TUALATIN SUBBASIN FISH MANAGEMENT PLAN

Prepared by
Tom Rien
Mike Gray
Robert Rohrer
Jay Massey

Oregon Department of Fish and Wildlife

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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. A high priority of the Willamette Basin Fish Management Plan (ODFW 1988) was the preparation of plans for subbasins within the Willamette system. The Tualatin Subbasin Fish Management Plan (hereafter referred to as the Tualatin Plan) was developed to direct management of the fish resources of the Tualatin Subbasin. The scope of the plan includes the main stem Tualatin River and its tributaries. It excludes lakes and reservoirs (e.g., Henry Hagg Lake) for which mini-management plans will or have been written.

ODFW is committed to the planning process as an integral part of all current and future management by the agency. The Tualatin Plan is one element of the Department's planning efforts. Species plans for coho, steelhead, chinook, trout, and warmwater game fish have been adopted. These statewide plans guide the development of more localized plans for individual river basins and subbasins. Likewise, the Willamette Basin Fish Management Plan (ODFW 1988, hereafter referred to as "Willamette Plan") provides the general guidance for management of the Tualatin and other subbasins within the Willamette Basin. The Willamette Plan should be consulted for information, policies, objectives, and actions that apply throughout the Willamette Subbasin.

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 Tualatin Plan was developed by the ODFW with the assistance of a public advisory committee and two technical advisory committees. The Tualatin Public Advisory Committee represented user groups and interested members of the community at large. The function of this committee was to help identify objectives and actions and to serve as a sounding board for public interests. The public advisory committee members were:

Member	Affiliation
Bob Davis	Tualatin Valley Bass Masters
Bill Eyler	Tualatin River Neighborhood Group

Dan Kearn	**N.W. Steelheaders, Tualatin Valley**
Tom Rice	**N.W. Steelheaders, Gales Creek**
Jim Tumbleson	**Isaak Walton League**

The Tualatin Technical Advisory Committee was composed of representatives of federal and state fishery and land management agencies, and electrical utilities. The committee contributed information used in the plans and reviewed drafts of the plans.

A technical committee with local representation provided information for and reviewed drafts of the Tualatin Plan. Members of this committee were:

Member	Affiliation
Debra Garner	**Unified Sewerage Agency**
Linda Kelly	**" " "**
Michael Simek	**Oregon Department of Forestry**
Bob House	**Bureau of Land Management**

A second technical advisory committee, one for the entire Willamette drainage, also reviewed the individual subbasin plans.

The Tualatin Plan should not be viewed as the final statement on the management of the fish and fisheries in the subbasin. Planning is a continuing process. As conditions of the resources and desires of the public change and as new information is obtained, the plan must be responsive and evolve as well. The Tualatin Plan will be reviewed every other year to evaluate progress in achieving its objectives, to modify the plan where necessary, and to set priorities for carrying out the plan in the succeeding two years. This review will precede the preparation of ODFW's biennial budget, which is submitted to the legislature for funding.

Organization

The plan is divided into sections that deal with habitat, 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 that helps explain the context of the guidelines, objectives, and actions that follow.

2. **Guidelines** -- constraints or principles developed specifically for management activities in the subbasin related to that species or topic.

3. **Objectives** -- what is intended to be accomplished.

4. **Problems** -- obstacles to achieving the objectives.

5. **Recommended Actions** -- solutions or methods for dealing with the problems.

IMPLEMENTATION AND REVIEW

This plan is intended to provide both long-term and short-term direction for management of the fisheries in the subbasin. 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.

Upon adoption by the Oregon Fish and Wildlife Commission, the policies and objectives will become Oregon Administrative Rules. Revision of these rules requires action by the Commission. The entire plan, including policies and objectives, will be formally reviewed and revised every 10 years. Emergency changes in administrative rules can be made by the Commission in accordance with the Administrative Procedures Act when needed.

Progress made toward implementing the actions in the plan will be reported by the Department every 2 years. At that time, implementation priorities will also be reexamined and adjustments made where necessary.

PRIORITIES

The following are considered the highest priorities in the Tualatin Subbasin:

-- Update the fish habitat and population inventory for the subbasin.

-- Screen the diversion into Lake Oswego Canal.

-- Improve access for bank anglers to increase utilization of warmwater species.

-- Improve passage for adult salmon, steelhead and trout at several dams.

Specific Priorities

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

Table 1. High priority actions in the Tualatin Subbasin Fish Management Plan and funding status.

Action	Requires action by other agencies	Currently funded
HABITAT		
Screen Lake Oswego Diversion	Yes	No
Improve dam passage at several facilities	Yes	No
COHO		
Release only mitigation smolts; consider releasing outside of subbasin	Yes	No
TROUT		
Maintain and enhance wild trout in areas above barriers	No	No
Manage Dairy Creek and tributaries for wild cutthroat production	No	No

Table 1 continued.

WARMWATER AND MISC. SPECIES		
Pursue increased access to utilize existing warmwater fish production	Yes	No
ACCESS		
Improve bank angler access for increased use of warmwater fish	Yes	No

GENERAL CONSTRAINTS

Besides the statewide species plans and the Willamette Plan, the Tualatin Plan must also conform to other established constraints. These include:

1 **Oregon Administrative Rules (OAR)** -- Goals and policies for commercial and sport fishing regulations, fish management, and salmon hatchery operation, including the Wild Fish Management Policy (WFMP). Portions of the Tualatin Plan adopted as Administrative Rules are contained in Appendix *** .

2. **Procedures developed by ODFW** -- e.g., a Department Guide for Introductions, Fish screen design policies and standards, Transfers of Finfish into Oregon Waters (1982) and "Fish Disease Control Guidelines (1979)".

3. **Agreements with other agencies** -- e.g., U.S. Forest Service (USFS), Bureau of Land Management (BLM), USACE, Columbia River Compact, Northwest Power Planning Council, and PGE.

4. **Rules and regulations of other federal, state, and local jurisdictions** -- e.g., Department of Environmental Quality (DEQ), Department of Forestry (DOF), Department of Land Conservation and Development (DLCD), and the Federal Energy Regulatory Commission (FERC).

5. **Legal considerations** -- e.g., state and federal laws (Appendix A).

HABITAT

Background and Status

Basin Description

The Tualatin River flows easterly from its headwaters in the Coast Range of northwestern Oregon to its mouth at river mile (RM) 28.6 on the Willamette River (Figure 1). The subbasin drains about 707 square miles. About half the basin is forested lands (SWRB 1965). The lower drainage is comprised of agricultural, residential and urban lands.

The drainage is almost entirely within Washington County. Southwest Portland is partially within the western end of the basin. Seven cities in the drainage have populations greater than 10,000 people. The populations of Beaverton and Hillsboro are greater than 30,000 people.

Major tributaries of the Tualatin include Fanno, Chicken, McFee, Rock, Dairy, Gales and Scoggins creeks.

Headwater streams for the Tualatin and its tributaries are in the relatively low elevation Coast Range and Tualatin Mountains in western and northern portions of the subbasin. Mountain peaks in the area range from 2,900 feet to more than 3,500 feet high. Most of the forested foothills surrounding the Tualatin Valley are from 1,300 to 2,200 feet (SCS 1982).

Slopes in the headwater stream reaches may be fairly steep. A rock-cut fishway on the mainstem at Lee Falls (RM 75) provides fish passage to an additional two miles of habitat. Haines Falls (RM 77) blocks all anadromous fish passage.

Most mainstem and tributary stream reaches are gently sloping to nearly flat. These low gradient areas create reaches with slow-moving water prone to high temperatures in late summer and fall.

Along the valley floor, the mainstem and tributaries flow through areas with deep alluvial soils. These mud bottom streams have little spawning gravel that is suitable for salmonid production.

Temperatures in the Tualatin Valley range from an average annual high of 99 degrees Fahrenheit to an average low of 13 F. Temperatures in the Coast Range average two to three degrees cooler than valley temperatures (SCS 1982). The average annual precipitation ranges from 80 inches in the Coast Range to 40 inches near the mouth of the Tualatin (SWRB 1965).

Figure 1. Tualatin Subbasin and access sites.

Most precipitation occurs as rain in fall (28%), winter (46%) and spring (20%). Only 6% of the annual precipitation occurs in the summer (Figure 2).

Because there is little snow, streamflows in the Tualatin are largely rainfall dependent. In late summer and fall low streamflows result from the lack of snow pack and rain. This problem is aggravated by consumptive water use. Scoggins Dam has helped to modulate flows in the subbasin.

Flows in the Tualatin system are dependent to a large extent on precipitation falling primarily as rain in winter months. This results in periods of rapid runoff. Summer months are characterized by extended periods of low flow. Scoggins Dam was built in part to help modulate flows in the subbasin. Mean monthly flow is presented in Table 2 for selected gauging stations in the Tualatin Subbasin.

Water quality improvement and pollution abatement have been the focus of a major effort in the Tualatin drainage. The subbasin has a number of large population centers (such as Beaverton, Hillsboro, Tigard) and agricultural lands comprise about one quarter of the subbasin. Effluent from sewage treatment plants and storm water runoff from developed areas and croplands contribute to the ammonia-nitrogen and phosphate levels in the water. An estimate of several water quality parameters is presented in Table 3.

The effects of low summer flows and high nutrient loads combine to create a poor environment for fish passage and production, particularly in lower reaches of the mainstem.

Past and Present Land Use

Nearly 93% of the land in the Tualatin Subbasin is privately owned (Table 4). The state of Oregon manages about 5% of the land and the remaining 2% is managed by the BLM.

Forestry

Timber is the second most important industry in Washington County (Bryson and Levine 1987). Most forest lands are located in the upper one-third of the subbasin. The major private timberland owners are Longview Fiber, Stimson Lumber Company and Willamette Industries. Numerous smaller private timber lots are scattered in the upper portion of the subbasin. DOF and BLM also manage forestland in their jurisdictions.

Most forested lands in the Tualatin Subbasin have been logged at least once. Some old-growth timber remains around Lee Creek (RM 75). Much of the acreage to the west of Hagg Lake and north across State Highway 6 (Scoggins and Gales creek drainages) was burned in the Tillamook Burn in 1939 and 1945.

Figure 2.

Table 2.

Table 3. Water quality characteristics of the Willamette River Subbasin at USGS gauging station 14207500 (Tualatin River at West Linn, Oregon).

Parameter	Fall[a]	Winter	Spring	Summer
pH	7.2	7.1	7.0	7.7
Temperature (°F)	49	44	58	68
Dissolved Oxygen (mg/l)	9.2	11.5	9.4	10
Specific Conductance (micromho)	137	123	140	185
Turbidity (NTU)	6.3	4.2	5.6	3.6

[a] Seasons: Fall - October through December; Winter - January through March; Spring - April through June; Summer - July through September.

Table 4. Land ownership in the Tualatin River Subbasin (acres) (Greg Nelson, 1988, Oregon Department Water Resources, computer data base report).

Hydro. Unit	SCS Watershed	BLM	State	Private	Total Acreage
Tualatin	Scoggins	964	9,918	91,201	102,083
	Gales		13,908	40,798	54,706
	Dairy	3,969	777	98,880	103,626
	McKay	2,515		89,793	92,308
	Lower			99,895	99,895
Tualatin	Total	7,448	24,602	420,567	452,618

Second growth timber in much of this area is now commercially harvestable (M. Simek, DOF, pers. commun.).

Past timber harvest along streams and associated road building has had adverse effects on fish habitat, such as removal of large woody debris from stream channels, removal of streamside vegetation, and increased sediment loading. In recent years improved sale planning and logging practices have reduced some of these impacts. An estimate of the number of acres harvested in the drainage is presented in Table 5.

Some general impacts of logging on stream habitat are increased stream temperature and sedimentation rate, as well as decreased cover and structural diversity (Bottom, Howell and Rodgers 1985).

Clearcutting is the most common timber harvest method. This is usually accomplished by ground or cable logging. Larger companies and DOF have harvest rotation rates of about 60 to 70 years. Harvest rates used by smaller timber holders are typically dictated by market conditions. Because of the diverse ownership, it is difficult to generalize about forestry operations in the subbasin (M. Simek, DOF, pers. commun.).

Table 5. Harvested acreage for private timber operations in the Tualatin River Subbasin (Mike Simek, DOF, personal communication).

Year	Harvested Acres
1980	5,200
1981	6,200
1982	6,700
1983	4,200
1984	6,800
1985	6,000
1986	8,700
1987	5,700
TOTAL	49,500

Agriculture and Grazing

Agriculture is an important component of the Washington County economy. Nearly one quarter of the land base is zoned for agricultural use (Washington County 1988). Principal crops include wheat, hay (clover and grass), red clover, alfalfa, filberts, barley, oats, prunes, strawberries and a variety of

vegetables (SCS 1982). There is little grazing in the county. Pesticide and fertilizer runoff affects fish habitat in the subbasin (see Residential, Commercial, and Municipal Development, below).

Mining

The upper reaches of McKay and Dairy creeks have considerable gravel reserves as do portions of the Gales Creek flood plain (Washington County 1988).

Residential, Commercial, and Municipal Development

Washington County (population 268,000) was identified as the fastest growing area in Oregon (Bryson and Levine 1987). Extensive urban, residential and light industrial development has adversely affected stream habitat throughout much of the lower Tualatin Subbasin. Table 5 lists the major cities wholly or partially within the subbasin.

