Biological Assessment of the Impacts to Wild Winter Steelhead on the Umpqua River from the Recreational Fishery and 2004 Angling Regulation Proposals

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Executive Summary

The Oregon Department of Fish and Wildlife is currently reviewing angling regulation proposal 091P, to allow 1 wild winter steelhead per day, five wild winter steelhead per year in the mainstem of the Umpqua River. This Biological Assessment (BA) was written to review the current biology and exploitation rates to determine the impact to the wild winter steelhead in the Umpqua River Basin.

The Department determined population estimates for the various sub-basins in the Umpqua River utilizing redd abundance surveys, telemetry studies, and Peterson mark recapture estimates. Exploitation rates in wild winter steelhead were than calculated from the punchcard date and population trends. The highest exploitation rate (35.08) was determined to impact the North Umpqua River stock of wild winter steelhead. This was caused by the cumulative impact of the proposed fishery in the mainstem Umpqua River and the present wild fishery in the North Umpqua. Current regulations for the South Umpqua River and Smith River are catch and release only for wild fish.

The population of wild winter steelhead in the Umpqua Basin was shown to be very robust and sustainable. Intrinsic population models utilized demonstrated the population could sustain exploitation rates from the fishery. Habitat and hatchery management was also reviewed to determine the long-term impacts and associated harvest impacts into the future.

The Winchester Dam counts on the North Umpqua River are real time, and actual fish counts, not estimates. The Department will monitor the impacts to the fishery on the North Umpqua on a yearly basis through Winchester Dam Counts. Monitoring throughout the basin will continue through additional adult traps, redd abundance surveys, and juvenile seeding levels.

The Department of Fish and Wildlife recommends the Commission Adopt angling regulation proposal 091P to allow a wild winter steelhead fishery on the mainstem of the Umpqua River. The Department would then review the fishery again when a Conservation Plan is written for the coastal winter steelhead ESU.

I. Introduction

Oregon Sport Fishing Regulations allow winter steelhead angling in all the Umpqua River Basin, which includes Smith River, the mainstem Umpqua River, North Umpqua River, and South Umpqua River (Figure 1.) Each sub-basin is unique with management of hatchery and wild winter steelhead, and thus these sub-basins vary with angling regulations. Winter steelhead angling in the Smith River allows harvest of adipose fin-clipped fish only from mid-November through the end of March. Hatchery fish are no longer released in the Smith River. The South Umpqua River and Cow Creek have the same regulation to protect wild fish, but annual releases of South Umpqua Hatchery fish occur. Angling regulations on the mainstem of the Umpqua River for winter steelhead is open year around, and requires all non-adipose fin-clipped steelhead to be released unharmed. The North Umpqua River is also open all year, but for the months of January 1st through April 30th, non-adipose fin-clipped steelhead (wild) may be harvested (1 wild fish per day and no more than 5 wild fish per year.) The harvest of non-adipose winter steelhead on the North Umpqua River began in 1997. Table 1 depicts the winter steelhead regulations as previously described.

Figure 1. Umpqua River Map.

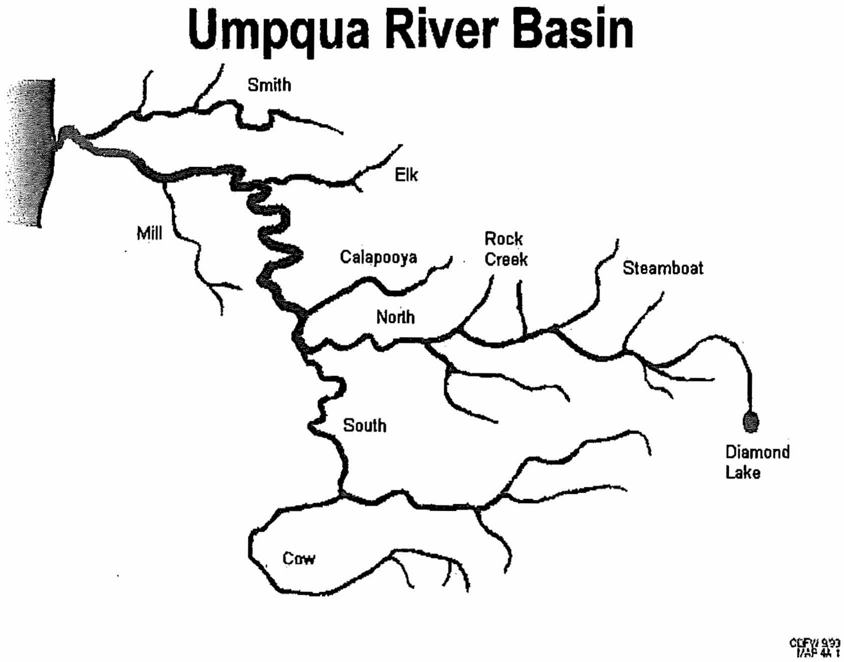


Table 1. Umpqua Winter Steelhead Regulations for the Various Sub-Basins.

