	0	4.1
Total 1990-96	88	844	0	9.3

Fry emerge in the spring and rear in backwater areas and stream margins (Nickelson et al. 1992). Juvenile coho need streams of low gradient and velocity. They are found mostly in pools. Research has shown that beaver ponds and complex pools with large quantities of wood hold the highest number of juvenile fish.

Winter habitat is a critical factor for coho. Winter habitat must provide refuge for juveniles from high stream velocities. Typical refuge areas include backwaters behind beaver ponds, log jams, sheltered side channels and backwaters. Winter habitat also must provide food and cover from predators.

Coho smolts migrate to the ocean in the spring after rearing one year in freshwater. After the first summer in the ocean, a small proportion of the males attain sexual maturity and return to spawn as 2 year old jacks. Most of the coho remain an additional year at sea before returning to freshwater to spawn at age 3 and an average size of about 8 pounds.

Indigenous Salmon River coho were used for hatchery broodstock during 1976-78. However, hatchery coho from the private hatchery at Newport have strayed into Salmon River Hatchery and have been inadvertently incorporated into the broodstock. The private hatchery coho were of Puget Sound origin and have different life history characteristics compared to the native Salmon River stock. The high level of introgression of private hatchery coho into the Salmon River Hatchery broodstock is evident based on the northern ocean distribution of this stock. Puget Sound stocks have a more northerly ocean distribution than Oregon coastal stocks.

Habitat Restoration Activities

Habitat restoration work for coho in the Salmon River has been given a lower priority than in other mid-coast basins because it is uncertain if self-sustaining wild populations are still present.

If restoration of wild coho salmon in the Salmon River is pursued, activities that are recommended are similar to other mid coast basins and include putting structure back in streams, improving passage, and encouraging beaver activity.

Hatchery Production

The purpose of hatchery coho production at Salmon River hatchery is to supplement ocean and in-basin coho fisheries. The annual production target for hatchery coho released into the Salmon River has been 300,000 smolts (Table 13). Survival of smolt releases into Salmon River has been poor. Surplus adult returns are passed upstream into natural spawning areas.

The Salmon River Hatchery program is out of compliance with the Wild Fish Management Policy because of the high proportion of hatchery coho on spawning

grounds. Given the severely depressed status of Salmon River wild coho, the most feasible option to address WFMP compliance are to attempt to recover the population by completely discontining the hatchery coho release or develop a weir at Salmon River Hatchery that could be used to selectively pass wild coho upstream.

Angling and Harvest

Salmon River Hatchery coho contribute to ocean fisheries off the entire Oregon coast, but have an ocean distribution that is shifted slightly to the north of what would be expected for a native coastal stock.

Table 13. Hatchery smolt releases and adult returns from 1978-1995.

Year	# Smolts released	Adult returns	Jack returns
1976	0	361	77
1977	0	285	107
1978	168426	359	933
1979	84992	884	627
1980	131168	1008	955
1981	204776	357	602
1982	180465	1227	746
1983	253446	535	804
1984	322333	1870	162
1985	365043	974	1329
1986	458386	4523	605
1987	395883	1539	735
1988	241609	944	190
1989	486196	1712	543
1990	340774	611	1045
1991	505175	2594	458
1992	255933	1161	549
1993	405164	1168	41
1994	403118	2649	274
1995	316281	693	238
1996	322200	2208	242

Fishing effort and harvest in the Salmon River fall salmon fisheries have been estimated using statistical creel programs during three years prior to initial hatchery adult returns (1976-1978) and in all years since 1986. The in-river catch of coho has doubled to about 280 fish per year since the hatchery program began through 1993 (Table 14). Since 1994-95 the Salmon River basin has been closed to all harvest of coho salmon. The increased coho catch from 1986-93 is attributable to both increased numbers of Salmon River Hatchery coho and heavy straying of private hatchery coho into the Salmon River along with increased fishing effort since the hatchery started

Table 14. Fishing effort and catch of coho salmon in the Salmon River based on fall creel surveys.

Year	Angler hours	Coho adults and jacks
Pre-Hatchery		
1976	7,567	97
1977	7,966	135
1978	7,470	192[a]
Average	7,668	141
Post Hatchery		
1986	39,911	574
1987	58,218	212
1988	78,663	59
1989	64,114	237
1990	45,058	716
1991	58,500	218
1992	31,788	31
1993	35,116	261
1994*	42,797	0[b]
1995*	54,475	0[b]
1996*	74,374	0[b]
Average	53,001	210

[a] Return of hatchery jacks are included beginning in 1978.

* 1994 and 1996 in river coho salmon fisheries closed.

[b] 1994 and 1996 assumed to be 0 due to the complete closure of in basin coho salmon fisheries.

Management Considerations

Coho salmon in the Salmon River Basin will be managed for wild and hatchery production. A hatchery program of sufficient size to provide for indicator tag groups (200,000 smolts) will be maintained. A non electric horizontal floating weir will be installed at or near Salmon River Hatchery to capture adult anadromous fish passing up Salmon River during time periods when hatchery coho return (October to mid-December). This capture facility will be used to remove hatchery origin adult coho and selectively pass wild coho upstream. Coho status will be assessed following a generation without heavy hatchery straying. If wild coho do not appear to be recovering on their own, re-introduction of wild coho from an adjacent basin will be considered.

Policies

Policy 1. The Salmon River Basin shall be managed for production of both wild and hatchery coho salmon.

Policy 2. Hatchery coho broodstocks that can be used in Salmon River are limited to the current hatchery broodstock, the hatchery broodstock in the Siletz or Alsea basins, or a new broodstock developed from wild coho salmon in a stream from the Nestucca to the Alsea Basins.

Objectives

Objective 1. Recover a self sustaining wild coho population in Salmon River with at least 300 spawners annually.

Assumptions and Rationale

1. The only feasible method to recover the wild coho population in Salmon River while maintaining a hatchery program is to construct a weir across Salmon River near the hatchery. This weir would be used to capture all adult anadromous fish migrating up Salmon River during the time period when hatchery coho are returning (October-mid December). Passage of hatchery coho to upstream areas could be prevented entirely, or limited to be consistent with the WFMP.

2. A floating horizontal weir can be installed in Salmon River to divert anadromous fish into a capture facility at the hatchery. This weir would be non electric, and could be removed during periods when hatchery coho are not migrating, if desired.