Runoff from developed lands is an important contributor of non-point source pollution in the Tualatin Subbasin. This contributes to the nutrification of the lower river and its tributaries. About 20% of the phosphate load in the Tualatin River is from natural and non-point sources. The rest is introduced through treated sewage (D. Garner, Unified Sewerage Agency, pers. commun.). Phosphates increase the quantity of algae in the river, causing primarily a problem of aesthetics.

The largest source of ammonia-nitrogen pollution in the Tualatin drainage is treated sewage from residential communities throughout the basin. Ammonia-nitrogen levels are directly and inversely related to levels of dissolved oxygen in the system. DEQ has established total maximum daily loads for phosphates and ammonia-nitrogen for the Tualatin system, and state and local governments have developed plans for reducing these problems. The Unified Sewerage Agency (USA) began operation of ammonia-nitrogen removal facilities at its Rock Creek plant in May 1989 (Dale Richwine, Unified Sewerage Agency, personal communication). The DEQ establishes the minimum acceptable level of dissolved oxygen.

Over the past 15 years, a number of fish toxicity problems have arisen that are directly traceable to urban and agricultural activities in the drainage. Chlorine poisoning from a drained swimming pool, battery acid spills and improper application of pesticides near streams are a few of the reported problems (DEQ 1987). Consumptive water use in the West Fork of Dairy Creek severely depletes flows during summer and early fall. This, in combination with the drainage's low gradient, results in high temperatures undesirable for salmonid production. Dissolved oxygen is also frequently at an undesirably low level due to high temperatures and nutrification.

Forested lands remain in the upper one-third of the subbasin in the Coast Range and Tualatin Mountains. Most land in the

Table. 6. Major cities within the Tualatin Subbasin.

City	1986 Population
Portland	379,000a
Beaverton	35,025
Hillsboro	30,332
Lake Oswego	24,224b
Tigard	20,725
Oregon City	14,505c
West Linn	12,954
Forest Grove	11,750
Tualatin	10,150
Cornelius	5,050
Sherwood	2,736
King City	1,980
North Plains	950
Durham	785
Gaston	550
Banks	490

a Only southwest Portland is in the subbasin.
b Not in the subbasin, but a major water user.
c Largely outside the subbasin.

lower Tualatin Valley has been developed for agriculture, residential or light industrial use.

Dams and Hydroelectric Projects

Four dams exist in the Tualatin system. Lake Oswego Corporation's (Oregon Iron and Steel) diversion dam at RM 3.8 may have the greatest impact on anadromous fish. When the dam's flashboards are in place, the rate of flow is reduced for several miles upstream. ODFW operates a fishway at the dam, but its effectiveness varies. The Tualatin's water level fluctuates dramatically after periods of heavy rainfall and the fishways stoplogs must be adjusted frequently. In high water conditions this may be impossible. The dam itself is passable when the flashboards are not in place and flows are moderate. Oswego Lake Dam, which impounds the lake, generates electricity via water diverted from the Tualatin River.

The largest dam in the Tualatin system is on Scoggins Creek, forming Henry Hagg Lake. This facility was built in 1974 by the U.S. Bureau of Reclamation to provide irrigation, municipal and industrial water, flood control and recreation. The dam is currently operated by Tualatin Valley Irrigation District (TVID). There is no fish passage at Scoggins dam. Funds for annual releases of 60,000 coho salmon smolts and 10,000 steelhead smolts are provided by the Bureau of Reclamation to ODFW as mitigation for lost spawning and rearing habitat in Scoggins Creek.

Scoggins Creek Dam does not currently have any hydroelectric facilities. However the dam was built to accommodate such development should it become desirable.

A private dam is operated at Balm Grove on Gales Creek, 13 miles from its confluence with the Tualatin. Originally the dam was a simple stoplog structure that backed up water to provide a recreational setting for picnicking, camping, swimming and fishing at Balm Grove Park. Without conferring with ODFW, the owners added a concrete apron in 1980, which raised the height of the dam and obstructed fish passage during low flow conditions. Railroad ties have been placed on the apron to improve passage by concentrating the spill in low water conditions. However, anglers have reported that this has been ineffective; adult salmon and steelhead are still delayed by this structure.

Clear Creek, a tributary of Gales Creek (Gales Creek RM 11.1), has a dam owned and operated by the city of Forest Grove. A fishway was constructed by the city in 1974. An inspection in 1989 revealed that the current structure needs to be repaired as it is not allowing adequate passage (J. Massey, ODFW, Lower Willamette District Fish Biologist, pers. commun.).

The Bureau of Reclamation has proposed a fifth dam (at RM 65.5 near Gaston, Oregon or at RM 68 near Mercer Creek) on the mainstem of the Tualatin River to provide additional water and power. Power generation was reportedly not cost effective at the proposed dam (U.S. Bureau of Reclamation 1983). Since 1983 the project has been on hold. Now the project's feasibility is being re-evaluated and power generation potential will likely be considered again. The proposal does not include fish passage facilities for anadromous or resident fish. This is a natural production area for winter steelhead and coho salmon. There are no immediate plans to build this facility, however, future water needs in the subbasin may make it necessary (J. Budolfson, U.S. Bureau of Reclamation, pers. commun.).

Diversions and Withdrawals

Oswego Lake Canal, an unscreened diversion at RM 6.8, diverts an average of 56 acre-feet annually. Juvenile salmonids entering Oswego Lake must exit through Oswego Lake Dam's turbines. Additionally, some returning adult salmonids are attracted to Tualatin River water exiting Oswego Lake's outlet, where there is no passage (DEQ 1987).

Substantial amounts of water are diverted from the Tualatin for municipal, industrial and agricultural purposes (Table 7). Water rights presented in the table are potential amounts of water that may be withdrawn during a given year, resulting in decreased flows for fish passage and fish production.

Minimum perennial streamflows established in the Tualatin Subbasin are given in Table 8. Oregon Senate Bill 140 (ORS 537.346 and OAR 690-77-050) will convert all minimum streamflows

Table 7. Surface water withdrawals (1985) (T. Broad, 1988, U.S. Geologic Survey, computer data base report) and water rights (B. Devyldere, 1988, DWR, computer data base report) for the Tualatin River Subbasin.

Use Type	Water Use (ac-ft)	Water Rights (ac-ft/yr)	(cfs)
Municipal	17,684	500	248
Domestic	NA	0	3
Recreational	NA	1	4
Industrial	263	0	69
Agricultural (Total)	398	1,107	822
Total (All Uses)	18,345	1,608	1,146

to instream water rights. No appropriations of water will be granted when flows are below the levels specified, however, according to ORS 536.310(12), preference shall be given to human consumption and livestock use when uses are in mutually exclusive conflict or supplies are not sufficient for all who desire to usethem. WRD has indicated that this statute will be applied such that domestic and livestock rights junior to an instream water right will be regulated in favor of the instream right, if needed, to protect the instream right.

Recreation

The lower Tualatin River has populations of crappie, bluegill, catfish and bass that are quarry for anglers. Most land in this area is privately owned so bank access is limited. In spite of poor access, boat angling and flat water canoeing are popular in the lower mainstem.

Salmon, steelhead and cutthroat angling occurs primarily in Gales Creek and the Tualatin River mainstem above Scoggins Creek. Much of the land on the mainstem is privately owned and angling access is limited.

Hagg Lake (Scoggins Reservoir) supports the most intensive recreational fishery in the basin for rainbow trout, which are stocked, as well as smallmouth bass and yellow perch which were illegally introduced.

Table 8.

Following is a list of habitat constraints to fish production in the Tualatin Subbasin:

1. Turbidity and Siltation
Agriculture and construction in the lower Tualatin Subbasin introduce sediments into the streams during rainy periods.

2. Limited Spawning and Rearing Areas
The lower Tualatin and its tributaries below Rock Creek are very low gradient, slow-flowing streams. The tributaries contain little spawning gravel and development in the lower subbasin has channelized many streams. During summer and early fall, temperatures in these reaches are undesirable for steelhead production.

3. Balm Grove Fishway
Anglers have reported that steelhead hold up in the pool below this small dam and they appear to have difficulty passing the dam in low water conditions.

4. Lake Oswego Canal
An unknown quantity of smolts migrate down this unscreened diversion. Smolts entering the canal must exit through hydropower facilities at Lake Oswego Dam, where they may be killed or injured.

5. Predation
There are enough warmwater game fish present in the Tualatin below Rock Creek to support a recreational fishery. There may also be substantial populations of squawfish. While predation has not been demonstrated as a problem, these fish are potential smolt predators.

Habitat Management

Agencies involved in management of fisheries and fish habitat in the Tualatin system (and their acronyms as used in this plan) include:

<u>Federal</u>
Bonneville Power Administration (BPA)
Bureau of Land Management (BLM)
Bureau of Reclamation
Federal Emergency Management Agency (FEMA)
Federal Energy Regulatory Commission (FERC)
National Marine Fisheries Service (NMFS)
Northwest Power Planning Council (NPPC)
U.S. Army Corps of Engineers (USACE)
USDA Soil Conservation Service (SCS)
U.S. Fish and Wildlife Service (USFWS)
U.S. Geological Survey (USGS)

State
Department of Environmental Quality (DEQ)
Department of Forestry (DOF)
Department of Geology and Mineral Industries (DOGAMI)
Department of Land Conservation and Development (DLCD)
Department of Transportation (ODOT)
Division of State Lands (DSL)
Water Resources Department (WRD)

Local
City Governments (zoning and planning divisions)
(see Table 6)
Washington County Planning and Zoning Division
Washington County Soil and Water Conservation District
Lake Oswego Corporation
Tualatin Valley Irrigation District (TVID)
Unified Sewerage Agency (USA)

Fishery managers recognize that habitat degradation and loss is a serious threat to the maintenance of healthy fish populations. Enforcing local, state, and federal laws for protecting fish habitat is essential to sustaining a vital habitat base. Consequently, ODFW must be a consistently strong advocate for the protection and proper management of fish habitat.

ODFW coordinates with local, state, and federal agencies regarding their habitat protection and management programs. Often this involves making recommendations to minimize impacts from various land and water use practices that may conflict with fishery interests. Fish production must compete with other land and water uses such as timber production, irrigation, and hydroelectric power production.

Each of the land and water management agencies has regulatory authority over some aspect of land or water use, or has overall responsibility for specific land or water areas. Each agency has its own policies, procedures, and management directives associated with its area of responsibility. No single agency has total jurisdiction over an entire river basin. For this reason, coordinated involvement and cooperation among fishery, land, and water managers is necessary to achieve comprehensive management of a watershed to the benefit of the entire system and its resources.

Existing Cooperation Among Agencies

Fish and wildlife managers coordinate with land and water managers to protect fishery resources and habitat. The role of ODFW concerning habitat protection issues is not through direct management. ODFW has enforcement authority for fish screens and fish passage. ODFW can apply for instream water rights to protect fish habitat and can collect costs of habitat damage from

polluters. ODFW reviews the activities of other public agencies and private entities that are land managers and provides recommendations intended to minimize harmful changes to fish habitat. Applications for permits issued by other agencies for land use activities are forwarded to ODFW for review and comment. ODFW is currently developing policies regarding screening, fill and removal, and habitat mitigation.

Memoranda of understanding among ODFW, BLM, and USACE describe cooperative activities for protecting and improving fish habitat on federal lands. Contractual agreements exist with NMFS and the USFWS concerning Columbia River and ocean salmon fisheries, marine fish investigations, and hatchery production. Annual contracts with the USACE have been established to mitigate for fish production lost as a result of Corps projects.

ODFW comments on BLM project proposals as well as the general land management plans. BLM has initiated its planning process for western Oregon. Projected date of completion is late 1990. The plan review process provides a forum for the state to address habitat improvement or protection for fishery resources. BLM fish habitat improvement projects require close coordination with the ODFW.

Activities that may affect threatened or endangered species must be coordinated with USFWS. No threatened or endangered species are currently identified in the Tualatin Subbasin.

DEQ establishes minimum water quality standards that comply with the federal Environmental Protection Act and the federal Clean Water Act. State water quality standards are specifically directed at fish bearing waters.

Opportunities for Additional Cooperation

ODFW's Salmon and Trout Enhancement Program (STEP) provides an opportunity for private individuals, industry, and user groups to become involved with projects designed to improve salmon and trout fisheries. Funding of these projects is primarily from donations and volunteers. ODFW provides additional funding when necessary.

The Governor's Watershed Enhancement Board (GWEB) provides an opportunity for private individuals as well as organizations to become involved in watershed rehabilitation projects. An Oregon Fish and Wildlife Commission member is a member of this board.

Unresolved or Anticipated Institutional Considerations

WRD is currently updating its management programs for the Willamette Basin. Programs affect future water rights, set priorities for water use, and prescribe actions to solve water

problems. ODFW, along with other state natural resource agencies, has identified issues that ODFW will cover and contribute to the WRD's planning process. Final adoption of new programs is expected in 1991 or 1992.

Information Needs

Stream surveys to evaluate habitat and fish use have not been done since the 1960s for many reaches. Of particular concern are Gales Creek and tributaries Iler, Clear, Roderick, Coffee and South Fork Gales creeks; Dairy Creek and tributaries Strassel, Poliwaski Canyon and Lousignont creeks; McFee Creek; and Roaring Creek.