Mainstem Umpqua River & Bay	Open for Adipose Fin-clipped Steelhead entire year.
South Umpqua River	Open for Adipose Fin-clipped Steelhead January 1 to March 31 and November 16 through December 31.
North Umpqua River	Open for Adipose Fin-clipped Steelhead entire year. Non-adipose fin-clipped steelhead may be kept January 1 through April 30; 1 per day, 5 per year.
Smith River	Open for Adipose Fin-clipped Steelhead January 1 to March 31 and November 16 to December 31.

The Oregon Department of Fish and Wildlife (ODFW) conducts a public review process of existing angling regulations every four years. ODFW staff biologists, Oregon State Police (OSP), and interested public are invited to submit new or modify the current Oregon Sport Fishing Regulations. All proposals are reviewed by a volunteer Angling Regulation Review Board made up of individuals representing the Native Fish Conservation Policy Task Force, Warmwater Working Group, and various fishing organizations and groups. ODFW Fish Division staff, district fish biologist, along with Oregon State Police and the Fish and Wildlife Commission are also members of the review board. The review board screens all proposals received on the following criteria: easily understood, enforceable, consistent with statutory mandates and ODFW management policies, goals, plans, and rules, consistent with biologically sound principles, consistent with court orders and approved agreements between ODFW and other management entities, supported by affected citizens, consistent with regulations on similar or nearby waters, unless social or biological circumstances require diversity, necessary to achieve and identified objective, necessary to balance harvest with reproduction or recruitment, and lastly necessary to provide angling opportunity to sequential fisheries. Public meeting are held throughout the state on those proposals that met the previously described criteria.

The public proposed a new fish regulation for the mainstem Umpqua beginning in 2005 (091P.) The proposal was identical to the current existing regulation on the North Umpqua River, which allows the harvest of non-adipose fin-clipped winter steelhead, 1 per day and 5 per year. The Angling Regulation Review Board passed the proposal (91P), and a public meeting was held in Roseburg, Oregon to discuss concerns. Public comments received at the meeting were unanimous in support of 91P. The Fish and Wildlife Commission in August and September 2004 will hear the proposal and receive public comments. This Biological Assessment is to review the impacts this angling proposals on wild winter steelhead on the Umpqua River.

II. Life History of Steelhead

The life history of steelhead trout, the sea-run form of rainbow trout, is highly variable. Two races of steelhead exist, winter-run and summer-run, defined by the timing of adult returns to natal spawning streams and by their extent of sexual maturity upon entering freshwater. Both races are present in the Umpqua ESU.

Adult winter-run typically enter rivers from November to May and are usually near final stages of maturity upon entry. Summer-run steelhead generally return as immature fish between April and October. Steelhead may spawn more than once with females surviving as repeat spawners more often than males. The length of most adult steelhead ranges from 18 to 28 inches, at a weight of 4 to 11 pounds. Steelhead can attain an age of nine years, 48 inches in length and 43 pounds in weight. Most wild adult steelhead are 4 to 6 years of age, but many age classes may occur. Steelhead usually spend from one to four years in the ocean before returning to their natal streams to complete the life cycle. Both races spawn in tributaries and mainstem areas from January to May. Fecundity ranges from 1,500 to 12,000 eggs per female and increases with size of fish. Females bury their eggs at a depth of 2 to 12 inches in redds in gravels that occupy up to 60 square feet. More than one redd may be constructed by each female in a season. Spawning sites typically require gravel from 0.5 to 4.5 inches in diameter, and well aerated flow. Eggs hatch in four to seven weeks depending upon water temperature. Sac fry remain in the gravel for two to three weeks before their yolk sacs are absorbed. Once the yolk sac is absorbed the fry emerge into the water column and begin to actively feed.

Juvenile wild steelhead usually rear in freshwater for one to three years before undergoing a physiological change to become smolts and out-migrate to the ocean. Wild steelhead smolts migrate from freshwater to saltwater from March through June. Hatchery steelhead in the Umpqua River are reared for two year prior to release as smolts in April or May. Juvenile steelhead tend to move offshore soon after entering the ocean, where they move north-westward from the mouth of the Umpqua River. By July, most juvenile steelhead can be found offshore in the Gulf of Alaska.

Substrate composition, cover, water quality, and water quantity are important habitat elements for steelhead before and after spawning. Steelhead spawn in clear, cool, well oxygenated streams with suitable gravel and water velocities. Adult fish waiting to spawn or in the process of spawning are vulnerable to disturbance and predation in areas without suitable cover. Cover types include overhanging vegetation, undercut banks, submerged vegetation, submerged objects (e.g., logs and rocks), deep water, and turbulence. In general, at the watershed level steelhead stock abundance is limited by freshwater rearing conditions. Juvenile steelhead abundance in freshwater can be affected by many factors. These include fry abundance, quantity and quality of suitable habitat, abundance and composition of food resources, ecological interactions with other fish, birds, and mammals. The abundance of older fish generally increases as the abundance of juveniles increases until an upper limit (carrying capacity) is reached. Juvenile steelhead move to deeper parts of their streams and establish territories as they grow.