3. The Salmon River has an estimated 42 miles of coho habitat.

4. The naturally produced coho salmon currently present in Salmon River are predominantly progeny of hatchery spawners.

5. By controlling hatchery spawners in natural habitats within Salmon River, a self sustaining wild coho run will re-establish naturally or can be re-established artificially by introducing wild coho salmon from an adjacent drainage.

6. A weir and adult coho trap at Salmon River Hatchery would facilitate use of Salmon River as a location for an ocean harvest management indicator stock, and would provide the opportunity to research recovery of a wild population that has been heavily influenced by hatchery fish.

Actions

1.1 Investigate options to develop a physical (non electric) adult anadromous fish weir at Salmon River Hatchery.

1.2 Select the most feasible option for a fish weir across Salmon River at the hatchery, seek funding and construct the weir as soon as possible.

1.3 Develop a plan for recovery of wild coho salmon in Salmon River including
   a) Operation of the weir and plans for fish passage above the weir.
   b) Inventory of juvenile coho before, during and after initiating the recovery effort.
   c) Use of the site for an ocean harvest indicator stock.
   d) Potential research activities associated with the recovery plan.
   e) Potential introduction of wild coho from adjacent basins if coho do not recover naturally.
   f) Staffing and funding requirements for the program.

1.4 Priortize actions to improve coho habitat in Salmon River similar to other mid coast basins (currently given lower priority).

Objective 2. Maintain a coho hatchery program in Salmon River that produces sufficient adult coho salmon to provide necessary tag lots for ocean fishery evaluation, and provides coho salmon for ocean and in-basin fisheries.

Assumptions and Rationale

1. A hatchery coho smolt program within the mid-north coast area is necessary to evaluate ocean fisheries harvest rates on fin-clipped hatchery coho and hooking mortality on wild coho salmon.

2. It may be desirable to supplement ocean fisheries with hatchery produced coho salmon smolts from the mid-north coast in the future. Hatchery production from Salmon River can meet this need.

Actions

2.1 Raise and release sufficient hatchery coho smolts from Salmon River to maintain the hatchery broodstock and provide for coded wire tag groups to assess ocean fishery impacts.

2.2 Continue to refine fish culture practices to maximize survival of hatchery smolts.

2.3 Adjust hatchery coho releases into Salmon River based on WFMP concerns in adjacent basins or for other species, prospects for fishery benefits, and production capacity at Salmon River Hatchery.

2.4 Achieve WFMP compliance for the hatchery program by operating a floating weir at Salmon River Hatchery as described under objective 1.

WINTER STEELHEAD

Background

Winter steelhead are native to all basins along the Oregon coast, including the Salmon River Basin. Important habitat for winter steelhead is not well documented. Good production areas are thought to be the mainstem Salmon River, Slick Rock Creek, and Bear Creek.

The Salmon River Basin was stocked with Alsea stock hatchery winter steelhead from the mid-1960s to 1994.

Status

Wild winter steelhead in the Salmon River Basin are depressed and are currently being reviewed along with other coastal steelhead for listing under the Endangered Species Act. The best indicator of the depressed status of wild runs is the sharp decline in the sport catch of naturally produced steelhead in recent years compared to the 1950s and early 1960s. The situation is aggravated because many of the naturally produced steelhead in recent years are progeny of Alsea Hatchery stock rather than of native strains.

Factors that have potentially contributed to the decline in the returns of wild steelhead include;

1. Unfavorable ocean conditions for smolt survival in recent years.
2. Increased predation by marine mammals or birds.
3. Past high seas net fisheries.
4. Excessive in-river sport harvest.
5. Freshwater habitat deterioration.
6. Genetic alteration of wild steelhead due to breeding with hatchery steelhead.
7. Competition in freshwater with juveniles from hatchery spawners.

The potential for recovery of wild Salmon River winter steelhead is high. Habitat in the drainage is inherently good for steelhead production as indicated by the large catch of wild steelhead in the basin prior to hatchery programs. The habitat characteristics that are conducive to good steelhead production are high gradients and good water quality throughout the mainstem Salmon River.

Life History Characteristics and Habitat Needs

Winter steelhead generally return to freshwater to spawn beginning in November, with the majority returning in January through March. Spawning of wild fish is thought to occur in the mainstem Salmon River and larger tributary streams primarily during January through May.

Generally, after 2 years of freshwater residence, juveniles smolt and migrate to the ocean in the spring. Steelhead most commonly remain in the ocean two years before returning to freshwater to spawn, although about a third of the returns will be comprised of older or younger age fish , or repeat spawners.

Compared to other salmonids in the basin, juvenile steelhead prefer stream reaches with high gradient and velocity. Young-of-the-year fry are usually found along the edges of pools or riffles, while older juveniles are in the main current in deeper pools and pocket water (Barnhart 1986). Yearling steelhead juveniles require enough cover to avoid predation and enough current velocity to supply drifting food items. Yearling and adult steelhead often use white water and turbulence as cover.

Large woody debris is an important component in steelhead habitat in some areas, both from the standpoint of serving as cover and of creating pools. In other areas, rock based structure creates instream channel complexity required by juvenile steelhead.

Habitat Restoration Activities

Habitat restoration activities directed specifically at winter steelhead have not been given a high priority in the mid-coast at this time because of the limited ability to improve habitat in the large, high gradient streams normally used by steelhead. At present, these areas frequently have habitat in fair condition due to cover provided by large instream rocky structure. In Salmon River, steelhead habitat could however be improved by placing large structure across or along the edge of the mainstem Salmon River, Bear Creek, or Slick Rock Creek. This structure would provide cover and catch spawning gravel.

Steelhead habitat in Salmon River can also be improved by allowing the large Sitka spruce that naturally fall into the stream to remain in the stream. In the past, these large trees have frequently been removed from the stream for firewood, lumber, erosion control or to improve navigability by boats.

Hatchery Production

The Salmon River Basin had been stocked with Alsea Hatchery stock winter steelhead produced at Alsea Hatchery since the 1960's (Table 15). The objective of the hatchery program was to contribute to in-river steelhead fisheries. The annual target release number for the Salmon River Basin had been 30,000 Alsea stock smolts. This hatchery program was discontinued with the 1994 release based on a February 1994 decision by the ODFW Commission.