Objectives

Objective 1. Maintain and improve upstream and downstream passage for anadromous fish at dams, water diversions, other man-made obstacles, existing fishways and where appropriate, at natural barriers.

Assumptions and Rationale***italics***

1. Anadromous salmonids and the migratory cutthroat depend on proper passage for dispersal into spawning and rearing habitat for optimum natural production. Angling opportunity also depends on proper dispersal of returning adults.

Actions***italics***

1.1 Provide adequate adult passage at dams in the Tualatin Subbasin.

a. Work with Lake Oswego Corporation to modify the ladder at Oregon Iron and Steel Dam to allow adequate adult fish passage in all flow conditions.

b. Work with the owners of Balm Grove Dam to modify the adult fish passage structure to allow adequate adult fish passage.

c. Work with the city of Forest Grove to restore fish passage at Clear Creek Dam in the Forest Grove Watershed.

d. If stream surveys indicate there is significant fish habitat available above a private dam on McFee Creek, require the owner to provide for fish passage.

1.2 Reduce migration delays and mortality of juvenile salmonids at diversions.

a. Require Lake Oswego Corporation to install fish screens at the entrance to Lake Oswego diversion canal

b. Determine where diversions in the Dairy Creek system impede fish migration. Require landowners to correct adult passage problems and protect downstream migrants as necessary.

Objective 2. Protect existing streamflows and water quality from degradation associated with operation of dams, water diversions, effluents, mining, recreation and other instream activities.

Assumptions and Rationale***italics***

1. The Tualatin Subbasin flows through a highly developed and densely populated area that is heavily impacted by land use. Protection measures are necessary to minimize the effects of such development.

2. Water quality is a critical concern in the subbasin.

Actions***italics***

2.1 Minimize the impacts of operation of existing and new dams in the subbasin on fish production.

a. Work with the Bureau of Reclamation and TVID to develop fill and release schedules for Scoggins Dam and proposed reservoir impoundments that will ensure adequate flows in the subbasin for fish passage and production.

b. Continue to participate with FERC in reviews of permit applications for new and existing hydroelectric development in the subbasin.

2.2. Coordinate with other agencies (i.e., WRD and DEQ) to improve water quality. Support and participate in interagency efforts to increase monitoring of water quality and pollutants in the Tualatin Subbasin.

Objective 3. Inventory stream and watershed characteristics that affect fish production.

Assumptions and Rationale***italics***

1. The physical and biological inventory for the subbasin is outdated or lacking, due to present manpower constraints. An update of the current habitat condition would aid in better management of the subbasin's fisheries.

2. ODFW's Restoration and Enhancement Program may provide the means to survey and update the fish habitat inventory.

Action

3.1 Conduct physical and biological surveys of riparian habitat, instream structure, spawning gravels and geomorphological characteristics. Conduct stream habitat surveys in stream reaches that have not been surveyed in recent years, including Gales Creek and tributaries Iler, Clear, Roderick, Coffee and South Fork Gales creeks; Dairy Creek and tributaries Strassel, Poliwaski Canyon and Lousignont creeks; McFee and Roaring creeks.

WINTER STEELHEAD

Background and Status

Origin

Steelhead are indigenous to the Tualatin River (ODFW 1986c), but managers know little about the population. Big Creek stock was introduced to the subbasin in the early 1970s. Eagle Creek stock has been used in STEP programs.

Big Creek steelhead account for some of the natural production in the subbasin. The magnitude of this production, however, is unknown. Their distribution is likely to be similar to the distribution of the ODFW's steelhead smolt release sites. These are in Gales Creek and the Tualatin mainstem above Scoggins Creek. These sites correspond with the most desirable steelhead rearing habitat in the basin.

Life History and Population Characteristics

The Tualatin Subbasin does not have fish counting stations. To estimate numbers of Big Creek winter steelhead returning to the Tualatin, planners divided the steelhead passing the Willamette Falls fish ladder between November 1 and February 15 (Big Creek stock) among the three subbasins they return to in important numbers -- the Coast Range tributaries, Molalla, and Tualatin rivers as follows:

Run size = (Punch-card catch for subbasin / punch-card catch for all 3 subbasins) X Willamette Falls "early" winter steelhead count.

The assumptions of this estimator are:

1) Exploitation rates are similar in all three subbasins.

2) The early-run stock returns only to these subbasins (no straying).

3) Catch of early-run stock above the falls in the mainstem is zero.

4) All Big Creek (early-run) steelhead pass Willamette Falls between November 1 and February 15. No other steelhead stocks pass the falls during this period.

The Tualatin's estimated run averaged 1,980 fish from 1976 to 1986. The highest return was 2,852 steelhead in 1985-1986. The lowest return was 330 fish in 1978-1979 (Table 9).

Steelhead passing Willamette Falls from November 1 to February 15 are mainly Big Creek Stock (Frazier 1988) (Figure 3).

Table 9. Big Creek winter steelhead run size estimates for the Tualatin, Molalla and Coast Range Subbasins (ODFW 1987, Frazier 1987) .

Estimated harvest from salmon steelhead angler catch records:

Subbasin	Area	Notes	Year 76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86
Tualatin												
	Tualatin R		62	87	26	55	3	99	31	44	77	50
	Gales Cr		145	209	11	324	315	193	221	289	368	285
	Total	A	207	296	37	379	318	292	252	333	445	335
Molalla												
	Molalla R	B	398	616	253	916	728	341	265	470	459	439
Coast Range												
	Luckiamute R		0	6	4	0	0	0	0	0	4	0
	L. Luckiamute		--	--	--	--	--	--	--	--	--	--
	Marys R		3	10	3	16	13	9	0	3	4	4
	Mill Cr (Yamhill Co.)		3	10	13	26	59	13	13	7	7	4
	Rickreall Cr		--	--	--	--	--	--	--	--	--	--
	Willamina Cr		9	135	29	69	97	54	27	57	66	76
	Yamhill R		--	8	0	3	22	4	0	0	21	23
	Yamhill R, N Fk		9	18	0	7	58	4	8	7	12	0
	Yamhill R, S Fk		--	15	0	0	13	20	14	3	4	4
	Total	C	24	202	49	121	262	104	62	77	118	111
Willamette Falls "early run" winter steelhead counts:												
Passage		D	5,327	8,599	2,861	6,258	7,662	6,117	4,596	6,664	4,549	8,475
Run Size Estimates												
Tualatin:	(A/A+B+C)*D		1,753	2,285	312	1,675	1,863	2,424	2,000	2,522	1,981	3,208
Molalla:	(B/A+B+C)*D		3,371	4,755	2,135	4,048	4,264	2,830	2,104	3,559	2,043	4,204
Coast Range:	(C/A+B+C)*D		203	1,559	414	535	1,535	863	492	583	525	1,063

Figure 3.

Table 10. Migration timing of adult winter steelhead tagged at Willamette Falls and recaptured in the Tualatin River.

Date Tagged	Date Captured	Days between tagging and recapture
1/13	1/31	18
1/13	2/01	19
1/13	2/12	30
1/13	3/12	58
1/25	2/17	23
2/18	3/10	20
3/05	3/12	7

Punch-card data from 1985 and 1986 show catches of winter steelhead from December to June. Most fish were caught from January to March.

Seven adult winter steelhead tagged at the fish ladder at Willamette Falls in 1982 were later recaptured at Gales Creek in the Tualatin (Buchanan and Wade 1982) (Table 10).

No specific information is available on spawning areas; managers believe that some natural spawning occurs in Gales Creek and the Tualatin River above Scoggins Creek. McKay Creek and the East and West Forks of Dairy Creek also have suitable steelhead spawning and rearing areas. Some fish that have strayed from their original release sites may spawn in these areas.

The Northwest Power Planning Council's computer model estimates the current smolt production capacity of the Tualatin Subbasin at 84,795 winter steelhead smolts. It is impossible to verify the accuracy of this estimate, but depending on the degree to which the Monitoring and Evaluation Group's study streams are both physically and morphologically different from the Tualatin Subbasin there is the potential that the model's estimate of the smolt production capacity of the drainage may significantly deviate from the true value. It should be noted, however, that more subbasin specific information will be needed before the accuracy of the computer model's estimate can be verified.

Hatchery Production

ODFW releases winter steelhead in Gales Creek and the Tualatin River at five fish per pound in late April and early May.

Table 11. Current smolt allocations and average releases (1984-1988 average) for hatchery reared Big Creek winter steelhead in the Tualatin Subbasin.

Hatchery	Allocation	Average Release
Tualatin River mainstem releases:		
Gnat Cr	10,000 @ 5/lb	8,900
Gales Creek releases:		
Gnat Cr	30,000 @ 5/lb	29,500

Ten thousand steelhead smolts are released annually into Scoggins Creek or the Tualatin River to mitigate for habitat lost when Scoggins Dam was built. The Bureau of Reclamation provides funds to ODFW to rear these fish.

ODFW releases between 20,000 and 30,000 winter steelhead smolts in the Gales Creek System to provide for recreational fisheries in and downstream of Gales Creek (Table 11). No hatcheries exist in the Tualatin Subbasin. Winter steelhead released in the Tualatin are Big Creek stock. Generally, these fish are reared at Trojan Ponds, or Big Creek and Gnat Creek hatcheries.

Salmon and Trout Enhancement Program (STEP) projects used Eagle Creek stock eggs for hatchboxes until 1988 when Big Creek stock was used (Table 12.). Annual releases averaged 70,000 fry from 1983 through 1987. Most of these were released in selected tributaries to Gales Creek and in McKay Creek.

Angling and Harvest

The estimated steelhead harvest in the Tualatin Subbasin from 1976 through 1986 averaged 289 fish. The highest catch was 445 steelhead caught in the 1984-1985 run year. A low catch of 37 fish occurred in 1978-1979. From 1976 through 1986 Gales Creek accounted for 76% of the steelhead caught in the Tualatin Subbasin (ODFW salmon-steelhead tag return data).

Under current regulations, anglers may harvest two salmon or steelhead in combination per day (six per week) in the Tualatin River and Dairy Creek. All other tributaries of the Tualatin are closed to steelhead angling.

Table 12. Releases of hatchery winter steelhead in the Tualatin Subbasin.

Brood Year	Release Year	Hatchery Source	Stock	Fry	Pre-Smolt	Smolt	Adult	Release Site
1975	1976	Big Creek	Big Creek	--	--	10,003	--	Scoggins Creek
	1976	Gnat Creek	Big Creek	--	--	20,090	--	Gales Creek
1976	1977	Big Creek	Big Creek	--	--	10,080	--	Scoggins Creek
	1977	Roaring River	Big Creek	--	--	20,004	--	Gales Creek
1977	1978	Big Creek	Big Creek	--	--	10,313	--	Scoggins Creek
	1978	Gnat Creek	Big Creek	--	--	29,640	--	Gales Creek
1978	1979	Big Creek	Big Creek	--	--	10,150	--	Scoggins Creek
	1979	Gnat Creek	Big Creek	--	--	19,747	--	Gales Creek
1979	1980	Big Creek	Big Creek	--	--	10,143	--	Scoggins Creek
	1980	Gnat Creek	Big Creek	--	--	20,554	--	Gales Creek
1980	1981	Big Creek	Big Creek	--	--	9,653	--	Tualatin River
	1981	Gnat Creek	Big Creek	--	--	18,090	--	Gales Creek
1981	1982	Gnat Creek	Big Creek	--	--	7,917	--	Gales Creek
1982	1983	Big Creek	Big Creek	--	--	9,023	--	Tualatin River
	1983	Gnat Creek	Big Creek	--	--	6,099	--	Gales Creek
	1983	Gnat Creek	Big Creek	--	--	11,702	--	Gales Creek
1983	1983	STEP	Eagle Creek	24,500	--	--	--	McKay Creek
	1984	Roaring River	Big Creek	--	--	10,030	--	Tualatin River
	1984	Roaring River	Big Creek	--	--	29,928	--	Gales Creek
1984	1984	STEP	Eagle Creek	28,953	--	--	--	McKay Creek
	1984	STEP	Eagle Creek	14,850	--	--	--	Gales Creek Trib.
	1984	STEP	Eagle Creek	9,733	--	--	--	Rock Creek
	1984	STEP	Eagle Creek	13,906	--	--	--	Chicken Creek
	1984	STEP	Eagle Creek	14,725	--	--	--	Bateman (Gales Crk)
	1984	STEP	Eagle Creek	14,725	--	--	--	Beaver (Gales Crk)
	1985	Gnat Creek	Big Creek	--	--	8,064	--	Gales Creek
	1985	Gnat Creek	Big Creek	--	--	14,990	--	Gales Creek
	1985	Trojan Pond	Big Creek	--	--	9,771	--	Tualatin River
	1985	Trojan Pond	Big Creek	--	--	6,800	--	Gales Creek

Table 12 continued.