Some factors that influence survival in freshwater include the number of eggs deposited, siltation, dissolved oxygen, temperature, passage barriers, pollution, predation, angling mortality, and competition with other fish. Stream discharges, water temperatures, and water quality must be sufficient for steelhead movements during the upstream migration season. Steelhead tend to migrate in rivers when water temperatures are between 37 and 68F. Waterfalls, debris blockages, and excessive water velocities may impede migrating steelhead. Hydroelectric facilities may delay or prevent migration of juveniles and/or adults. Marine survival is primarily dependent on high seas rather than near shore conditions because steelhead move offshore quickly.

Steelhead in marine waters feed mainly on fish and squid, but also utilize euphausids, amphipods, pteropods, and pelagic polychaetes. Physical and biological oceanic conditions such as sea surface temperatures, winter air temperatures, ocean currents, wind speed and direction, strength of upwelling, El Nino events, primary and secondary productivity, predation, and competition are major factors responsible for coastwide similarities in steelhead abundance trends. Thus marine conditions can have a major influence on steelhead abundance at the watershed level.

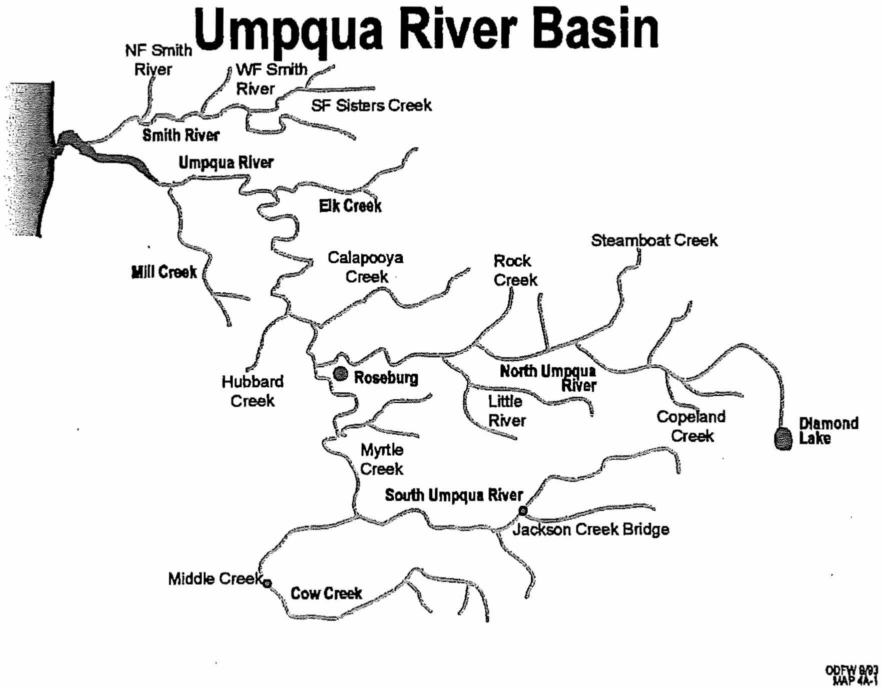
Similar to variability observed in steelhead life history and associated habitat utilization, steelhead contain a high degree of genetic diversity. This genetic diversity is partitioned within and between stocks and populations. It provides the essential resource upon which natural selection acts in the face of changing environmental conditions, thereby allowing future adaptation to each stock's local environment. Genetic diversity has also been used to clarify risks to wild stocks posed by the use of artificially produced steelhead. The genetic diversity and fitness of local wild stocks can be affected when genetic material from genetically dissimilar hatchery or wild strays becomes incorporated in the wild gene pools of a given stock. Genetic changes may result when wild spawning population sizes are very small, allowing random genetic changes due to genetic drift and inbreeding. They may also occur due to harvest practices affecting a particular segment of a stock in time or space, or by loss or fragmentation of habitat. The latter may be especially important in situations where major segments of a stock's distribution are lost due to factors such as migration barriers.

III. Fish Distribution and Abundance

Fish Distribution

The Umpqua River enters the Pacific Ocean near the city of Reedsport, and contains about 1900 miles of spawning habitat for winter steelhead. Smith River is the first major sub-basin entering the Umpqua River at River Mile 11 (Figure 2.) Smith River winter steelhead are very similar to coastal steelhead populations and is managed as a sanctuary for wild winter steelhead within the Umpqua Basin. Major spawning tributaries within the Smith River Basin include: North, West, and South forks of Smith River, Wasson Creek, Buck Creek, Vincent Creek, and North and South Sisters Creek. A major second sub-basin to the Umpqua River is Elk Creek. Flowing into the Umpqua at River Mile 48.5, the Elk Creek basin is closed to the harvest of winter steelhead, which provides yet another sanctuary and genetic reserve area for winter steelhead. Calapooya Creek enters at river mile 103, and is similar in size to Elk Creek, and is also closed to the harvest of winter steelhead. Smaller sub-basin tributaries of the Umpqua River providing both protected spawning and rearing habitat include Wolf, Rader, Cougar, and Hubbard Creeks. All tributaries of the Umpqua River are closed except the Smith River, North and South Umpqua rivers, and the mainstem Umpqua River and Bay (table 1.)

Figure 2. Umpqua River Basin.