Table 15. Winter steelhead yearling annual stocking rate, Salmon River.

Year	Number Stocked
1964	9,900
1965	19,754
1966	20,776
1967	30,009
1968	27,300
1969	30,000
1970	25,000
1971	29,650
1972	29,300
1973	30,032
1974	29,710
1975	38,715
1976	40,264
1977	41,237
1978	34,952
1979	35,054
1980	35,142
1981	48,026
1982	34,998
1983	39,873
1984	50,200
1985	43,040
1986	50,234
1987	34,903
1988	34,900
1989	34,980
1990	37,101
1991	34,746
1992	34,823
1993	20,005
1994	30,878
1995	0

Returns from the hatchery program have declined over the years. Factors that could potentially be responsible for declines in hatchery smolt survival include;

1. Unfavorable ocean conditions for smolt survival in recent years.
2. Increased predation by marine mammals or birds.
3. Past high seas net fisheries.
4. Deterioration in the genetic fitness of the Alsea hatchery stock.
5. Increases in disease organisms in the hatchery environment or decreased resistance of hatchery fish to disease organisms present in the natural environment.

Angling and Harvest

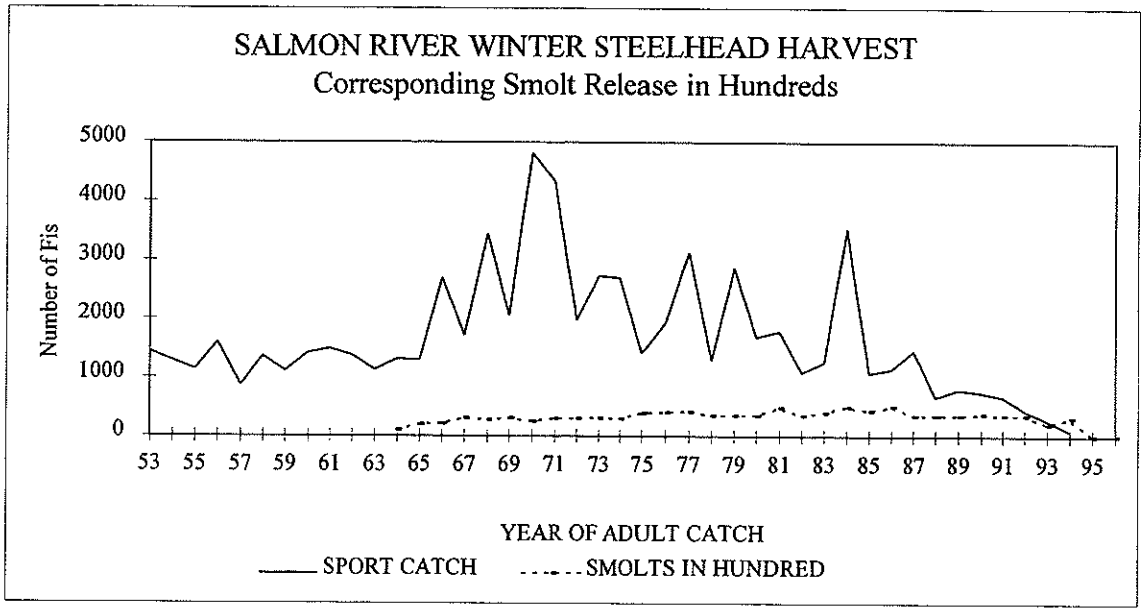
Winter steelhead catch estimates and smolt releases are shown in Figure 14. There were moderate catches of winter steelhead prior to the hatchery program. Angler harvest increased following initiation of the hatchery program, but has fallen to levels that are lower than prior to the hatchery program in recent years. The composition of steelhead in the angler catch has been about 16% wild and 84% hatchery fish since 1982 (Table 16).

Angling regulations requiring that all non-finclipped steelhead must be released unharmed were implemented beginning in 1994. This has probably reduced angler mortality of wild fish from about 50% to 5-10%.

Table 16. Origin of winter steelhead caught in the Salmon River based on analysis of scale samples.

Run Year	Numbers of fish Hatchery	Wild
1983-84	12	1
1984-85	4	2
1985-86	11	2
1986-87	2	1
1987-88	14	1
1988-89	6	1
1989-90	8	2
1990-91	7	3
1991-92	15	2
Total	79	15
Percent of Total	84%	16%

Figure 14. Winter steelhead harvest and corresponding smolt releases, Salmon River.



Management Considerations

Winter steelhead in the Salmon River Basin will be managed for wild and hatchery production. Inventories will be conducted to better assess wild winter steelhead status in the Salmon River Basin and to provide an information base to develop a hatchery program using a Salmon River native broodstock in the future, if considered feasible to do so. Angling regulations that require the release of all non-finclipped steelhead will continue.

Policies

Policy 1. The Salmon River Basin shall be managed for wild winter steelhead with an option for a winter steelhead hatchery program designed to augment fisheries in the future.

Policy 2. Winter steelhead hatchery stocks that can be used in the Salmon River Basin are limited to a broodstock developed from Salmon River natural winter steelhead.

Objectives

Objective 1. Increase production of wild winter steelhead.

Assumptions and Rationale

1. Insufficient information is available to establish accurate production and escapement objectives for wild winter steelhead in the Salmon Basin. If the Oregon Plan adopts interim escapement goals they will be used until sufficient information is available to establish accurate production and escapement objectives for the basin.

2. Accomplishing habitat protection and restoration objectives will improve stream conditions for winter steelhead and result in increased production.

3. Bringing mid-coast hatchery programs into compliance with the Wild Fish Management Policy will protect the genetic resources of wild winter steelhead in the basin and result in increased productivity.

4. Catch-and-release angling regulations for wild winter steelhead will increase escapement and production.

Actions

1.1 Accomplish the habitat management objectives in this plan.

1.2 When reviewing proposals for land use activities and development, give emphasis to important winter steelhead production areas.

1.3 Continue angling regulations requiring the release of all non-finclipped naturally produced steelhead in the Salmon River Basin.

1.4 Maintain hatchery steelhead spawning in the wild to less than 10% of the total population.

Objective 2. Develop an information base and methodology for measuring and monitoring natural production of winter steelhead in the Salmon River Basin over the next five years.

Assumptions and Rationale

1. Comprehensive information on wild Salmon River winter steelhead is not available.

2. Estimating escapement of wild steelhead using angler creel data may no longer be possible because of wild fish release regulations.