Brood Year	Release Year	Hatchery Source	Stock	Fry	Pre-Smolt	Smolt	Adult	Release Site
1985	1985	STEP	Eagle Creek	28,706	--	--	--	McKay Creek
	1985	STEP	Eagle Creek	14,725	--	--	--	Beaver (Gales Crk)
	1985	STEP	Eagle Creek	14,443	--	--	--	Gales Creek Trib.
	1985	STEP	Eagle Creek	14,162	--	--	--	Gales Creek Trib.
	1985	STEP	Eagle Creek	14,733	--	--	--	Beaver (Gales Crk)
	1985	STEP	Eagle Creek	14,489	--	--	--	Iller (Gales Crk)
	1985	STEP	Eagle Creek	5,000	--	--	--	Bateman (Gales Crk)
	1985	STEP	Eagle Creek	9,339	--	--	--	Beaver (Gales Crk)
	1985	STEP	Eagle Creek	7,111	--	--	--	Clear (Gales Crk)
	1985	STEP	Eagle Creek	6,000	--	--	--	Thomas (Gales Crk)
	1985	STEP	Eagle Creek	14,419	--	--	--	Buckheaven Creek
	1986	Trojan Pond	Big Creek	--	--	4,948	--	Tualatin River
	1986	Trojan Pond	Big Creek	--	--	20,069	--	Gales Creek
	1986	Trojan Pond	Big Creek	--	--	4,954	--	Tualatin River
	1986	Trojan Pond	Big Creek	--	--	6,097	--	Gales Creek
	1986	Trojan Pond	Big Creek	--	--	6,123	--	Gales Creek
1986	1986	STEP	Eagle Creek	--	--	--	--	
	1987	Gnat Creek	Big Creek	--	--	25,315	--	Gales Creek
	1987	Big Creek	Big Creek	--	--	9,964	--	Tualatin River
1987	1987	STEP	Eagle Creek	9,732	--	--	--	Beaver Creek
	1987	STEP	Eagle Creek	9,759	--	--	--	Clear Creek
	1987	STEP	Eagle Creek	8,157	--	--	--	Clear Creek
	1987	STEP	Eagle Creek	9,893	--	--	--	Beaver Creek
	1987	STEP	Eagle Creek	9,936	--	--	--	Ihler Creek
	1987	STEP	Eagle Creek	9,361	--	--	--	Bateman Creek
	1987	STEP	Eagle Creek	9,899	--	--	--	Iller (Gales Crk)
	1987	STEP	Eagle Creek	18,760	--	--	--	Clear Creek
	1988	Big Creek	Big Creek	--	--	10,001	--	Tualatin River
	1988	Gnat Creek	Big Creek	--	--	24,967	--	Gales Creek

Table 12 continued.

Brood Year	Fry	Pre-smolt	Smolt	Adult
BROOD YEAR SUMMARY:				
1975	--	--	30,093	--
1976	--	--	30,084	--
1977	--	--	39,953	--
1978	--	--	29,897	--
1979	--	--	30,697	--
1980	--	--	27,743	--
1981	--	--	7,917	--
1982	--	--	26,824	--
1983	24,500	--	39,958	--
1984	96,892	--	39,625	--
1985	143,127	--	42,191	--
1986	--	--	35,279	--
1987	85,497	--	34,968	--

Trout season does not open on Gales Creek until the fourth Saturday in May to protect downstream migrant juvenile steelhead from handling and harvest.

Management Concerns

Smolt releases of Big Creek stock winter steelhead into Gales Creek and the mainstem Tualatin above Scoggins Creek may contribute to production in the Tualatin River (Tables 10 and 11). Smolts reared for release into the Tualatin mainstem are funded by the Bureau of Reclamation as compensation for lost habitat and passage above Scoggins Dam.

Little information exists on steelhead exploitation rates and angler effort in the Tualatin. Steelhead run size in the Tualatin was estimated by apportioning the counts of Big Creek steelhead at Willamette Falls among the Tualatin, Molalla, and Coast Range subbasins in proportion to the estimated catch in those subbasins. The estimated Tualatin run averaged 2,000 fish from 1977 through 1986 (range: 300 to 3,200 fish) (Table 9).

A number of fish passage problems occur in the subbasin. The Oregon Iron and Steel Dam operated by Lake Oswego Corporation, a private dam at Balm Grove and a dam on Clear Creek in the Forest Grove Watershed impede upstream fish migration. The Lake Oswego Diversion Canal is not screened. An unknown percentage of juvenile salmonids are diverted to Lake Oswego where they must exit through hydroelectric facilities. Water diverted into Lake Oswego is released into Sucker Creek, which enters the Willamette below the mouth of the Tualatin. This falsely attracts and delays returning adults destined for the Tualatin River.

Water quality problems in the Tualatin Subbasin also affect fish production. Ammonia nitrogen pollution from treated sewage and non-point sources (such as storm water drainage, farmlands, golf courses) is harmful to fish. Sediments from bank erosion, farmlands and construction sites silt in spawning gravels. Water temperatures during late summer and early fall in the Tualatin River below Rock Creek often exceed the range desirable for salmonid production.

Information Needs:

1) Accuracy of run size estimates. There are many missing pieces in the estimates, and a counting station at one of the dams (Oregon Iron and Steel dam) would provide a run size estimate.

2) Steelhead competition with indigenous cutthroat. The Dairy Creek system (not including McKay Creek) has been managed primarily for the natural production of cutthroat trout. Steelhead releases in this system would likely reduce cutthroat production.

3) Effects of an additional dam on the upper mainstem. Details of its operation in conjunction with Scoggins Dam have not been worked out. Operation of this facility may increase streamflows in late summer and fall. This would improve water quality and fish passage conditions. However, 7 to 11 miles of steelhead spawning and rearing habitat may be lost to this impoundment.

4) Creel data on Tualatin fisheries. Managers are unable to determine the number of steelhead that are produced naturally and have a poor picture of steelhead angling in the subbasin. A steelhead hatchery-wild ratio is needed.

5) Habitat in basin has not been surveyed in recent years. The most recent comprehensive stream survey of the Tualatin was in 1958 (Willis, Collins and Sams 1960). This data is extremely out of date.

6) An evaluation of steelhead fry releases. Steelhead fry releases need to be evaluated to determine the success of programs.

Management Alternatives

Two alternatives for management of winter steelhead in the Tualatin Subbasin were developed.

Alternative 1 allows for natural production only; hatchery smolt releases would be discontinued or made outside of the Tualatin Subbasin. Natural habitat would be protected and enhanced.

Alternative 2 proposes to continue the current hatchery smolt release level, to improve upstream and downstream passage at dams and water diversions, and to continue efforts to improve water quality in the subbasin.

In a system with hatchery releases, compliance with the WFMP can be accomplished in five ways as follows:

Criterion 1. Eliminate or reduce hatchery releases.
Criterion 2. Release sterile hatchery smolts.
Criterion 3. Release genetically similar hatchery fish, keeping them less than 50% of the total naturally spawning population.
Criterion 4. Release hatchery fish that are spatially or temporally isolated from the wild run.
Criterion 5. Release genetically dissimilar hatchery fish, keeping them less than 10% of the total naturally spawning population.

In the Tualatin Subbasin, compliance with the WFMP would come through addressing Criterion 1 or 5, above. Hatchery smolt releases could be eliminated, or natural spawning of the hatchery stock held below the 10% level.

Alternative 1 would impact the winter steelhead fishery in the subbasin. Alternative 2 provides a greater diversity of angling opportunities for local area residents.

ODFW staff recommends Alternative 2. The P.A.C. approved of Alternative 2.

Alternative 1

Policies

Policy 1. No hatchery winter steelhead will be released in the Tualatin Subbasin.

Objectives

Objective 1. Protect and enhance production of indigenous populations and species of fish in the subbasin by eliminating hatchery releases of winter steelhead.

Assumptions and Rationale***italics***

1. The winter steelhead run in the Tualatin Subbasin is primarily an introduced run, supported mainly by hatchery releases. Without hatchery releases, and relying strictly on natural production, the winter steelhead run is predicted to be minimal.

2. With the exception of Gales Creek and the upper Tualatin, the subbasin is not generally good steelhead habitat. With many diversions, urban developments, areas of poor water quality, and the general conformation of a valley drainage, production potential is minimal.

3. Habitat enhancement and protection are needed to maintain the current run.

Actions***italics***

1.1 Discontinue steelhead smolt releases in the Tualatin Subbasin, to provide protection of wild fish. Renegotiate the compensation for Scoggins Creek Dam toward habitat enhancement or smolt releases outside of the subbasin.

1.2 Encourage the harvest of the remaining marked winter steelhead through public information campaigns and regulations designed to reduce natural escapement of hatchery winter steelhead.

1.3 Work with Lake Oswego Corporation to modify the fish ladder at Oregon Iron and Steel Dam to allow adequate adult fish passage in all flow conditions. This action is designed to benefit coho salmon as well as winter steelhead for the same cost.

1.4 Request that the owners of Balm Grove Dam modify the unauthorized dam to allow adequate adult fish passage. This action is designed to benefit coho salmon as well as winter steelhead for the same cost. The Public Advisory Committee is in strong opposition to the very existence of the structure.

1.5 Work with the city of Forest Grove to restore fish passage at Clear Creek Dam in the Forest Grove Watershed. This action is designed to benefit coho salmon as well as winter steelhead for the same cost.

1.6 Require Lake Oswego Corporation to install fish screens at the entrance to Lake Oswego diversion canal, to reduce the number of juvenile fish diverted through Lake Oswego and the hydroelectric turbines. This action is designed to benefit coho salmon as well as winter steelhead for the same cost.

1.7 Work with the Bureau of Reclamation and the TVID to develop fill and release schedules for Scoggins Dam and proposed reservoir impoundments that will ensure adequate flows in the subbasin for fish passage and production.

1.8 Implement habitat improvement projects:

a. If stream surveys indicate there is significant fish habitat available above a private dam on McFee Creek, require the owner to provide for fish passage.

b. Determine where diversions in the Dairy Creek system impede fish migration. Require landowners to correct adult passage problems and protect downstream migrants as necessary.

1.9 Monitor harvest and escapement:

a. Initiate a creel sample program to estimate angler effort and catch per unit effort, and to collect scales from harvested fish, to aid in better management of the subbasin's fisheries.

b. Install an upstream fish counter at Oregon Iron and Steel Dam, to monitor subbasin returns.

c. Conduct spawning ground surveys to determine the extent and distribution of steelhead spawning in the subbasin.

1.10 Monitor changes in winter steelhead habitat throughout the drainage:

a. Conduct stream habitat surveys in stream reaches with outdated inventory information. Streams should include but not be limited to: Gales Creek and tributaries Iler, Clear, Roderick, Coffee creeks and South Fork; Dairy Creek and tributaries Strassel, Poliwaski Canyon and Lousignont creeks; McFee and Roaring creeks.

b. Support and participate with DEQ and other agency efforts to increase monitoring and improve water quality in the Tualatin Subbasin, to protect and enhance natural fish production.

c. Participate in the process of evaluating the potential effects of constructing a new dam in the upper Tualatin Subbasin, near Gaston. (Known as Tualatin Project: phase II.) ODFW should take an advisory role in the planning of this project.

Alternative 2

Policies

Policy 1. **The Tualatin Subbasin, except Dairy Creek, shall be managed for hatchery and natural production and harvest of Big Creek hatchery steelhead. Dairy Creek shall be for natural production.**

Policy 2. **Fry or presmolts shall be used only in stream reaches where escapement of spawning adults and/or recruitment of fry is a demonstrated limiting factor for steelhead production.**

Objectives

Objective 1. **Maintain an average annual run of 2,000 winter steelhead to the Tualatin Subbasin.**

Assumptions and Rationale

1. Habitat enhancement and protection are needed to maintain the current run.

Actions

1.1 Work with Lake Oswego Corporation to modify the fish ladder at Oregon Iron and Steel Dam to allow adequate adult fish passage in all flow conditions. This action is designed to benefit coho salmon as well as winter steelhead for the same cost.

1.2 Request that the owners of Balm Grove Dam modify the unauthorized dam to allow adequate adult fish passage. This action is designed to benefit coho salmon as well as winter steelhead for the same cost. The Public Advisory Committee is in strong opposition to the very existence of the structure.

1.3 Work with the city of Forest Grove to restore fish passage at Clear Creek Dam in the Forest Grove Watershed. This action is designed to benefit coho salmon as well as winter steelhead for the same cost.

1.4 Require Lake Oswego Corporation to install fish screens at the entrance to Lake Oswego diversion canal, to reduce the number of juvenile fish diverted through Lake Oswego and the hydroelectric turbines. This action is designed to benefit coho salmon as well as winter steelhead for the same cost.

1.5 Work with the Bureau of Reclamation and the TVID to develop fill and release schedules for Scoggins Dam and proposed reservoir impoundments that will ensure

adequate flows in the subbasin for fish passage and production.

1.6 Implement habitat improvement projects:

a. If stream surveys indicate there is significant fish habitat available above a private dam on McFee Creek, require the owner to provide for fish passage.

b. Determine where diversions in the Dairy Creek system impede fish migration. Require landowners to correct adult passage problems and protect downstream migrants as necessary.

1.7 Monitor changes in winter steelhead habitat throughout the drainage:

a. Conduct stream habitat surveys in stream reaches with outdated inventory information. Streams should include but not be limited to: Gales Creek and tributaries Iler, Clear, Roderick, Coffee creeks and South Fork; Dairy Creek and tributaries Strassel, Poliwaski Canyon and Lousignont creeks; McFee and Roaring creeks.

b. Support and participate with DEQ and other agency efforts to increase monitoring and improve water quality in the Tualatin Subbasin, to protect and enhance natural fish production.

c. Participate in the process of evaluating the potential effects of constructing a new dam in the upper Tualatin Subbasin, near Gaston. (Known as Tualatin Project: phase II.) ODFW should take an advisory role in the planning of this project.