The North Umpqua River and the South Umpqua River join together at River Mile 112 on the Umpqua River. The North Umpqua is well known throughout the Northwest for its beauty, great fly-fishing, and overall excellent salmon and steelhead fishing. The upper portion of the North Umpqua is located in the "Wild and Scenic Area." Winchester Dam is located on the lower North Umpqua, and is a long-term fish counting station for the ODFW. Significant tributaries of the North Umpqua are Little River, Rock Creek, Steamboat Creek, and Canton Creek.

The South Umpqua River is also a larger contributor of wild steelhead production. The winter steelhead hatchery production is located at Canyon Creek, a tributary of the South Umpqua. Significant other tributaries for steelhead include Myrtle Creek, Cow Creek, Jackson Creek, and Lookingglass Creek.

Winter Steelhead are distributed throughout the much of the Umpqua River Basin. The Umpqua River mainstem including Smith River winter steelhead distribution is shown in Figure 3. The distribution of winter steelhead for the North Umpqua and South Umpqua rivers are shown in Figure 4 and Figure 5 respectively. Historical distribution has been affected by man-made migration barriers. Hydro projects and water storage dams have contributed to over 41 miles of lost steelhead distribution. Pacific Power and Light (PPL) have constructed Soda Springs Dam on the North Umpqua which cut off winter steelhead production to an estimated 8 miles of spawning habitat mainly on Fish Creek. Galesville Dam and Ben Irving Dam were constructed on the South Umpqua for water storage and have eliminated 28 miles of Cow Creek and 5 miles of Berry Creek to anadromous fish.

Road crossings also have created barriers for steelhead distribution in the Umpqua Basin, but through cooperative efforts of the Oregon Plan are now being surveyed and prioritized for replacement. Most culverts that eliminated large tracts of anadromous production have already been replaced with fish friendly culverts and bridges. The remaining impassable culverts identified as barriers to migration are estimated to comprise three to eight percent of the winter steelhead distribution in the Umpqua Basin. The offending culverts are typically located in the upper portions of the tributaries with ¼ to ½ miles if anadromous habitat being blocked.