Actions

2.1 Develop and implement evaluation of hatchery strays in natural spawning areas.

2.2 Implement adult winter steelhead spawning surveys in likely high use spawning areas.

2.3 Conduct inventories for juvenile steelhead in areas throughout the Salmon River Basin.

2.4 Establish standardized adult and/or juvenile surveys to measure trends in production of wild steelhead.

2.5 Make estimates of winter steelhead spawning escapement based on results from adult and juvenile surveys.

2.6 Compile steelhead inventory information annually and make it available to anyone who desires it.

Objective 3. Provide angling opportunities for wild or hatchery winter steelhead in the Salmon River Basin.

Assumptions and Rationale

1. Catch and release fisheries will be the primary steelhead angling opportunity in Salmon River in the near future.

Actions

3.1 Maintain existing angling regulations until wild fish recover sufficiently to warrant a consumptive harvest.

3.2 Evaluate the feasibility of establishing a hatchery winter steelhead program in Salmon River using native broodstock following several years of inventory of wild adult and juvenile steelhead.

CUTTHROAT TROUT

Background

Cutthroat trout are distributed widely throughout all Oregon coastal basins, including the Salmon River Basin. The Salmon River Basin had a hatchery program for cutthroat trout which existed until 1996.

Status

The status of cutthroat trout can be assessed based on observations of cutthroat trout made during fish sampling in tributary streams. These observations show that multiple age classes of cutthroat trout are consistently present in a vast network of Oregon coastal streams. This wide distribution and consistent presence indicates that, overall, cutthroat trout are very secure in Oregon coastal streams. It is not known, however, if these cutthroat trout observed in tributary streams are juvenile searuns, fluvial juveniles, or resident cutthroat.

Oregon Department of Forestry (DOF) studies were conducted during the summer of 1993 to determine the upstream distribution of gamefish. In coastal streams, cutthroat trout are consistently the gamefish species with the widest distribution. The evaluation indicated that there was an 80% chance that cutthroat trout would be present in a stream channel with a drainage area of greater than 100 acres. The study also determined that there are about 1.6 miles of stream containing cutthroat trout per square mile of drainage area. Using this information, the Salmon River Basin, which has a drainage area of about 77 square miles, contains about 120 miles of stream containing cutthroat trout.

There have been no studies specifically on searun cutthroat trout in the Salmon River Basin. In the Alsea Basin, which is the nearest basin where searun cutthroat have been monitored, there was a substantial decline in run size over the last 20 years. There has also been a sharp decline in wild searun cutthroat trout returns in other streams with monitoring information, such as the North Umpqua and Siuslaw rivers; both have been stocked with Alsea Hatchery cutthroat trout. Although there is no direct information, it is thought the pattern in the Salmon River Basin is similar. The perception of the angling public is usually that there has been a decline in searun cutthroat trout abundance.

Life History and Population Characteristics

Cutthroat trout exhibit several life history patterns (Trotter, 1989). Resident cutthroat spend their entire life history in tributary streams and mature at a small size, usually less than 10 inches. They do not migrate within or out of the basin. There is one

identified resident cutthroat trout populations above barriers in the Salmon River Basin in addition to resident cutthroat trout populations in streams accessible to anadromous fish (Table 17).

Table 17. Cutthroat trout populations, Salmon River Basin.

Location	Comments
Salmon River	
Treat Creek	Permanent natural falls

Fluvial cutthroat trout spawn and rear as juveniles in small streams. They migrate to larger stream reaches and rivers where they attain greater size and mature. They return to headwater streams to spawn. Fluvial cutthroat will frequently attain a size of 12 to 16 inches before spawning.

Searun or anadromous cutthroat trout spawn and rear for 2 to 3 years in headwater streams before smolting and migrating to the ocean. They remain in the ocean for one summer and then return to headwater streams to spawn at a size of 12 to 20 inches.

It is uncertain if cutthroat trout with different life history patterns represent distinct breeding groups, or if there are life history variations within the same breeding group.

Habitat Restoration Activities

Habitat restoration activities directed specifically at cutthroat trout have not been given a high priority in the Salmon River Basin at this time because the network of small streams where they are dominant is so vast that achieving meaningful habitat improvement would be difficult. Anadromous cutthroat should benefit from restoration efforts directed at other salmonids.

Hatchery Production

The Salmon River had been stocked with an average of 4,100 yearling cutthroat trout from Alsea Hatchery since 1962 to 1996 (Table 18). The program released the hatchery cutthroat trout at an average size of 3 fish per pound. These fish were stocked throughout the mainstem a few days before the opening day of the spring trout fishery. There were and are no recapture facilities for returning hatchery adult searun cutthroat trout within the Salmon River Basin. The hatchery cutthroat release in Salmon River was terminated following the 1996 release.

The hatchery broodstock used for the Salmon River cutthroat trout releases was obtained from native Alsea River cutthroat trout in about 1936. The brood was maintained at Alsea Hatchery by hatching and raising fish to maturity at the hatchery

rather than by capturing returning anadromous adults. The broodstock had little infusion of wild cutthroat trout since it was established.

The contribution of hatchery cutthroat trout to the Salmon River Basin fisheries is not well documented. ODFW's target catch rate for trout stocked at the size of 3 fish per pound is 40% of the number released. The hatchery program in the Salmon River was believed to have been far below this target rate.

Angling and Harvest

The Salmon River Basin is currently under catch and release angling regulations for cutthroat trout. Angling for cutthroat trout is allowed throughout the basin during the general summer season from the fourth Saturday in May through the end of October.

Fishing pressure is very low in the majority of the small and medium size streams containing resident cutthroat trout. These streams are not fished heavily because the streams are small and access is difficult. The only area where ODFW staff feel cutthroat trout harvest may be significant is in the mainstem and tidewater where more anglers are attracted by the larger cutthroat or where cutthroat are caught incidentally while angling for salmon and steelhead.

Management Considerations

Cutthroat trout in the Salmon River Basin will be managed for wild production only. This will be consistent with the Department's recommendation to discontinue all cutthroat trout hatchery programs for running waters.