Objective 2. Provide a potential average annual harvest of 400 winter steelhead in the Tualatin Subbasin.

Assumptions and Rationale***italics***

1. The average steelhead harvest from 1977 through 1986 was about 300 fish. A harvest of 400 fish represents a 20% exploitation rate, which is about average for winter steelhead harvest in the Willamette Subbasin. Creel census data and a counting station at Oregon Iron and Steel Dam will allow ODFW personnel to better inform anglers of fishing opportunities in the subbasin.

Actions***italics***

2.1 Continue annual releases of 10,000 Big Creek steelhead smolts in the upper Tualatin and 20,000 Big Creek smolts in the Gales Creek system, all at five fish per pound. An equivalent poundage of 6,000 pounds may be released if a different target smolt size becomes desirable. All smolts will be marked prior to release, to provide the means to evaluate the hatchery stocks and to manage steelhead under the WFMP, if desired.

2.2 Programs to aid in achieving the utilization and biological objectives for the drainage:

a. Reduce the number of juvenile steelhead released if the average annual run size exceeds 2,000 fish and the exploitation rate is less than 20%. Excess smolts could be used in another acceptable subbasin, to avoid underutilization of returning adults.

b. Fry releases will not be made in the Dairy Creek system, except McKay Creek, to limit competition of steelhead juveniles with native cutthroat trout.

c. To avoid competition with wild steelhead fry, limit stocking of fry to stream reaches where escapement of adult spawners or recruitment of fry is a problem. Field work to determine appropriate reaches will be performed. Pre-and post project evaluations will be conducted.

2.3 Develop a public information program to inform public of angling opportunities in the drainage. Based on fish passage counts and creel survey data, inform the public of underutilized angling opportunities in the Tualatin Subbasin.

2.4 Liberalize the creel limit on winter steelhead to increase exploitation to at least 20%.

2.5 Monitor harvest and escapement:

a. Initiate a creel sample program to estimate angler effort and catch per unit effort, and to collect scales from harvested fish, to aid in better management of the subbasin's fisheries.

b. Install an upstream fish counter at Oregon Iron and Steel Dam, to monitor subbasin returns.

COHO SALMON

Background and Status

Origin

Prior to the late 1800s, when a fish ladder was constructed at Willamette Falls, coho salmon were probably not present in the Tualatin Subbasin (or any tributaries above the falls). While the falls were passable by spring chinook and winter steelhead, apparently they were not passable at the time early-run coho are migrating upstream. It is interesting to note that late-run coho present in the Clackamas River did not occur above Willamette Falls, though given their migration timing and flows at the falls it seems that passage of some fish would have been possible.

There is little specific information available on natural production of coho salmon in the Tualatin Subbasin. Production is believed to be maintained primarily by the annual release of about 60,000 early-run stock smolts in the upper subbasin.

Two stocks of coho have been used in the Tualatin: an early-run stock from Oregon (Howell 1985) and Cowlitz late-run stock. The Cowlitz stock was introduced because its late return timing may avoid low flow conditions present in early fall, possibly enhancing egg-to-smolt survival. Evaluation of smolt releases made into Scoggins Creek showed similar survival rates to escapement for both stocks, 0.14% for Cowlitz and 0.15% for Toutle, however the early-run stock provided a nearly 50% greater harvest to Oregon fisheries because of its ocean migration pattern (R. Williams, Oregon Dept. of Fish and Wildlife, unpublished report on coho salmon in the Willamette River, Corvallis, Oregon, 1983).

Life History and Population Characteristics

The current smolt production capacity of the Tualatin Subbasin is estimated at 185,791 coho smolts, using the Northwest Power Planning Council's model.

From 1977 through 1985, harvest ranged from 0 to 16 adults (Table 13).

Information on adult time of entry specific to the Tualatin River is not available (Figure 4). Information on passage at Willamette Falls represents the earliest possible return times. Coho salmon passage at Willamette Falls spans August to December, but the majority of passage (more than 90%) is in October and November (Frazier 1987).

Table 13. Tualatin Subbasin coho harvest, 1977-1985.

	Run Year									
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Tualatin River	8	0	0	0	0	13	3	10	0	
Gales Creek	3	0	0	3	3	3	0	3	4	
Total Subbasin Harvest	11	0	0	3	3	16	3	13	4	

Hatchery Production

Coho fry have been released in the Tualatin Subbasin since 1962 (Table 14). Several stocks have been used in the Subbasin.

From 1982 through 1986, volunteers through the Salmon and Trout Enhancement Program (STEP) released an annual average of about 313,000 coho fry in McKay Creek and tributaries of Gales Creek (Tables 14). All fry releases have been discontinued in the Tualatin.

The first recorded release of coho smolts into the Tualatin River was in 1973 (Table 14). Production releases have varied, but in recent years have averaged around 60,000 smolts annually. These release groups represent mitigation for Scoggins Dam. Other production releases have been discontinued on the Tualatin River. The Willamette Basin Fish Management Plan states that production costs, mortality at Willamette Falls, and the location of the fisheries make coho smolt releases above Willamette Falls inappropriate (ODFW 1988).

Typically age 1+ smolts are released in May at about 15 fish per pound.

No fish hatcheries exist in the Tualatin Subbasin, and no hatcheries or other supplementation programs for coho are planned.

Angling and Harvest

Harvest of coho in the Tualatin Subbasin is minimal (Table 13). From 1977 through 1986 the maximum estimated annual harvest was 16 fish; estimated coho harvest was zero in two of those years. Coho released in the Tualatin contribute to commercial

Figure 4.

Table 14. Coho releases in the Tualatin Subbasin.

Brood Year	Release Year	Hatchery Source	Stock	Fry	Pre-Smolt	Smolt	Adult	Release Site
1962	--	--	Early Run	195,000	--	--	--	Tualatin R
1963	--	--	Early Run	--	--	--	--	
1964	--	--	Early Run	--	--	--	635	Tualatin R
1965	--	--	Early Run	349,700	--	--	--	Tualatin R
1966	--	--	Early Run	195,300	--	--	--	Tualatin R
	--	--	Early Run	--	--	--	150	Tualatin R
1967	--	--	Early Run	685,700	--	--	--	Tualatin R
1968	--	--	Early Run	--	--	--	503	Tualatin R
1969	--	--	Early Run	740,000	--	--	--	Tualatin R
	--	--	Early Run	--	--	--	500	Tualatin R
1970	--	--	Early Run	--	--	--	320	Tualatin R
1971	--	--	Early Run	454,400	--	--	--	Tualatin R
	--	--	Early Run	--	--	--	150	Tualatin R
1972								
	--	--	Early Run	182,300	--	--	--	Tualatin R
	--	--	Early Run	--	--	--	159	Tualatin R
1973	-							
	--	--	Early Run	373,000	--	--	--	Tualatin R
--								
	--	--	Early Run	--	--	94,900	--	Tualatin R
1974	--	--	Early Run	183,100	--	--	--	Tualatin R
	--	--	Early Run	--	--	59,900	--	Tualatin R
1975	1977	Cascade	Cowlitz	--	--	202,134	--	Scoggins Cr
	1977	Cascade	Cowlitz	--	--	92,523	--	Scoggins Cr
	1976	Gnat Creek	Early Run	--	--	20,090	--	Gales Cr
	1977	Cascade	Early Run	--	--	8,540	--	Scoggins Cr
	1977	Cascade	Early Run	--	--	90,766	--	Scoggins Cr
1976	1978	Big Creek	Cowlitz	--	--	71,743	--	Scoggins Cr
	1978	Big Creek	Early & Cowlitz	--	--	19,338	--	Scoggins Cr
	1977	McKenzie	Early Run	204,103	--	--	--	Tualatin R
	1977	Roaring River	Early Run	--	--	20,004	--	Gales Cr
	1978	Big Creek	Early Run	--	--	68,801	--	Scoggins Cr
1977	1979	Big Creek	Cowlitz	--	--	74,577	--	Scoggins Cr
	1979	Big Creek	Early & Cowlitz	--	--	33,436	--	Scoggins Cr
	1978	Gnat Creek	Early Run	--	--	29,640	--	Gales Cr
	1979	Big Creek	Early Run	--	--	81,189	--	Scoggins Cr

(continued)

Table 14 continued.

Brood Year	Release Year	Hatchery Source	Stock	Fry	Pre-Smolt	Smolt	Adult	Release Site
1978	1979	Big Creek	Cowlitz	--	--	80,190	--	Scoggins Cr
	1979	Big Creek	Early Run	--	--	83,700	--	Scoggins Cr
	1980	Big Creek	Early Run	--	--	22,256	--	Scoggins Cr
	1980	Big Creek	Early Run	--	--	37,846	--	Scoggins Cr
1979	1980	Big Creek	Early Run	--	--	19,617	--	Scoggins Cr
	1980	Big Creek	Early Run	--	--	39,825	--	Tualatin R
1980	1981	Oxbow	Early Run	86,414	--	--	--	Beaver Cr (Gales Cr)
	1981	Oxbow	Early Run	111,168	--	--	--	Lee Cr
	1981	Oxbow	Early Run	98,816	--	--	--	Sunday Cr
	1981	Oxbow	Early Run	61,760	--	--	--	McFee Cr
	1981	Oxbow	Early Run	49,408	--	--	--	Little
1980	1981	Oxbow	Early Run	49,408	--	--	--	Iler Cr (Gales Cr)
	1981	Oxbow	Early Run	84,644	--	--	--	Clear Cr (Gales Cr)
	1982	Big Creek	Early Run	--	--	14,641	--	Scoggins Cr
	1982	Big Creek	Early Run	--	--	40,302	--	Tualatin R
1981	1982	Bonneville	Early Run	--	34,965	--	--	Tualatin R
	1982	Bonneville	Early Run	--	59,724	--	--	Lee Cr
	1982	Bonneville	Early Run	--				
	1983	Big Creek	Early Run	--	--	53,797	--	Tualatin R
1982	1983	Oxbow	Early Run	127,865	--	--	--	Tualatin R
	1983	Oxbow	Early Run	76,480	--	--	--	Little Beaver Cr (Gales Cr)
	1983	Oxbow	Early Run	127,865	--	--	--	Rock Cr
	1983	Oxbow	Early Run	115,915	--	--	--	Clear Cr (Gales Cr)
	1983	Oxbow	Early Run	51,348	--	--	--	McFee Cr
	1983	Sandy	Early Run	47,080	--	--	--	Jackson Cr

(continued)

Table 14 continued.

Brood Year	Release Year	Hatchery Source	Stock	Fry	Pre-Smolt	Smolt	Adult	Release Site
1982	1983	Sandy	Early Run	47,080	--	--	--	E Fk McKay
	1983	Sandy	Early Run	176,550	--	--	--	McKay Cr (Dairy Cr)
	1983	Sandy	Early Run	117,700	--	--	--	Beaver Cr (Gales Cr)
	1983	Sandy	Early Run	70,620	--	--	--	Iler Cr (Gales Cr)
	1983	Sandy (STEP)	Early Run	4,000	--	--	--	McKay Cr (Dairy Cr)
	1984	Big Creek	Early Run	--	--	60,255	--	Tualatin R
1983	1984	(STEP)	Cowlitz	22,381	--	--	--	Chicken Cr
	1984	(STEP)	Cowlitz	49,552	--	--	--	McKay Cr (Dairy Cr)
	1984	(STEP)	Cowlitz	12,368	--	--	--	Rock Cr
	1984	(STEP)	Cowlitz	24,480	--	--	--	Gales Cr tributary
	1985	Big Creek	Early Run	--	--	60,010	--	Tualatin R
1984	1985	Bonneville	Early Run	--	55,671	--	--	McFee Cr
	1985	Bonneville	Early Run	--	111,294	--	--	Tualatin R
	1985	Cascade	Early Run	200,000	--	--	--	Rock Cr
	1985	Sandy (STEP)	Early Run	22,966	--	--	--	Clear Cr (Gales Cr)
	1985	Sandy (STEP)	Early Run	5,000	--	--	--	Roderick Cr (Gales Cr)
	1985	Sandy (STEP)	Early Run	29,677	--	--	--	McKay Cr (Dairy Cr)
	1985	Sandy (STEP)	Early Run	29,252	--	--	--	Gales Cr tributary
	1985	Sandy (STEP)	Early Run	29,635	--	--	--	Beaver Cr (Gales Cr)
	1985	Sandy (STEP)	Early Run	14,813	--	--	--	Rock Cr
	1986	Big Creek	Early Run	--	--	--	--	Tualatin R

(continued)

Table 14 continued.

Brood Year	Release Year	Hatchery Source	Stock	Fry	Pre-Smolt	Smolt	Adult	Release Site
1985	1986	Sandy (STEP)	Early Run	14,865	--	--	--	McKay Cr (Dairy Cr)
	1986	Sandy (STEP)	Early Run	29,610	--	--	--	N Fk Gales
	1986	Sandy (STEP)	Early Run	29,254	--	--	--	Clear (Gales Cr)
	1986	Sandy (STEP)	Early Run	14,775	--	--	--	Rock Cr
	1986	Sandy (STEP)	Early Run	14,598	--	--	--	Iler Cr (Gales Cr)
	1986	Sandy (STEP)	Early Run	29,323	--	--	--	Beaver Cr (Gales Cr)
	1987	Cascade	Early Run	--	--	60,003	--	Tualatin
1986	1987	Sandy (STEP)	Early Run	28,600	--	--	--	Beaver Cr (Gales Cr)
	1988	Big Creek	Early Run	--	--	60,013	--	Tualatin

and sport fisheries in the ocean and Columbia River, but the magnitude of this contribution is unknown.