Figure 3 Distribution of winter steelhead in the mainstem Umpqua and Smith River

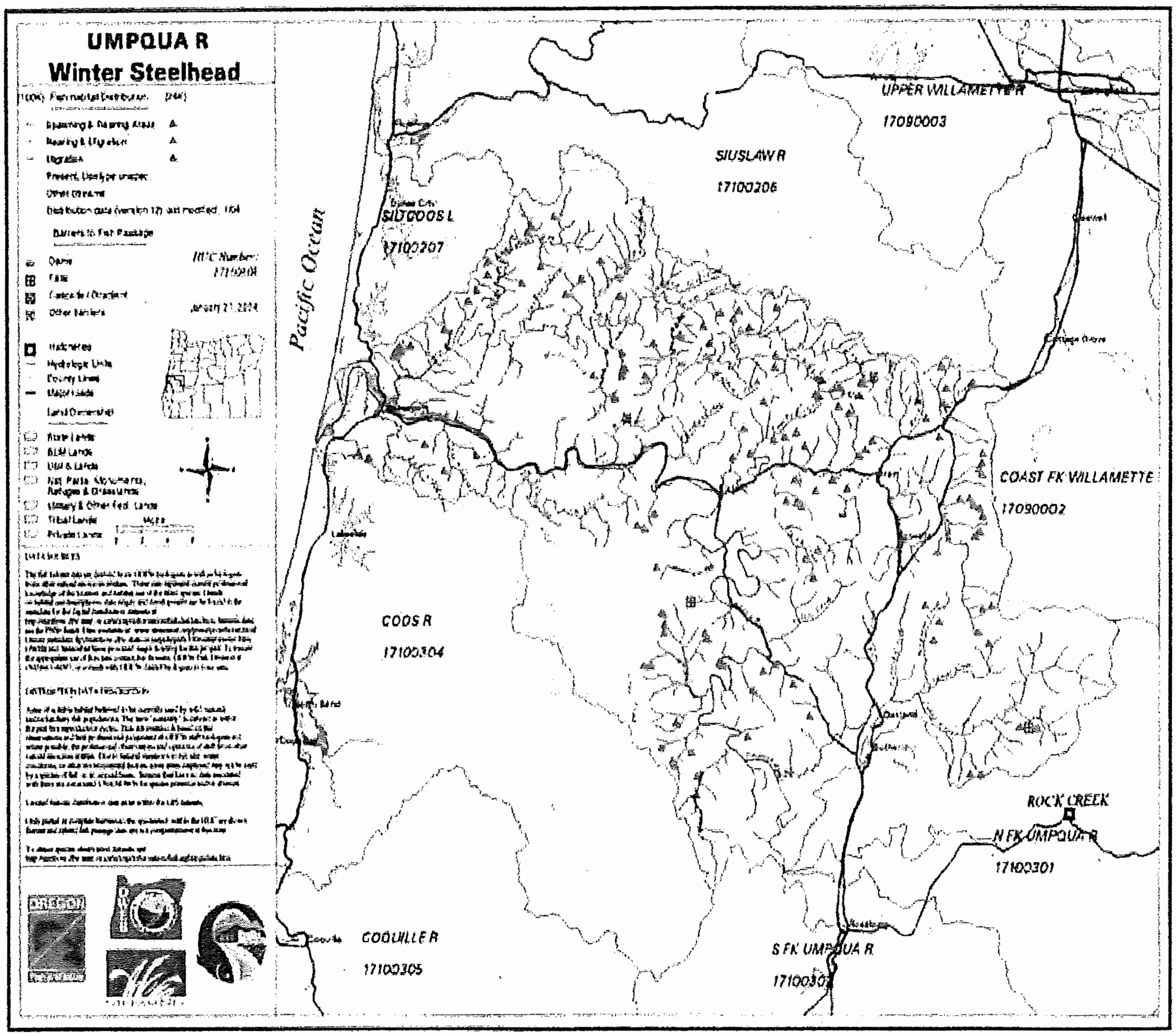