Subsequent to the initial writing of this plan, the ODFW Commission decided to close all coastal streams to consumptive harvest of cutthroat trout due to the depressed status of the searun cutthroat trout population. Retention of all cutthroat trout will remain closed until population data warrants resumed harvest. However, angling opportunity for cutthroat trout remains an objective of this plan with consumptive harvest potential considered in the future if population status warrants.

Table 18. Cutthroat stocking history, Salmon River Basin.

Years	Cutthroat Yearling	Cutthroat Fry
1962	9,000	0
1963	6,500	0
1964	3,002	0
1965	1,999	0
1966	3,004	0
1967	6,003	0
1968	3,000	0
1969	0	0
1970	4,000	0
1971	4,000	0
1972	4,085	0
1973	5,000	0
1974	4,995	0
1975	5,000	0
1976	5,016	0
1977	4,993	0
1978	4,602	0
1979	3,003	0
1980	5,001	0
1981	5,013	0
1982	5,000	0
1983	1,499	0
1984	4,179	0
1985	1,225	0
1986	5,049	0
1987	5,027	0
1988	5,074	0
1989	3,739	0
1990	4,995	0
1991	5,003	0
1992	5,008	0
1993	2,522	0
1994	5,242	0
1995	3,000	0
1996	3,000	0
1997	0	0

Policies

Policy 1. Cutthroat trout in stream reaches of the Salmon River Basin shall be managed for wild production only. Hatchery programs for trout shall be confined to lakes and reservoirs without substantial wild cutthroat trout production.

Objectives

Objective 1. Maintain the existing distribution and density of cutthroat trout in the Salmon River Basin.

Assumptions and Rationale

1. Cutthroat trout are found in about 120 miles of stream habitat in the Salmon River Basin.

2. The differences between resident, fluvial, and anadromous cutthroat trout and the factors determining the relative abundance of the different life history types are not understood.

3. The future abundance of cutthroat trout with different life history types currently can not be predicted.

4. Baseline information on cutthroat trout densities is available from fish sampling associated with research on coho salmon.

Actions

1.1 Measure cutthroat trout abundance in tributary streams and compare to historic abundance during sampling of multiple salmonid species.

1.2 Systematically document cutthroat trout distribution as necessary to implement the Oregon Forest Practices Act. Use this information to determine changes in overall cutthroat trout distribution.

1.3 Accomplish habitat protection and restoration objectives.

1.4 Continue annual angler surveys on the opening day of the spring trout season.

Objective 2. Re-establish spring, summer and early fall consumptive fishing opportunities for cutthroat trout in Salmon River Basin streams, when population status warrants

Assumptions and Rationale

1. The fishing opportunity will continue as a catch and release fishery unless population status warrants a resumption of consumptive harvest.

2. A broad opportunity for an introductory fishing opportunity makes these fisheries desirable.

Actions

2.1 Continue existing catch and release angling opportunity throughout the Salmon River Basin.

2.2 Re-instate angling regulations allowing a consumptive fishing opportunity for cutthroat trout in most areas of the Salmon River Basin if population status warrants.

PACIFIC LAMPREY

Background

Pacific lamprey (*Lampetra tridentata*) are found along the Pacific coast of North America from Unalaska Island, Alaska, south to southern California. Pacific lamprey migrate into all major river systems, often moving substantial distances upstream to headwaters.

Status

Pacific lamprey have been designated as a sensitive species by the state of Oregon. Pronounced declines in Pacific lamprey numbers have been noted statewide. The decline of Pacific lamprey is suspected to be due to degradation of spawning and larval rearing habitat, ocean conditions, marine mammal predation, and passage problems.

Life History Characteristics

Like salmon and steelhead, Pacific lamprey are anadromous, although numerous landlocked populations are known. Adults, 12 inches and greater in length, migrate into freshwater from July to September and spawn the following spring (Scott and Crossman 1973). Mature adult Pacific lamprey have also been identified to enter freshwater during the spring immediately prior to spawning (Wydoski 1979). Their moderately strong swimming ability and their capacity to cling to rocks, dams, and fish ladders by means of a disc-shaped mouth enable them to overcome many passage barriers.

Nest building and spawning occur from April to July in sandy gravel at the upstream edge of riffles. Females lay from 30,000 to 100,000 eggs. Adults die soon after spawning.

Eggs hatch in two to three weeks. The larvae, or ammocoetes, burrow into the fine substrates along the margin of streams downstream from their nest. The filter feeding ammocoetes spend 5 to 6 years in freshwater.

Toward the end of their freshwater period, the ammocoete transforms into the adult form. They migrate downstream in the late summer or fall with increasing flows. In the ocean they adopt a parasitic life, and prey upon soft scaled fish and other marine vertebrates. Lampreys live one to two years at sea before returning to freshwater to

spawn. Diet studies indicate marine mammals are natural predators of lampreys (personal communication from Hal Weeks, ODFW).

Harvest

Indians throughout the northwest have used the lamprey for food for centuries. Lamprey are managed for tribal harvest in the Columbia River. There is a limited commercial harvest of lamprey at Willamette Falls, in the Willamette Basin. Lamprey have not been managed for commercial, sport or tribal harvest in Oregon mid-coast basins.

Management Considerations

Pacific lamprey in the Salmon River Basin will be managed for wild production only. Management activities for lamprey will focus on habitat protection and restoration. It is assumed that efforts to recover habitat for salmonids will also benefit lamprey.

Policies

Policy 1. The Salmon River Basin shall be managed for wild production of Pacific lamprey.

Objectives

Objective 1. Maintain or increase Pacific lamprey production in rivers and streams in the Salmon River Basin where they naturally occur.

Assumptions and Rationale

1. The habitat required by Pacific lamprey will be provided by accomplishing basin wide habitat objectives.

Actions

1.1 While conducting routine inventory for other fish species, collect and summarize information and data for lampreys.

1.2 Accomplish basin habitat protection and restoration objectives.

1.3 Support and seek funding for research on Pacific lamprey life history, habitat requirements and factors responsible for declining abundance.

CRAYFISH

Background and Status

Origin

Crayfish are the most important freshwater invertebrate to Oregon's fisheries. They provide a small fishery and are also important fish forage in the Salmon River basin.

Status

Three species of crayfish are native to Oregon (Hobbs 1976). These species, their subspecies and intergrades are spread statewide, with overlapping distributions.

There are no quantitative estimates of population size or status of crayfish in the Salmon River Basin. Crayfish are frequently observed in moderate numbers during surveys for other species.