There are no commercial or tribal fisheries in the Tualatin Subbasin. Oregon sport fishing regulations are established by the Oregon Fish and Wildlife Commission based on recommendations from ODFW biologists and the general public.

Management Concerns

Adult coho returns from smolts stocked in the Tualatin are low. Studies at Scoggins Dam showed only 0.135% of coho smolts released from the 1975 through 1977 broods returned to the release site as adults. Of adults that do return, few are caught in recreational fisheries within the subbasin. Smolt releases outside the subbasin might contribute more effectively to non-subbasin fisheries by bypassing some sources of mortality that occur early in the life history.

A number of fish passage problems occur in the subbasin. The Oregon Iron and Steel Dam operated by Lake Oswego Corporation, an unauthorized private dam at Balm Grove, and a dam on Clear Creek in the Forest Grove Watershed impede upstream fish migration. The Lake Oswego Diversion Canal is not screened. Juvenile salmonids are diverted to Lake Oswego where they must exit

through hydroelectric facilities and may encounter increased predation. Water diverted into Lake Oswego is released into Sucker Creek, which enters the Willamette below the mouth of the Tualatin River. This discharge into Sucker Creek attracts and delays returning adults destined for the Tualatin Subbasin.

Serious water quality problems in the Tualatin Subbasin that affect coho production include nitrogen pollution from treated sewage; non-point sources of pollution (such as storm water drainage, farmlands, and golf courses); and heavy sediment loads from bank erosion, farmlands, and construction sites. Water temperatures during late summer and early fall in the Tualatin River below Rock Creek often exceed the range desirable for salmonid production. Most tributaries in the lower Tualatin lack suitable spawning gravel for salmonids.

The Willamette Basin Fish Management Plan (ODFW 1988) stipulates that hatchery smolts will not be released above Willamette Falls except for experimental or mitigation purposes (OAR 635-500-209) and that pre-smolt releases above Willamette Falls will be limited to tagged experimental groups to evaluate their contribution to offshore and Columbia River fisheries.

Information Needs:

1) Information on run size. The lack of a counting facility on the Tualatin River makes it difficult to reasonably estimate run size.

2) Distribution and amount of natural production.

3) Extent of competition between coho and native species.

4) The effects of water quality on fish production. Treated sewage water and other sources of non-point pollution contribute to high ammonia nitrogen levels in the mainstem and tributaries below Rock Creek.

5) The effects of season fluctuations in water temperature on fish production. Low summer flows in the mainstem and tributaries below developed areas result in high water temperatures undesirable for salmonid production.

6) The spatial distribution of suitable spawning and rearing habitat in the subbasin. Many low gradient tributaries have muddy bottoms and lack suitable spawning gravel.

Management Alternatives

Two alternatives were developed for the management of coho in the Tualatin Subbasin. Coho are not indigenous to the Tualatin Subbasin, so a "no hatchery fish" alternative was not developed for WFMP compliance. Under Alternative 1, however, hatchery smolts would not be released in the subbasin. Therefor, Alternative would be a "no hatchery alternative".

Alternative 1 proposes the release of compensation smolts below Willamette Falls, outside the subbasin.

Alternative 2 proposes to continue the release of compensation smolts in the Tualatin Subbasin, to improve passage and bypass problems in the subbasin, and to increase the monitoring of harvest and escapement for better management.

ODFW staff recommend Alternative 1. The P.A.C. approved of Alternative 1.

Alternative 1 was chosen as preferred over Alternative 2 primarily because the major benefits of coho production in the Tualatin are realized outside the subbasin. Alternative 1 differs from Alternative 2 in that hatchery smolts would be released in the mainstem of the Willamette River or an out-of-subbasin site rather than in the Tualatin Subbasin, and adult returns would be aimed at ocean and Columbia River fisheries, rather than subbasin harvest. This would increase smolt survival by circumventing passage mortality and other habitat problems in the subbasin and at Willamette Falls. The recommended alternative is also designed to decrease the occurrence of natural production of the non-indigenous coho, providing protection to the indigenous cutthroat and winter steelhead populations.

Alternative 1

Policies

Policy 1. Hatchery coho salmon production for the Tualatin Subbasin shall consist solely of compensation releases for Scoggins Dam project to provide fish for harvest primarily outside the subbasin.

Objective

Objective 1. Provide a potential average annual harvest of 1,200 and 900 coho salmon in ocean and Columbia River fisheries, respectively, to mitigate for production losses resulting from Scoggins Dam.

Assumptions and Rationale***italics***

1. The potential harvest objective is based on the release number, and on estimates of fishery harvest rates and smolt-to-adult survival.

2. Increased smolt-to-adult survival will be experienced if smolts are released outside the subbasin. The effects of unscreened diversions, dam passage, and potential predation will be reduced by release below Willamette Falls.

3. Coho harvest and demand is minimal within the subbasin.

4. Natural production of coho in the subbasin is not desired, due to competitive effects with indigenous cutthroat and winter steelhead.

5. Smolts reared from adults collected at hatcheries outside the basin.

Actions***italics***

1.1 Negotiate with the Bureau of Reclamation to release the smolts produced for Scoggins Dam compensation at sites in the Willamette River below Willamette Falls. Some of the compensation might also be negotiated toward enhancement of flows or habitat for cutthroat and steelhead. Coho smolts will no longer be released in the subbasin, and returns will benefit fisheries primarily outside the subbasin.

Alternative 2

Policies

Policy 1. Hatchery coho salmon production for the Tualatin Subbasin shall consist solely of compensation releases for Scoggins Dam project.

Objective

Objective 1. Achieve and maintain an average annual escapement of 600 coho salmon to the Tualatin Subbasin.

Assumptions and Rationale***italics***

1. Because of potential competition with winter steelhead and native cutthroat trout, there are no natural production objectives for coho in the Tualatin.

2. If coho were not planted in the Tualatin Subbasin, little, if any, coho run would exist. Historically, coho probably could not pass Willamette Falls prior to the installation of a fish ladder. The current run is produced primarily by the compensation releases of 60,000 smolts, and very few from natural production.

3. Mitigation coho provided from adults collected outside the basin.

Actions***italics***

1.1 Continue releasing 60,000 compensation coho smolts annually into the upper Tualatin Subbasin. There are currently no plans to mark coho salmon smolts released into the subbasin.

1.2 Work with FERC, ODFW's Habitat Conservation Division, and Lake Oswego Corporation to install fish screens at the entrance to Lake Oswego diversion canal. This action is designed to benefit winter steelhead and coho juveniles, as well as to protect resident trout and warmwater fish.

1.3 Work with FERC, ODFW's Habitat Conservation Division, and Lake Oswego Corporation to modify the fish ladder at Oregon Iron and Steel Dam to allow adequate adult fish passage during all flow conditions.

1.4 Continue to work with the ODFW's Habitat Conservation Division, WRD, Bureau of Reclamation, and TVID to develop fill and release schedules for Scoggins Dam and proposed reservoir impoundments that will ensure adequate flows in the subbasin for fish passage and production.

1.5 Work with ODFW's Habitat Conservation Division and request that the owners of Balm Grove Dam modify the unauthorized structure to allow adequate adult fish passage. This action is designed to benefit winter steelhead and coho salmon.

1.6 Work with ODFW's Habitat Conservation Division and the city of Forest Grove to restore fish passage at Clear Creek Dam in the Forest Grove Watershed. This action is designed to benefit winter steelhead and coho salmon.

Objective 2. Provide a potential average annual harvest of 150 coho salmon in the Tualatin Subbasin and a potential average annual harvest of 1,200 and 900 fish in ocean and Columbia River fisheries, respectively.

Assumptions and Rationale

1. An average annual escapement of 600 adults, at an exploitation rate of 25%, would provide the means to achieve the harvest objectives.

2. Tualatin coho are important for contributing to the ocean and Columbia River fisheries.

Actions

2.1 Monitor harvest and escapement for better management of subbasin fisheries. Work with FERC, ODFW's Habitat Conservation Division, and Lake Oswego Corporation to install an upstream fish counter at Oregon Iron and Steel Dam. Initiate a creel sample program to estimate angler effort and catch per unit effort, and to collect scales from harvested fish. Evaluate naturally-produced versus hatchery return of adults.

SPRING CHINOOK SALMON

Spring Chinook may have used the upper reaches of upper Gales Creek prior to 1940 (Willis 1960). However, they probably were never abundant and do not occur in the subbasin at this time. The introduction of spring chinook in the Tualatin Subbasin is not recommended at this time.

FALL CHINOOK SALMON

Fall chinook are not native to the Willamette River above Willamette Falls and have not been introduced in the Tualatin. Strays were, however, documented at a fish trap in Scoggins Creek in the 1970s (J. Massey, ODFW, Lower Willamette District Fish Biologist, pers. commun.). The introduction of fall chinook in the Tualatin Subbasin is not recommended at this time.

WARMWATER AND MISCELLANEOUS FISH

Species List

The upper reaches of the Tualatin drainage are typically cold, flowing habitats, and tend to harbor the coldwater species such as salmonids and sculpins. The lower Tualatin and some impoundments provide habitat for other species, however. The following fish are known or believed to inhabit the waters of the Tualatin River or its tributaries:

Non-game Fish

Chiselmouth Acrocheilus alutaceus
Peamouth Mylocheilus caurinus
Northern squawfish Ptychocheilus oregonensis
Goldfish Carassius auratus **
Common carp Cyprinus carpio **
Longnose dace Rhinicthys cataractae
Redside shiner Richardsonius balteatus
Prickly sculpin Cottus asper
Reticulate sculpin Cottus perplexus
Three-spine stickleback Gasterosteus aculeatus
Largescale sucker Catostomus macrocheilus
Mountain sucker Catostomus platyrhynchus
Sand roller Percopsis transmontana
Starry flounder Platichthys stellatus
Banded killifish Fundulus diaphanus **
Pacific lamprey Entosphenus tridentatus *
Western brook lamprey Lampetra richardsoni *
Mosquitofish Gambusia affinis **

Non-salmonid Game Fish

Yellow bullhead Ictalurus natalis **
Brown bullhead Ictalurus nebulosus **
Black bullhead Ictalurus melas **
Channel catfish Ictalurus punctatus **
White catfish Ictalurus catus **
Yellow perch Perca flavescens **
Walleye Stizostedion vitreum **
Pumpkinseed Lepomis gibbosus **
Warmouth Lepomis gulosis **
Bluegill Lepomis macrochirus **
Green sunfish Lepomis cyanellus **
Smallmouth bass Micropterus dolomieui **
Largemouth bass Micropterus salmoides **
White crappie Pomoxis annularis **
Black crappie Pomoxis nigromaculatus **
American shad Alosa sapidissima * **
White sturgeon Acipenser transmontanus *

* Not "resident", these species are migratory but may spend a portion of their life cycle in the Tualatin River.
** Not "indigenous", these species were not found in the Tualatin prior to 1800.

Background And Status

Origin

The game fish on the above list were introduced in the late 1800s and early 1900s (excluding sturgeon). The non-game fish except goldfish, carp, and killifish are indigenous to the rivers, streams, or lakes of the subbasin.

Life History and Population Characteristics

The non-salmonid game and non-game fish in the Tualatin Subbasin are primarily found in the mainstem and lower tributaries below Rock Creek. Some of the species are also found in standing waters such as Hagg Lake, Lake Oswego, and Dorman Pond.

In 1987, ODFW biologists electrofished the lower Tualatin River, from river mile 4.0 to river mile 20.0. Although largemouth bass far outnumbered any other species sampled (Figure 4*), they are most susceptible to electrofishing. Non-game species such as carp and suckers were not counted. Two-and-six inch bass were sampled quite frequently, otherwise abundance typically declinedwith size. The maximum fish size captured was 14 in (Figure 5*). Age information for these fish was not collected. Length frequency distribution indicates that largemouth bass in the Tualatin are approximately 2 inches at age 0+, 6 inches at age 1+, and 9 inches at age 2+.

Hatchery Production

No hatchery production of warmwater fish occurs in the Tualatin Subbasin.

Angling and Harvest

Harvest figures are unavailable for warmwater fish in the Tualatin Subbasin.

Objectives

Objective 1: Increase utilization of the existing warmwater fisheries in the Tualatin River.

Assumptions and Rationale***italics***

1. Excellent opportunities for largemouth bass and other warmwater game fish already exist in the Tualatin River.

2. Limited angler access causes the current warmwater production to be underutilized.

Actions***italics***

1.1 ODFW shall investigate and attempt to obtain additional public bank and boat launch access for the lower Tualatin.

1.2 Increased access should be developed.

1.3 Publicize the warmwater angling potential in the Tualatin Subbasin, especially if access is increased.

1.4 Recommend that speed limits, horsepower or boat size limits, etc. be instituted by the State Marine Board for the lower Tualatin, to maintain a quality fishing and boating experience for all users.