Figure 4 Distribution of winter steelhead in the North Umpqua River

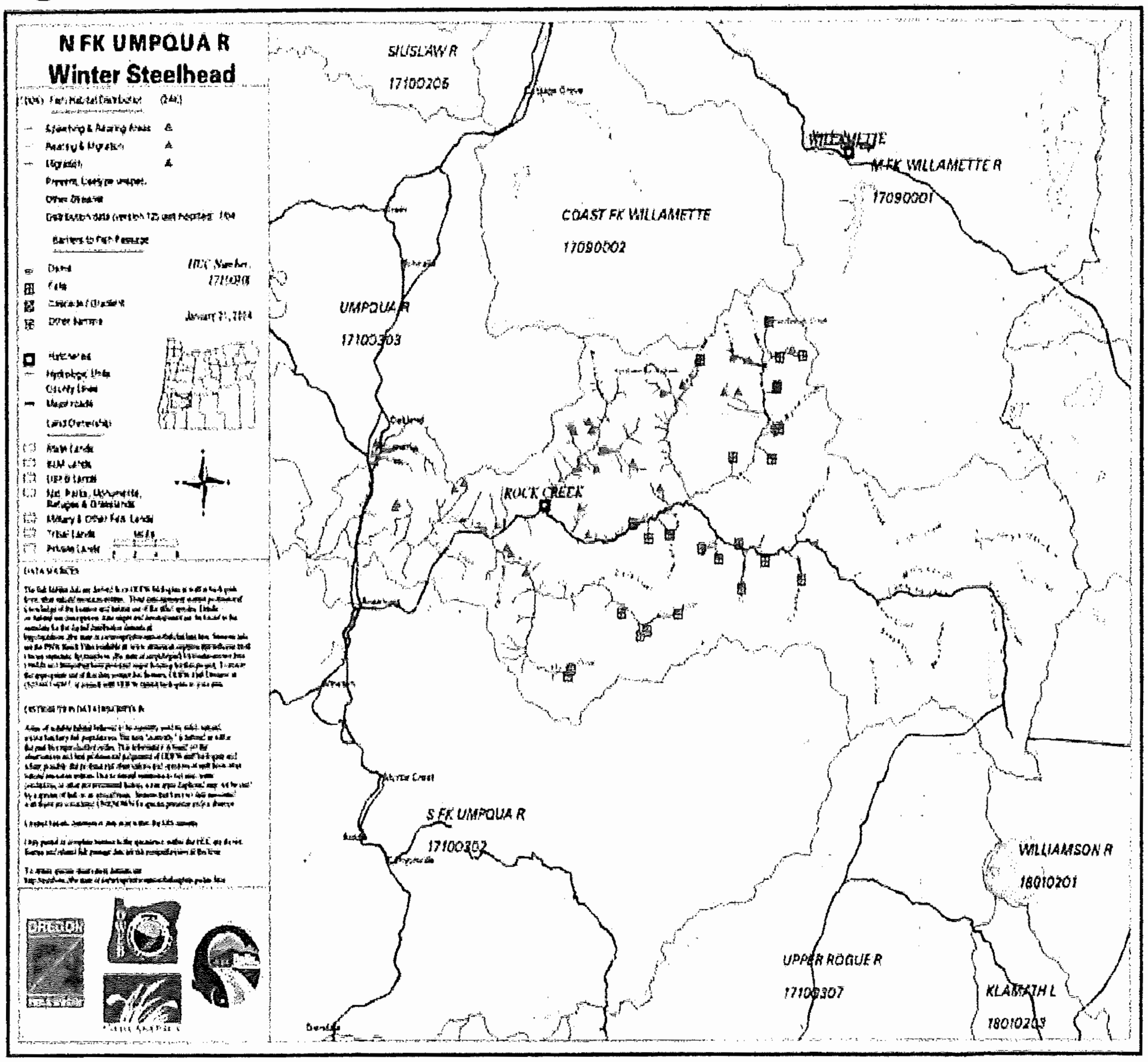
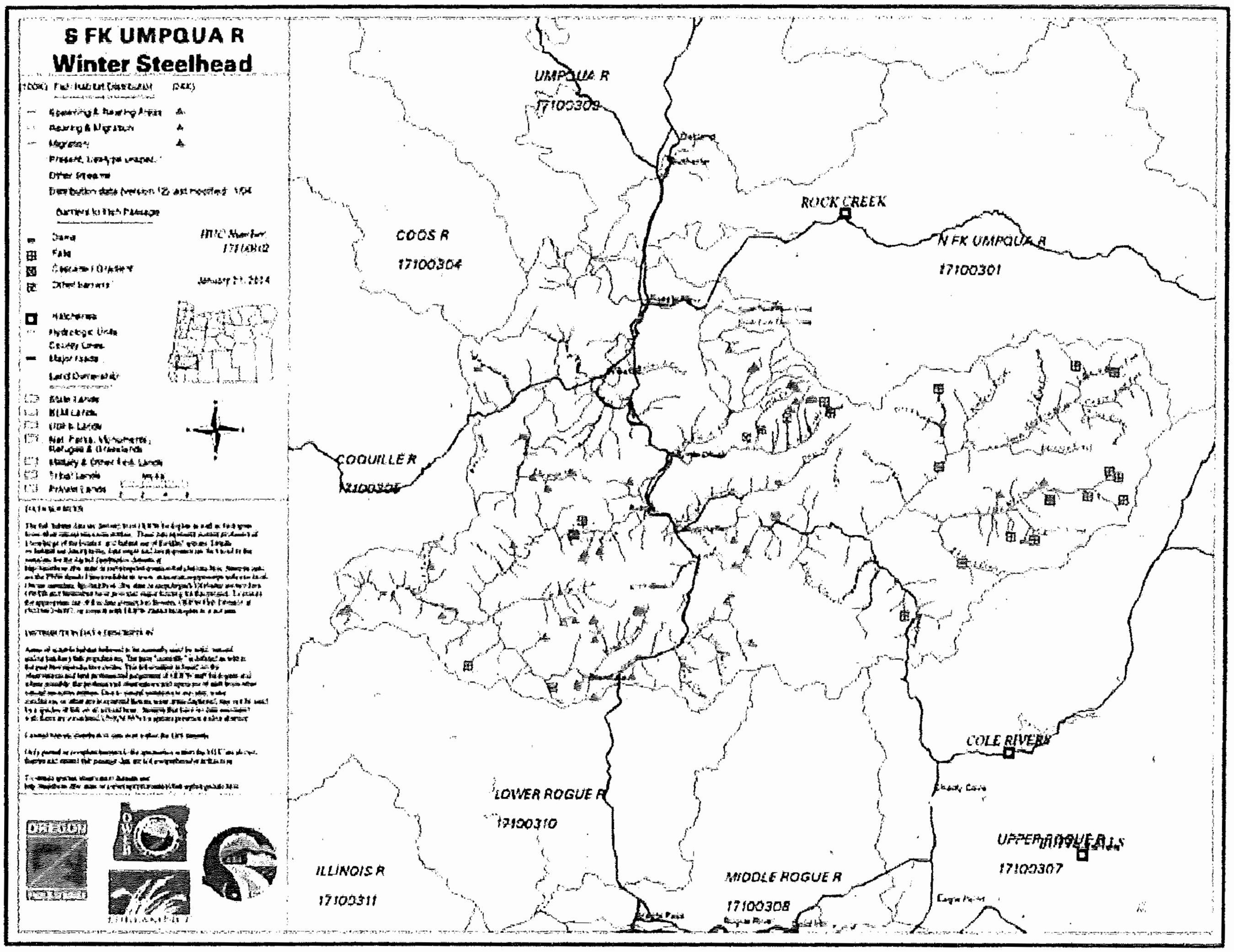