Life History Characteristics

Crayfish breed in the summer, with the first egg-bearing females appearing as early as September. Eggs are carried over the winter and hatch from late April to late June. The young are attached to the female by a thread-like material for a short time. Size achieved by zero-age crayfish during the first summer is quite variable due to the long period over which eggs hatch. Age determination by the length-frequency method is extremely difficult.

Females mature at about 18-30 months. Fecundity increases with size and perhaps age. There is evidence to suggest that some or perhaps all females do not breed each year.

Hatchery Production

There is no hatchery production of crayfish in the Salmon River basin. No commercial crayfish culture operations have yet been successful in the state.

Harvest

Crayfish have been fished commercially in Oregon since before 1893 when records were first kept. Markets for bait and for restaurant food dictate the size of landings. Most of the Salmon River basin harvest occurs during June through September (ODFW, unpublished data). There are no estimates of commercial landings specifically

for the Salmon River Basin. Lincoln and Polk county landings, which may or may not be from the Salmon River Basin, have been zero during the past four years.

The commercial crayfish season is open from April 1 through October 31. Crayfish may be taken only by crayfish pots or ring nets. Only crayfish 3-5/8 inches or longer in length may be taken. Undersized crayfish must be returned unharmed to the water. Any crayfish caught with eggs attached must be returned unharmed to the water. Gear must be labeled with an identification number issued by ODFW.

Recreational use of the resource is widespread for bait and direct consumption. No license is required to take crayfish. The daily bag limit is 100 per person. The season is open the entire year at all hours. Estimates of sport harvest levels in the Salmon River basin are unavailable.

Management Considerations

Habitat deterioration is the most serious threat to crayfish populations. Local populations may be subject to overharvesting.

Crayfish in the Salmon River Basin will be managed for wild production only, to provide for commercial and recreational fisheries.

Objectives

Objective 1. Maintain natural production of crayfish in the Salmon River Basin.

Assumptions and Rationale

1. Quantitative information is not available for crayfish distribution, abundance, and population characteristics in the Salmon River Basin.

2. Information on crayfish could be collected during routine surveys for other species.

3. Protection and enhancement of crayfish populations can be achieved principally through habitat protection.

4. Recreational and commercial harvest of crayfish in the Salmon River Basin is not excessive at this time.

Actions

1.1 While conducting routine inventory for juvenile salmonids or creel surveys, record and file observations of crayfish in a standardized format.

1.2 Monitor commercial crayfish landings in Polk and Lincoln County. If substantial landings occur, investigate if they are from the Salmon Basin.

1.3 Accomplish basin habitat protection and restoration objectives.

Objective 2. Determine the size and importance of the recreational crayfish harvest in the Salmon River Basin.

Assumptions and Rationale

1. There are no estimates of current harvest or effort.

2. Recreational harvest is widespread and may be increasing.

3. Recreational harvest could be described and monitored through time by counting and checking fishermen during peak use periods in mid summer following a consistent procedure.

Actions

3.1 Conduct creel studies in key areas to evaluate harvest and effort.

Objective 3. Maintain recreational crayfish harvest opportunity in the Salmon River Basin.

Assumptions and Rationale

1. Recreational harvest of crayfish in the Salmon Basin is not excessive at this time.

Actions

3.1 Maintain existing crayfish angling regulations.

ANGLER ACCESS

Background

The majority of angling in the Salmon River basin occurs in mixed private and public ownership. There is one boat access site in tidewater and several miles of bank angling access sites on publicly owned lands in the basin (Figure 15).

The tidewater portion of Salmon River is accessible by boat from the Knight Park boat ranp.

Bank access is available from the ocean upstream to Salmon River Hatchery and through the VanDuzer corridor in the upper basin. Land ownership surrounding the Salmon River between Salmon River Hatchery and the VanDuzer corridor is predominantly private with the exception of two public access points. Bank access in this area generally requires permission from individual landowners.

Management Considerations

Overall, angler access in the Salmon River Basin is good. Access is secure due to publically owned lands. Additional bank angling access sites could be developed through cooperative ventures with landowners surrounding the mainstem Salmon River above tidewater. No additional boat access sites are needed in the Salmon River Basin since the mainstem is not well suited to boating. Conflicts between anglers and landowners primarily involve trespass, littering, and damage to vegetation. Incentives need to be developed to encourage private landowners to allow public access and to encourage anglers to respect property rights and to minimize disturbance to wildlife. Anglers must police their ranks to assure all anglers respect private property.