Objective 2. If, sensitive, threatened, or endangered nongame fishes are recognized in the Tualatin Subbasin, protection authority granted to ODFW shall be used to protect their populations and habitats.

Assumptions and Rationale***italics***

1. No sensitive, threatened, or endangered species are currently known to exist in the Tualatin Subbasin.

Actions***italics***

2.1 District personnel will make recommendations to land use regulatory agencies and use granted authority to protect habitats and populations of nongame endemic fishes in the subbasin.

Objective 3. Enhance warmwater fisheries in the Tualatin consistent with other species programs and species plans.

Assumptions and Rationale***italics***

1. Suitable habitat and opportunities may exist for smallmouth bass and channel catfish, as well as other species.

2. Locations and other specifics of the enhancement of new species should be thoroughly investigated for potential harm to current game and non-game species production.

3. The lower Tualatin River is suitable habitat for warmwater fish production, and thoughtful enhancement can be consistent with management programs for other species.

4. Insufficient data are available for indigenous cutthroat distribution and habitat utilization, and should be made available prior to introducing potentially predatory or competitive species.

Actions***italics***

3.1 Investigate the possible impacts and potential benefits of enhancing warmwater populations in the subbasin such as smallmouth bass or channel catfish . Smallmouth bass are already present in the drainage with limited distribution.

TROUT

The following "trout" (indigenous or introduced) are known or believed to inhabit waters of the Tualatin River and its tributaries:

Cutthroat trout Oncorhynchus clarki
Rainbow trout Oncorhynchus mykiss
Mountain whitefish Prosopium williamsoni

Background And Status

Origin

The coastal cutthroat is indigenous to the Tualatin Subbasin, and is a major consideration in the management of fisheries in the drainage. Biologists are not aware of any indigenous rainbow in the subbasin.

Domestic rainbow are no longer introduced into the flowing sections of the Tualatin drainage. These liberations were discontinued to reserve the available habitat for the indigenous coastal cutthroat and for anadromous fish production. Hatchery cutthroat (Alsea stock) were once released in the drainage, but are no longer used.

Life History and Population Characteristics

Indigenous cutthroat are found throughout the Tualatin Subbasin, especially in the Dairy Creek and Gales Creek systems. Some are migratory (see below) and others are resident in small tributary streams.

Little is known about the production levels for resident trout in the Tualatin Subbasin.

Nickelson and Hafele (1978) determined that cover is the most important factor determining the standing crop of cutthroat in a stream, although velocity can decrease the value of cover if over or under the optimum flow. Cover was described in their models as depths over 45 cm (17.7 in.), escape cover such as undercut banks and rootwads, overhanging cover, turbulence which blocks the stream bottom from view, or velocity shelters like logs and boulders which provide a resting place.

Cutthroat were found distributed in over 95% of the streams in another study (Moring and Youker 1979) but typically from smaller, higher elevation streams down to the upper reaches of larger streams of the Willamette system.

Results presented in three ODFW Information Reports (Nicholas 1978, Ely 1981, and Hunt 1982) make several overlapping observations on size and age for Willamette Basin cutthroat trout:

1. If recruitment to the trout fishery is 15 cm (6 in.), Willamette cutthroat are recruited at age 1 for warmer, larger, low elevation streams and at age 2 for cooler, smaller, high elevation streams. Trout size differences between the two types of streams may be attributable to slow growth in cool water temperatures, lower food availability, and limited space.

2. In migratory cutthroat, growth accelerates when a fish moves downstream into a mainstem from a smaller tributary.

3. In females, some are mature at age 2, most are mature by age 3. In males, maturity is achieved slightly earlier.

4. Fish in larger streams had a greater age range than fish in smaller headwater streams. The absence of older fish in the smaller streams supports an earlier concept of downstream migration of older fish.

For the Willamette tributaries in general, approximately 50% of the cutthroat were age 1, and 33% were age 2 (Moring and Youker 1979). The Tualatin River fish were an exception, however, with those percentages corresponding to age 0 and age 1 fish, respectively. Few older age fish were found in the Tualatin sample. Tualatin cutthroat of age 1 ranged from 9.7 to 14.3 cm (3.8 to 5.6 in.), while those of age 2 ranged from 11.4 to 20.1 cm (4.5 to 7.9 in.) FL.

Cutthroat as small as 9.9 cm FL (4 in.) were observed to be ripe in the Willamette system (Moring and Youker 1979). Ripe fish, sampled in December in the Gales Creek system, were one male at 12.3 cm (4.8 in.) and one female at 19.5 cm (7.7 in.) FL.

Willamette cutthroat trout spawn in late winter and early spring (ODFW Trout Plan 1987). Cutthroat have been found to spawn any time from January to July in the Willamette system (Nicholas 1978). The timing is likely dictated by water temperatures and runoff in individual tributaries.

In another study, cutthroat spawning was observed in every month except July, October, and November in the Willamette system, however, only eight fish were observed spawning outside the January to March range (Moring and Youker 1979).

Cutthroat spawning locations are widespread in the subbasin, in the upper Tualatin and many of the smaller tributaries where suitable spawning gravels are found. Cutthroat trout have been observed to migrate upstream into small tributaries for spawning

(Nicholas 1978). Tag studies indicate that individual fish will locate the same spawning stream in successive years.

Spawning was observed in streams having flow as low as 0.05 to 1.0 cfs in the Willamette system (Moring and Youker 1979).

The Tualatin Subbasin has seasonally migratory (potamodromous) cutthroat, which inhabit the mainstem Tualatin or the Willamette from late May to fall. In the late fall and winter, they migrate upstream into smaller tributaries, pair up, and spawn. Searun (anadromous) cutthroat are not known to occur in the Tualatin River.

Hatchery Production

Dairy Creek, Gales Creek, and the upper mainstem Tualatin were once stocked with catchable rainbow and cutthroat. This stocking was discontinued in 1979 for Dairy, 1981 for Gales, and 1986 for the mainstem. Stocking of hatchery trout in Tualatin streams was discontinued in favor of natural production of indigenous cutthroat. Standing waters (i.e. Hagg Lake, Dorman Pond) receive the only catchable trout releases in the subbasin.

Angling and Harvest

Moring and Youker (1979) described a "Great Balancing Equilibrium" for the harvest on cutthroat in western Oregon. The potential for harvest having adverse effects on a population is inversely proportional to the size of the stream. That potential is high in the small tributaries of the Tualatin Subbasin.

The fishery on resident cutthroat in western Oregon is typically limited to a small percentage of anglers who fish small streams for indigenous trout. The vast majority of trout anglers fish larger, more popular streams or lakes for planted catchable trout.

The Public Advisory Committee identified a need for greater enforcement of the trout season in the subbasin, due to local anglers who fish private property during closed seasons.

Only one alternative is offered for management of trout in the Tualatin Subbasin, since hatchery fish are not stocked in the flowing waters, and the proposed actions meet the criteria of the WFMP

Management Concerns

Habitat constraints discussed earlier can limit trout production and are a concern.

Policy

Policy 1. No hatchery trout shall be stocked in streams designated for wild trout management.

Objectives

Objective 1. Maintain the genetic diversity and fitness of existing wild trout populations.

Assumptions and Rationale***italics***

1. The Tualatin Subbasin has many miles of suitable mainstem and tributary streams providing habitat for indigenous cutthroat.

2. Hatchery trout are not currently stocked into flowing waters of the subbasin.

3. Hatchery trout are stocked in Hagg Lake but there is minimal biological risk:
   a. Yearling and fingerling rainbow trout are progeny of domestic fall spawners.
   b. There is little chance that hatchery trout will escape the intensive exploitation and mature and spawn.

4. The current inventory data is outdated. Additional data is necessary to properly manage the indigenous cutthroat and other species in the subbasin.

5. Wild populations of trout are a valuable resource that reproduce naturally. Maintaining population health entails protecting genetic diversity and adaptiveness (including life history diversity), avoiding reduction of distribution, restoring distribution to formerly occupied habitats, and maintaining abundance of multiple age classes.

Actions***italics***

1.1 Manage the East and West Dairy Creek systems and the upper mainstem Tualatin above Haines Falls for wild trout.

1.2 Increase habitat protection on streams identified for wild trout management, paying special attention to proposed development in or near these waters.

1.3 Encourage habitat enhancement by community groups, angler clubs, and S.T.E.P. groups on streams with wild cutthroat populations.

1.4 Update the physical and biological survey data base. Conduct regular, periodic inventory of trout habitat and populations in the subbasin, to facilitate better management of wild trout.

1.5 Combine physical-biological survey information and limiting factors analysis to reevaluate the production potential of current trout habitat.

1.6 Design habitat projects based on the physical-biological surveys, limiting factor analysis, and production capacity assessment of habitat in the subbasin.

Objective 2. Maintain the current trout angling opportunities, mainly a "basic yield" fishery on naturally produced trout.

Assumptions and Rationale***italics***

1. Due to limited access and strictly natural production of cutthroat in the flowing waters of the Tualatin Subbasin, no new opportunities are proposed.

Actions***italics***

2.1 ODFW should prevent the loss of angler access and angling opportunity.

Objective 3. Inform the public through the media and ODFW publications of the values of wild trout and the protections needed to sustain wild production. Gain angler and citizen involvement in wild trout enhancement projects.

Assumptions and Rationale***italics***

1. Wild populations in the streams cannot withstand major and increasing amounts of effort as the catchable trout in standing waters can.

Actions***italics***

3.1 Publicize the values of wild trout and habitat protection, without publicizing specific angling locations or otherwise encouraging overfishing.

3.2 Encourage the involvement of citizen groups in protecting and enhancing wild trout populations and habitat through STEP, Project WILD, Stream Scene, GWEB, and other programs.

ACCESS

Background and Status

The lower Tualatin River is popular for angling for bass, crappie, bluegill, and catfish. Because most of the adjacent land is privately owned, most angling is by boat. In spite of poor access, flat water canoeing is popular in the area.

Salmon, steelhead and trout angling is primarily done in Gales Creek and in the upper mainstem Tualatin above Scoggins Creek. Much of the land in the basin is privately owned with limited access.

Access for angling and nonconsumptive uses of fish resources is decreasing, despite increasing demand for angling and viewing opportunities. Privately controlled areas along waters of the Tualatin Subbasin may have restricted entry to the public, for a variety of reasons. ODFW can and should take measures to provide access and recreational opportunity for the public.

In a recent survey of ODFW district biologists, the reach from Hillsboro (rm 45) to Cook Park in Tigard (rm 12) was identified as in need of boat ramps. No boat access is available above Cook Park, although many miles of warmwater fish habitat are present in this stretch of river.

The Public Advisory Committee identified the need for increased access all the way up to Forest Grove. The Spring Hill Pumping Plant (Bureau of Reclamation) and the Forest Grove Sewer Plan were identified as potential sites for a boat ramp (Appendix B). (See also Figure 1, Subbasin map.)

Policies

Policy 1. ODFW shall seek to provide access to allow the public to enjoy the subbasin's fish populations, to provide a diversity of angling and viewing opportunities and to encourage a dispersion of angling effort.

Objectives

Objective 1. Increase access for bank and boat anglers, to publicly and privately controlled sites.

Assumptions and Rationale***italics***

1. A growing population in the Portland area will increase demand for angling opportunities.

2. The fish production of the Tualatin Subbasin is currently underutilized due to limited access and the expanse of private land in the drainage.

Actions***italics***

1.1 Determine needs and potential opportunities for increased access to the Tualatin River, especially to enhance warmwater fisheries. Research the availability of the Forest Grove Sewer Plant or the Spring Hill Pumping Plant properties as potential access sites.

1.2 Acquire, purchase, or accept donations of land or right-of-ways which will enhance public access to the Tualatin River. Access for warmwater anglers is needed in the lower mainstem. Access for trout and steelhead anglers is needed in the upper mainstem and in Gales Creek.

1.3 Improve or expand current access facilities if such improvement will provide increased access for public benefit.

REFERENCES

Bennett, D.E. 1988. 1987 Willamette River spring chinook salmon run. Oregon Department of Fish and Wildlife, Clackamas, Oregon, USA.

Bottom, D.L., P.J. Howell and J.D. Rodgers. 1985. The effects of stream alterations on salmon and trout habitat in Oregon. Oregon Department of Fish and Wildlife, Portland, Oregon.

Bryson, T. and C. Levine, editors. 1987. Oregon bluebook 87-88. Barbara Roberts, Secretary of State. Salem, Oregon, USA.

Buchanan, D.Y., J.E. Sanders, J.L. Zinn and J.L. Fryer. 1983. Relative susceptibility of four strains of summer steelhead to infection by *Ceratomyxa shasta*. Transactions of the American Fisheries Society 112:541-543.

Bureau of Reclamation. 1983. Tualatin project Oregon: second phase. United States Department of the Interior, Pacific Northwest Region, Boise, Idaho.

Cairns, V.W. P.V. Hodson and J.R. Nriagu, editors. 1984. Contaminant effects on fisheries. John Wiley & Sons, New York, New York.

Clady, M.D. 1971. The biology and timing of the winter steelhead of the Willamette River, Oregon. Oregon State Game Commission, Portland, Oregon.

Clark, D.E., D.P. Cramer and B.L. Lynch. 1976. Evaluation of downstream migrant by-pass system, T.W. Sullivan Plant, Willamette Falls, Progress Report 1976. Portland General Electric. Portland, Oregon.