Figure 5 Distribution of winter steelhead in the South Umpqua River



Population Estimates

The District has maintained a long-term fish counting station at Winchester Dam beginning in 1945. Winchester Dam is located on the North Umpqua at river mile seven. The winter steelhead counts for return year are shown in Figure 6. The counts of wild winter steelhead have ranged from a low of 3,928 in 1990-91 to a high of 12,888 in 2003-04. The average wild winter steelheads count since 1945-46 is 6,948 (Table 2). Over the last 10 years the average return passing over Winchester Dam is 6,945

Figure 6: Winchester Dam Wild Winter Steelhead Returns, 1946-2004

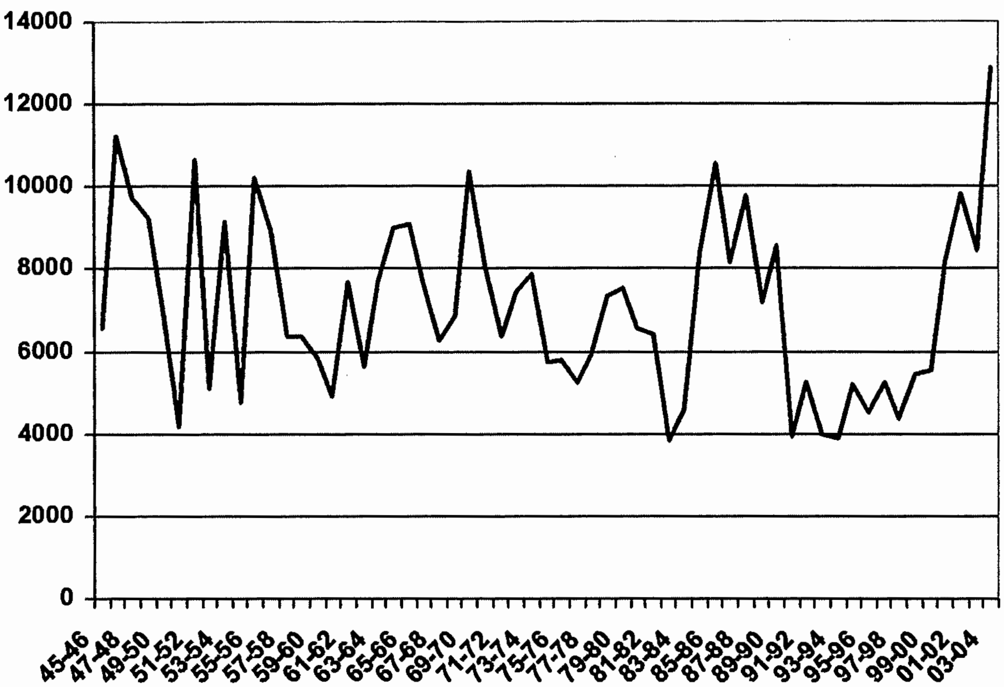


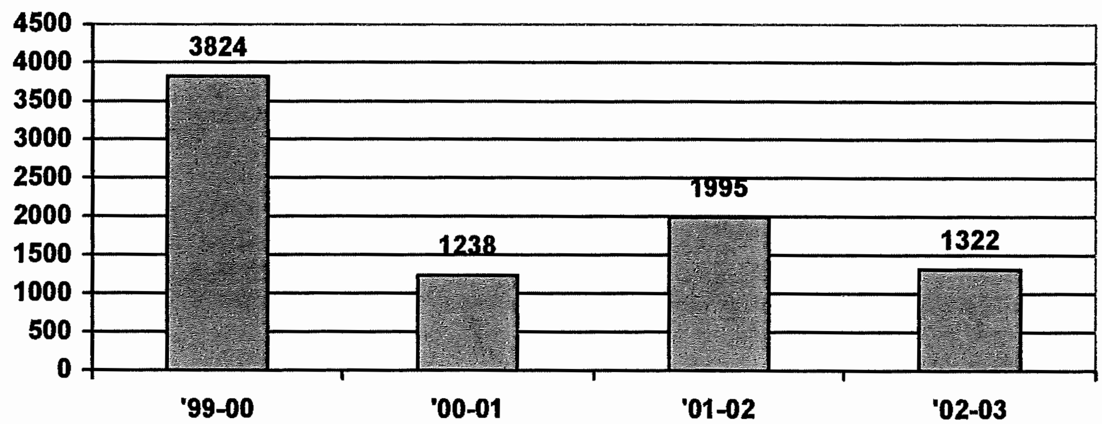
Table 2: Ten Year Average Winter Steelhead Counts at Winchester Dam Fishway on the North Umpqua River.

Average Counts	Wild	Hatchery	Total
1946-50	7,083		7,083
1951-60	7,147	323	7,470
1961-70	7,511	948	8,459
1971-80	6,738	735	7,473
1981-90	7,401	94	7,495
1991-00	4,698	681	5,379
2001-04	9,798	1,247	11,045

Average Counts	Wild	Hatchery	Total
Since 1946	**6,948**	**809**	**7,757**
Last 10 Years	**6,945**	**968**	**7,913**

The Department has also implemented a mark recapture study on Smith River during the run-years 1999-00, 2000-01, 2001-02, and 2002-03. Returning adult winter steelhead were trapped at Smith River Falls Fishway and Floy tagged. Tagged and non-tagged steelhead were observed upstream at an adult trap on the West Fork Smith River and during spawning ground surveys. This research study is published in the Department Information Bulletin called the *Status of Oregon Coastal Stocks of Anadromous Salmonids*, which includes winter steelhead population estimates for upper Smith River. Population estimates ranged from 1,238 to 3,824 over the four-year period. The average population during this research was 2,097. Figure 7 depicts estimates made from the mark recapture study for upper Smith River.

Figure 7: Estimated Winter Steelhead Population for Upper Smith River, 1999-2004.