Figure 15. River Access in the Salmon River Basin

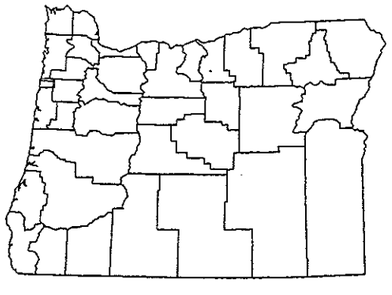
RIVER ACCESS
SALMON RIVER BASIN

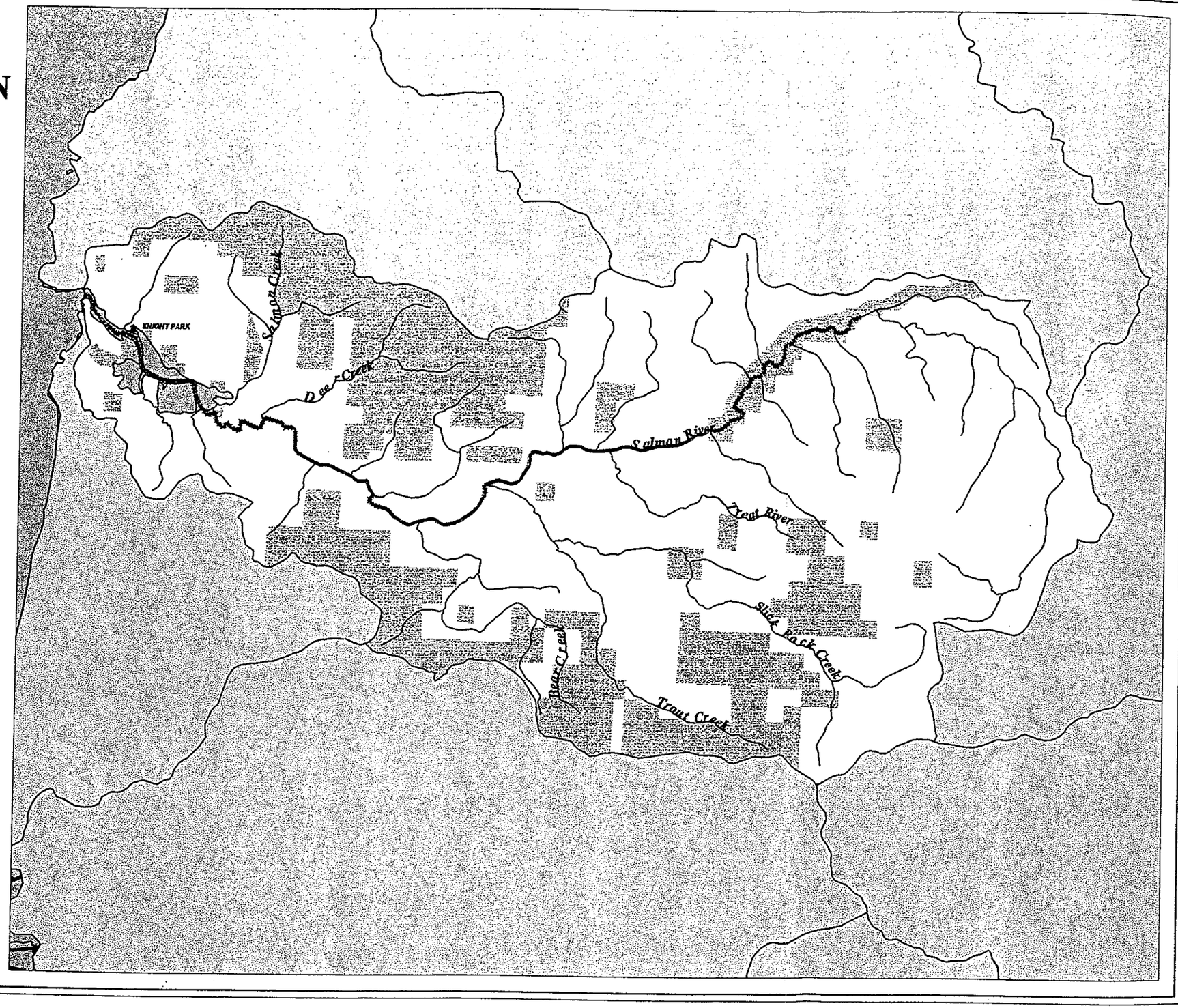
- ▲ Public Boat Access
- ★ Pay Boat Access
- Seasonal Salmon & Steelhead Fishing Opportunities
- Primary Bank Access
- Public Bank Access
- Public Lands
- Close to Angling Year Round

MI
0 1 2 3 4

OREGON
Fish & Wildlife

Location





Policies

Policy 1. The Department shall seek to provide access for boat and bank angling that will satisfy public need for a variety of angling opportunities and a dispersion of angling effort throughout the basin.

Policy 2. Acquisition and development of angler access sites shall be consistent with guidelines and objectives for management of fish species and habitat.

Objectives

Objective 1. Provide and maintain one permanent boat access site in tidewater on the Salmon River and its tributaries.

Assumptions and Rationale

1. Boat anglers primarily use tidewater for day trips.
2. No additional boat access sites are needed in the Salmon River Basin.
3. Lincoln county will continue to maintain the boat launch at Knight Park.

Actions

1.1 Stay appraised of the condition of the boat access site at Knight Park and seek to organize repair through cooperative ventures, if needed.

Objective 2. Maintain bank angling access in the Salmon River Basin.

Assumptions and Rationale

1. Much of the shoreline along the mainstem Salmon River is privately owned.
2. There are presently excellent bank angling opportunities from the Salmon River Hatchery downstream to the ocean and in the VanDuzer corridor.

Actions

2.1 Work cooperatively with landowners above tidewater to gain additional bank angling access sites.

2.2 Encourage the public to be good stewards of the land when given privilege of accessing private land.

PRIORITIES

The following are considered the highest priorities in the Salmon River basin:

Section	Action
Overview	
	Action 1.1. Overall habitat objectives.
	Action 1.4. Recovery program for winter steelhead.
Chinook	
	Action 2.2. Adjust programs to bring into compliance with the WFMP.
Steelhead	
	Action 2.1. Survey spawners.
	Action 2.2. Survey juveniles.

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.

Action	Requires action by other jurisdictions	Currently funded	Requires additional funding Short term	Long term
Overview				
Obj. 1, Fish Assemblage,				
1.1 : Overall Habitat	X	X	X	X
1.2 : Hatchery strays		X	X	
1.3 : Harvest of fish		X		
1.4 : Recovery programs	X		X	X
1.5 : Predation study	X		X	
Habitat				
Obj. 1, Summer Flow				
1.1 : Flow measurement	X			
1.2 : Instream water rights	X			
1.3 : Abandoned WR's	X		X	
1.4 : Enforcement of WR's	X	X		
1.5 : Cumulative WR's	X	X		
1.6 : Review of new WR's	X	X		
1.7 : Recommend reservoirs	X	X		
Obj. 2, Summer Temperatures				
2.1 : Temp. monitors	X		X	
2.2 : Temp. monitors	X			X
2.3 : Forest shade	X	X		
2.4 : Agriculture shade	X	X		
2.5 : Residential shade	X	X		

Action	Requires action by other jurisdictions	Currently funded	Requires additional funding Short term	Long term
Obj. 2, Summer Temperatures (cont.)				
2.6 : Channel widening	X	X		
2.7 : Data availability	X	X		
Obj. 3, Instream Structure				
3.1 : Measure	X	X	X	X
3.2 : Comment on buffers	X	X		
3.3 : ID restoration sites	X	X		
3.4 : Implement restoration	X	X	X	X
3.5 : Beaver benefits	X	X		
3.6 : Riparian conifers	X	X		
Obj. 4, Sediment				
4.1 : Monitoring techniques	X		X	
4.2 : Monitor	X			X
4.3 : Cumulative effects	X	X		
4.4 : Road sediments	X	X		
4.5 : Mass failure reports	X	X		
4.6 : Turbid streams	X	X		
Obj. 5, Water Quality				
5.1 : Recommend measuring	X	X		
5.2 : Consult with DEQ	X	X		
Obj. 6, Passage				
6.1 : Re-establish passage			X	X
6.2 : Inventory culverts	X		X	
6.3 : Correct passage	X		X	
Obj. 7, Aquatic Area				
7.1 : Evaluate change	X	X	X	X
7.2 : ID priority areas	X	X		
7.3 : Prevent channelization	X	X		
7.4 : Prevent diking/filling	X	X		
7.5 : recover lost areas	X	X	X	X
Obj. 8, Communication				
8.1 : Communicate	X	X		
8.2 : Watershed Council	X			X