Ely, C. 1981. Wild trout inventory, 1979. Oregon Department of Fish and Wildlife Information Report number 78-1.

Franklin, J.F. and C.T. Dyrness. 1973. Natural vegetation of Oregon and Washington. United States Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Frazier, P. A. 1987. Fish passage at Willamette Falls in 1986. Oregon Department of Fish and Wildlife, Project F-115-R-5 and F- 115-R, Annual Report to United States Fish and Wildlife Service, Portland, Oregon.

Holmes, H.B. and M.C. Bell. 1960. A study of the upstream passage of anadromous fish at Willamette Falls, with recommendations for improvements of fish-passage facilities. Oregon Fish Commission, Portland, Oregon.

Howell, P, K. Jones, D Scarnecchia, L. LaVoy, W. Kendra, and D. Ortman. 1985. Stock assessment of Columbia River anadromous salmonids. Oregon Department of Fish and Wildlife, Fish Research Project DE-AI79-84BP12737, Final Report to Bonneville Administration, Portland, Oregon.

Hunt, W. 1982. Wild trout inventory, 1980. Oregon Department of Fish and Wildlife Information Report number 82-1.

Hutchinson, J.M. and W. W. Aney. 1964. The fish and wildlife resources of the lower Willamette River Basin, Oregon, and their habitat use requirements. Oregon State Game Commission. Federal Aid to Fish Restoration Project Number F-69-R-1, Portland, Oregon.

Moring, J.R. and R.L. Youker. 1979. Oregon rainbow and cutthroat trout evaluation. Oregon Department of Fish and Wildlife, Federal Aid Progress Report, Project # F-94-R.

Nicholas, J.W. 1978. A review of the literature and unpublished information on cutthroat trout (Salmo clarki clarki) of the Willamette watershed. Oregon Department of Fish and Wildlife Information Report number 78-1.

Nickelson, T.E. and R.E. Hafele. 1978. Streamflow requirements of salmonids. Oregon Department of Fish and Wildlife, Federal Aid Progress Report, Project # AFS-62.

Northwest Power Planning Council. 1987. Columbia basin system planning data standardization report, September 1987. System Planning Group and Monitoring and Evaluation Group, Portland, Oregon.

Oregon Department of Environmental Quality. 1987. Tualatin River basin fish and water quality. Oregon Department of Environmental Quality. (Attachment to request for authority to hold hearings on total maximum daily loadings in the Tualatin River.) Portland, Oregon.

Oregon Department of Environmental Quality. 1988. Tualatin basin water quality assessment. Oregon Department of Environmental Quality. (Attachment to request of authority to hold hearings on total maximum daily loadings in the Tualatin River.) Portland, Oregon.

Oregon Department of Fish and Wildlife. 1985. Coho salmon plan status report. Portland, Oregon.

Oregon Department of Fish and Wildlife. 1986. Steelhead management plan, 1986-1992. Portland, Oregon.

Oregon Department of Fish and Wildlife. 1987. Oregon salmon and steelhead catch data, 1985. Portland, Oregon.

Oregon Department of Fish and Wildlife. 1988. Willamette basin fish management plan. Portland, Oregon.

Oregon Department of Fish and Wildlife. 1987a. Warmwater Game Fish Management Plan. Portland, Oregon.

Oregon Department of Fish and Wildlife. 1987b. Trout Plan. Portland, Oregon.

Oregon Department of Fish and Wildlife. 1988. Willamette Basin Fish Management Plan. Portland, Oregon.

Oregon State Water Resources Board. 1963. Lower Willamette drainage basin. Map #2C.8. Salem, Oregon.

Pyles, R. R. 1965. Miscellaneous physical surveys of Willamette valley streams, 1965. Oregon State Game Commission, Portland, Oregon.

Rodgers, J.D. 1986. The effects of non point pollution sources on salmonids and techniques for restoration of degraded stream habitat: a bibliography. Oregon Department of Fish and Wildlife, Portland, Oregon.

Sams, R.E. and K.R. Conover. 1969. Water quality and the migration of fall salmon in the lower Willamette River, final report. Fish Commission of Oregon, Funded by Northwest Pulp and Paper Association, Portland, Oregon.

Soil Conservation Service. 1982. Soil survey of Washington County, Oregon. United Sates Department of Agriculture, Soil Conservation Service, in cooperation with United Sates Department of Agriculture, Forest Service and Oregon Agricultural Experiment Station, Forest Grove, Oregon.

Washington County. 1988. Rural and natural resource maps. Department of Land Use and Transportation, Planning Division, Hillsboro, Oregon.

Willis, R.A., M. P. Collins and R. E. Sams. 1960. Environmental survey report pertaining to salmon and steelhead in certain rivers of Eastern Oregon and the Willamette River and its tributaries. Part II. Survey reports of the Willamette River and its tributaries. Fish Commission of Oregon, Research Division, United States Department of the Interior Contract Number 14-17-001-178, Clackamas, Oregon.

Appendix A. Legal considerations (federal and state laws) that Subbasin Plans must conform with.

Federal Laws

Conservation Programs on Public Land Act of 1960: Federal and state agencies cooperatively plan, develop, and maintain programs designed to conserve, rehabilitate, and protect fish, wildlife, and threatened and endangered species.

Endangered Species Act of 1973 - P.L. 93-205, reauthorized 1988: Provides protection for habitat of endangered and threatened species and provides for status review of candidates for listing. Currently, the bull trout (Salvelinus confluentus) is listed as a candidate (Category 2) species. More information is needed on its distribution before it can be classified as either rare or endangered. Based on recent research conducted by Oregon State University, the Oregon chub (Oregonichthys crameri) may be nominated for consideration for threatened or endangered species status.

Federal Aid in Wildlife Restoration Act of 1937: Provides funding for wildlife programs such as land acquisition, habitat improvement, research and education.

Federal Aid in Sport Fish Restoration Act of 1950, expanded in 1984 (Wallop-Breaux Act) and amended in 1988: Provides funding for sport fish restoration and fish programs such as land acquisition, habitat improvement, research and education.

Federal Land Policy and Management Act of 1976 -P.L. 94-579: Allows Congress to withdraw or designate federal lands for specified purposes.

Federal Water Pollution Control Act, amended by the Clean Water Act of 1977: Establishes as an objective the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters. Sections of the act provide authorization for regulations regarding the discharge of pollutants (Section 402) and the disposal of dredged or fill material (Section 404).

Fish and Wildlife Coordination Act of 1934: States that fish and wildlife conservation shall receive equal consideration with water resources development programs.

Flood Control Act of 1936: Legislative mandate authorizing the Corps to study, plan, and construct major flood control works.

Floodplain Management, 1977 - Executive Order 11988: Designed to avoid adverse impacts associated with destruction or modification of floodplains and to mitigate impacts when avoidance cannot be achieved.

Food Security Act of 1985: Designed to reduce erosion and sedimentation in watersheds.

Forest and Rangeland Renewable Resources Planning Act of 1974: Directs management planning process for units of the National Forest System.

Land and Water Conservation Fund Act of 1965 - P.L. 88-578: Provides federal assistance to states for planning, acquisition and development of land and water recreation resources.

Magnuson Fishery Conservation and Management Act: Establishes forum for recommendations to the Pacific Fishery Management Council for establishing harvest rates and for conservation, restoration, and enhancement of habitat of anadromous salmonids.

Mitchell Act of 1938, amended in 1946: Authorized the establishment of hatcheries and fishways for anadromous fish in the Columbia River watershed of Idaho, Washington, and Oregon and annually provides operation and maintenance funding.

Multiple Use - Sustained Yield Act: Authorizes and directs the administration and development of the renewable surface resources of the national forests.

National Environmental Policy Act of 1969: Requires that any federal agency proposing an action that significantly affects the human environment must prepare an environmental impact statement.

National Forest Management Act of 1976: Provides for multiple use and sustained yield of the products and services of National Forest System land; includes legislation for protection of riparian vegetation.

Northwest Power Act of 1980: Creates an interstate policy making and planning body for electrical power and fish and wildlife in the Columbia River Basin.

O&C Act: Principle legal mandate for BLM and USFS management of O&C lands.

Rivers and Harbors Act of 1899: Authorizes the U.S. Army Corps of Engineers to issue permits for many types of activities in navigable waters of the United States.

Sikes Act: Provides for state and federal cooperative management of fisheries resources.

United States - Canada Reciprocal Fisheries Agreement: Governs the harvest of fish stocks of mutual concern.

Water Bank Act of 1970 - P.L. 91-559: Authorizes the Secretary of Agriculture, after coordination with the Secretary of the Interior, to enter into 10-year contracts with landowners to preserve wetlands and retire adjoining agricultural lands. Annual payments to landowners and sharing in the costs of conservation measures are included.

Water Pollution Control Act of 1972 - P.L. 92-500: Precursor to the Clean Water Act. Authorized issuance of permit to discharge fill or dredged material into navigable waters at specified disposal sites.

Water Resources Planning Act of 1965 - P.L. 89-80: Established the Water Resources Council, which issues the "Principles and Standards and Procedures for Federal Participation in Water and Related Land Resource Planning and Development." The act also authorized establishment of State-Federal River Basin Commissions.

Water Use Act of 1940: Provides domestic, mining, milling and irrigation uses of waters within national forests.

Watershed Protection and Flood Prevention Act of 1954: Assures cooperation of the federal government with state and local agencies in preventing damage from floodwater, erosion and sediment.

Wild and Scenic Rivers Act of 1968, revised 1988: Designates selected rivers for protection under the National Wild and Scenic Rivers System, which preserves scenic, recreational and fish and wildlife characteristics.

Wilderness Act of 1964: Preserves selected units of land for their wilderness characteristics.

State Laws

The Riparian Tax Incentive Program provides a tax break for landowners that choose to preserve riparian habitat on private property. ODFW's Habitat Conservation Division and the Education Association of Oregon developed a monitoring package. The Habitat Conservation Division works with and signs agreements with landowners.

Oregon Administrative Rules (OARs), which require compliance, include goals and policies for commercial and sport fishing regulations, fish management, and salmon hatchery operations. Portions of statewide species plans and subbasin plans are also adopted as administrative rules. The Willamette Basin Plan, revised in 1988, provides general direction for management activities in the Willamette system.

Species plans for coho, steelhead, trout, and warmwater game fish were developed as part of ODFW's planning program to provide a comprehensive, systematic, and long-term approach to management of the fish species in Oregon. They contain statewide management goals, guidelines, and objectives. The species plans provide general direction for developing this and other specific basin management plans.

The Oregon Forest Practices Act (Forest Practices Act) (ORS 527.610 to 527.730) was adopted in 1972. Commercial timber operations on state and private land are regulated by the act, which is administered by the Oregon Department of Forestry. The Forest Practices Act contains provisions for protection of aquatic habitat. Forest management activities on USFS and BLM land are designed to comply with Forest Practices Act rules and state water quality standards. The Forest Practices Act also applies within the urban growth boundary of towns and cities. Cities and towns may or may not have regulations for stream protection.

The Oregon Removal-Fill Law requires a permit for the removal or filling of 50 cubic yards or more of material in natural waterways. DSL oversees the program, reviews applications and issues permits, and enforces the law. ODFW has the opportunity to comment on permit requests.

DEQ has developed state water quality standards that are in compliance with federal water quality standards. DEQ administrative rules (Chapter 340, Division 41) address water quality standards basin by basin. The ODFW has had input in developing these standards.

DLCD has developed statewide planning goals. Goals that affect fishery resources include Goal 5, which addresses fish and wildlife areas and habitats, and Goal 6, which addresses water quality.

Senate Bill 140 (ORS 537.332 through 537.360) directed the Water Resources Commission to convert minimum streamflows into instream water rights following review. In 1989 the Oregon Fish and Wildlife Commission adopted administrative rules (OAR 635-400-000 through 635-400-040) regarding instream water rights.

Oregon Senate Bill 2990 prohibits hydroelectric projects that would result in the mortality of a single anadromous fish. Its

general impact has been to halt hydroelectric development on anadromous fish streams.

Oregon Senate Bill 523 of 1985 initiated a coordinated effort among state resource agencies for planning and management of the state's water resources.

Appendix B. Tualatin River access sites.

1. RM 00 -- BERNERT LANDING -- CITY OF WEST LINN
    a. Boat launch and parking on north bank.

    b. Bank fishing on north bank.

2. RM 7 -- OSWEGO CANAL MOUTH -- LAKE OSWEGO CORP.
    a. Limited bank access near canal diversion.

3. RM 10 -- TUALATIN CITY PARK
    a. Bank access.

    b. Boat launch.

4. RM 10 -- CITY OF TIGARD -- COOK PARK
    a. Boat launch.

    b. Bank access.

5. UPPER EAST FORK OF DAIRY CREEK -- BLM PARK
    a. Bank access.

6. GALES CREEK -- RIPPLING WATERS SCENIC TRAIL AREA
    a. Bank access.

    b. Scenic/nature trails.

7. GALES CREEK/DORMAN POND
    a. Bank access, mostly to ponds; limited creek access.

8. GALES CREEK -- RECREATION AREA -- STATE FORESTRY WAYSIDE
    a. Bank access.

9. HAGG LAKE -- WASHINGTON COUNTY PARK
    a. Boat launch "A" on east side of lake.

    b. Boat launch "C" on west side of lake.

    c. Bank access around most of lakeshore.