Action	Requires action by other jurisdictions	Currently funded	Requires additional funding Short term	Long term
Chum Obj. 1				
1.1 : Spawning surveys				X
1.2 : Exploratory surveys			X	
1.3 : Angling regulations		X		
1.4 : Advice landowners		X		
Fall Chinook Obj. 1				
1.1 : Monitor escapement		X		
1.2 : Angling regulations		X		
1.3 : Hatchery release		X		
1.4 : Emergency regulation		X		
Obj. 2				
2.1 : Continue hatchery release		X		
2.2 : Plan for WFMP		X		
Obj. 3				
3.1 : Mark hatchery release		X		
3.2 : Facilitate indicator stock		X		
Coho Obj. 1				
1.1 : Hatchery releases		X		
1.2 : Maximize smolt survial		X		
1.3 : Allow hatchery harvest		X		
1.4 : Adjust hatchery program		X		
Winter Steelhead Obj. 1				
1.1 : Overall habitat	X	X	X	X
1.2 : Land use comment	X	X		X
1.3 : Angling regulations		X		
1.4 : WFMP compliance		X		
Obj. 2				
2.1 : Hatchery strays			X	
2.2 : Spawner surveys			X	
2.3 : Juvenile surveys			X	
2.4 : Trends in escapement				X
2.5 : Run size		X		
2.5 : Compile information		X		
Obj. 3				
3.1 : Angling regulations		X		

Action	Requires action by other jurisdictions	Currently funded	Requires additional funding Short term	Long term
Cutthroat Obj. 1				
1.1 : Measure abundance			X	
1.2 : Distribution	X	X	X	
1.3 : Habitat protection	X	X	X	X
1.4 : Creel survey		X		
Obj. 2				
2.1 : Angling regulations		X		
Pacific Lamprey Obj. 1				
1.1 : Collect information		X		
1.2 : Habitat protection	X	X	X	X
1.3 : Support research	X			
Crayfish Obj. 1				
1.1 : Record observations		X		
1.2 : Commercial fishery		X		
1.2 : Habitat protection	X	X	X	X
Obj. 2				
2.1 : Monitor harvest		X		
Obj. 3				
3.1 : Maintain regulations		X		
Angler Access Obj. 1				
1.1 : Boat launches	X	X	X	
Obj. 2				
2.1 : Public access	X	X		
2.2 : Public stewardship	X	X		

IMPLEMENTATION AND REVIEW

This plan is intended to provide both short-term and long-term direction for management of the fisheries in the basin. A separate "Action Plan" will be prepared by the Department that contains the actions from the basin plan that will be funded and undertaken during each biennium. Progress made implementing those actions will be reported by the Department every two years. At that time implementation priorities will also be reexamined and adjustments made where necessary.

Upon adoption by the Oregon Fish and Wildlife Commission, the policies and objectives will become Oregon Administrative Rules. As conditions for the resources and desires of the public change and as new information is obtained, the plan must be responsive and evolve as well. The entire plan, including policies and objectives, will be formally reviewed and revised every ten years. Interim changes in administrative rules can be made by the Commission in accordance with the Administrative Procedures Act when needed.

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APPENDICES

APPENDIX A

Habitat Restoration Activities

Habitat protection measures, such as land use laws, the Forest Practices Act, and fill and removal laws, are necessary to maintain habitat conditions that currently support fish stocks and will continue to do so in the long term. Habitat restoration activities are intended to improve degraded habitats which have potential for increased production of depressed fish populations in the near term.

Areas in the Salmon River Basin were identified that have the greatest potential for benefiting fish stocks that are at risk. Restoration activities that have the greatest chance of producing measurable improvements in the status and abundance of fish stocks in the short term were identified for these areas. Priorities were developed based on current knowledge of the habitat needs of a species and the ability to artificially modify habitat to provide for these needs in an ecologically sound manner. Additional information on biology of fish runs, their habitat needs, and the condition of the existing habitat will in all probability lead to the identification of additional restoration opportunities. Restoration actions are targeted at improving conditions for a single species although it is recognized that other species will frequently benefit from the restoration efforts.

High priority areas are listed Table A-1. More detailed descriptions of specific restoration activities for each species are provided in the species chapters in this document.

Table A-1. High priority areas and associated activities for habitat restoration in the Salmon River Basin.

Key species	Secondary species	Area	Activities
Chum salmon Winter steelhead Cutthroat trout	Coho salmon	Salmon River tidewater tributaries	Correct passage problems; sedimentation control
Coho salmon	Winter steelhead Cutthroat trout	Salmon River basin	Improve passage to beaver dams and lakes; increase instream structure; sedimentation control; plant conifers in buffer strips

Appendix B

Table B-1

Angling and fish viewing opportunities in the Salmon River Basin.
Verify open seasons based on fishing regulation pamphlets

Fishing Opportunities

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Bay												
Crabbing	○	○	○	○	◎	◎	●	●	●	●	◎	○
Chinook Salmon								◎	●	●		
Cutthroat trout							◎	◎	◎			
Main River and Forks												
Winter Steelhead	●	●	◎								○	●
Cutthroat trout					●	●	●	●	◎	○		
Chinook Salmon									◎	●	●	
Crayfish	○	○	○	◎	●	●	●	●	◎	◎	◎	○
Tributaries												
Cutthroat trout					●	●	●	●	◎	○		
Crayfish	○	○	○	◎	●	●	●	●	◎	◎	◎	○

Table B-1 continued.

Viewing/Educational Opportunities

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Chinook and Coho Salmon Spawning												
Site #1. Salmon River Hatchery											●	◎
Juvenile salmon and trout												
Salmon River tributaries						●	●	●	●			

Fishing or viewing opportunities

- ● Excellent
- ◎ Fair
- ○ Poor