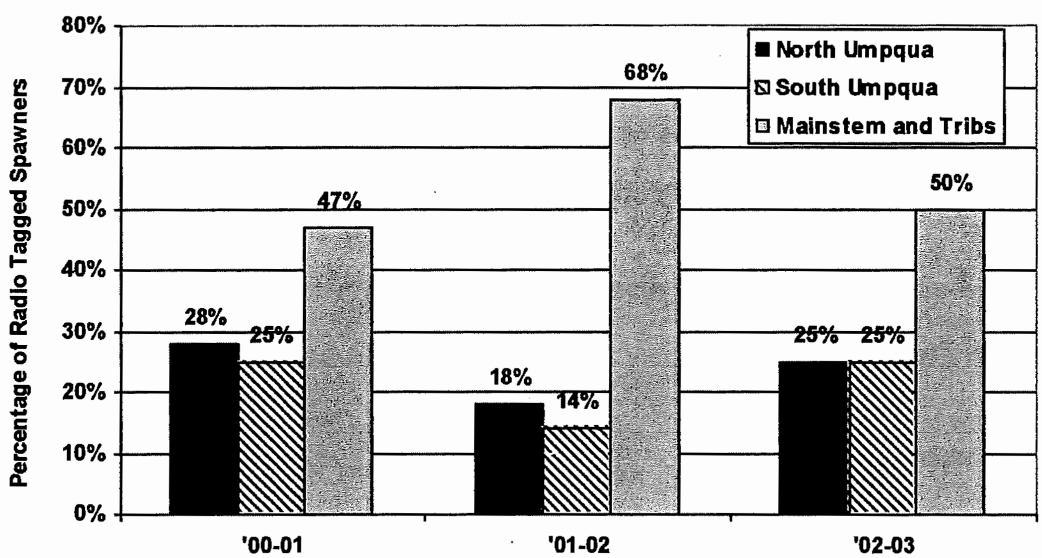
Scales collected from returning winter steelhead at Smith River Falls during 2000-01 and 2001-02 has shown a high percentage of the returning adult population to consist of repeat spawners. The adult returns for run years 2000-01 was 12.8% male and 30.17% female while in run year 2001-02, the adult returns were 11.2% for male and 18.6% for female. High repeat returns may be attributed to the short distance kelts travel to re-enter estuarine environment and reduced angling pressure. The Smith River has been closed to the take of wild winter steelhead since 1999 and there is no longer a hatchery program to provide a consumptive fishery.

Several studies have been conducted on the Umpqua River to determine a basin-wide population estimate for winter steelhead on the Umpqua River. These studies consisted of 1) Using radio/telemetry and Winchester Dam counts as a segregate for basin-wide estimate, 2) A Peterson Mark/Recapture estimate, and 3) Population Estimates utilizing Area Under the Curve methodology (AUC).

Radio Telemetry

The Umpqua Fish District conducted radio telemetry studies on winter steelhead from 2000-01 through 2002-03 on the Umpqua River Basin. Radio tags were inserted into upstream migrating adult winter steelhead near Sawyers Rapids in the lower Umpqua River. Floy tags were also added to all radio tagged steelhead to aid identification by staff and anglers. These tagged fish were then tracked several times per week to ensure that distributions to the spawning grounds were documented. Figure 8 displays spawner escapement and distribution.

Figure 8: Radio Telemetry Distribution for Wild Winter Steelhead within the Umpqua Basin, 2000-2003



The distribution of radio tagged fish per year was fairly consistent over the study period. The three year average indicated that 54% of the winter steelhead spawned in the mainstem Umpqua River and its tributaries, 24% of the fish entered the North Umpqua River, and 22% of the fish migrated up the South Umpqua River. Figure 9 displays the three-year average of radio tag spawners in the Umpqua Basin. Winchester Dam counts were then utilized as a segregate, based on a 24% return ratio, to estimate the Umpqua Basin Population (Figure 10). The population estimate for the Umpqua Basin in 2002-03 was 35,313 (pre-harvest and includes the Smith River.)

Figure 9: Three Year Average Winter Steelhead Spawner Distribution within the Umpqua Basin

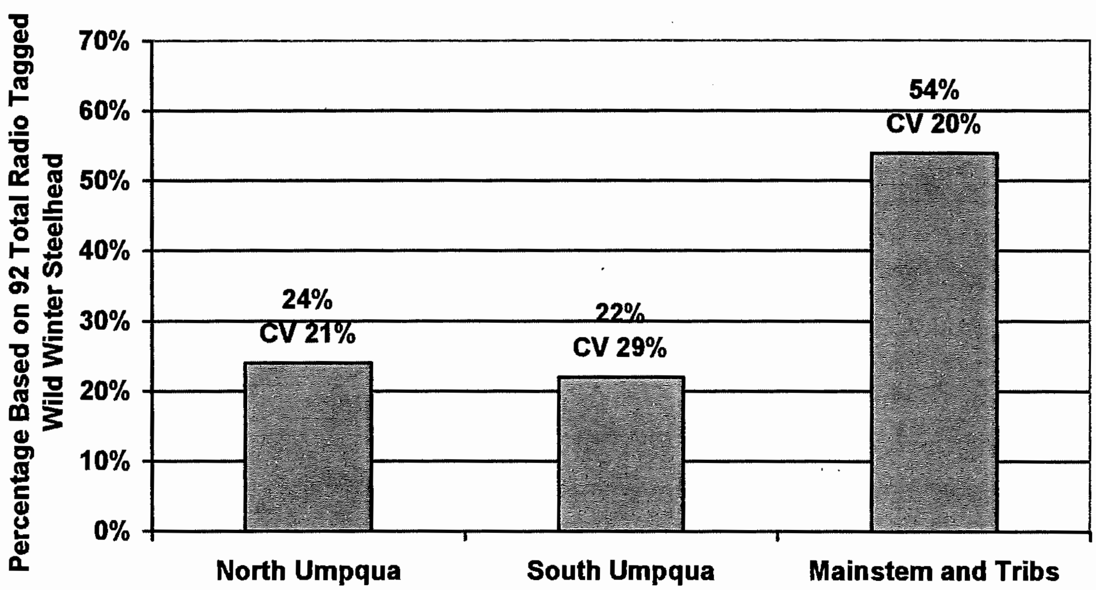
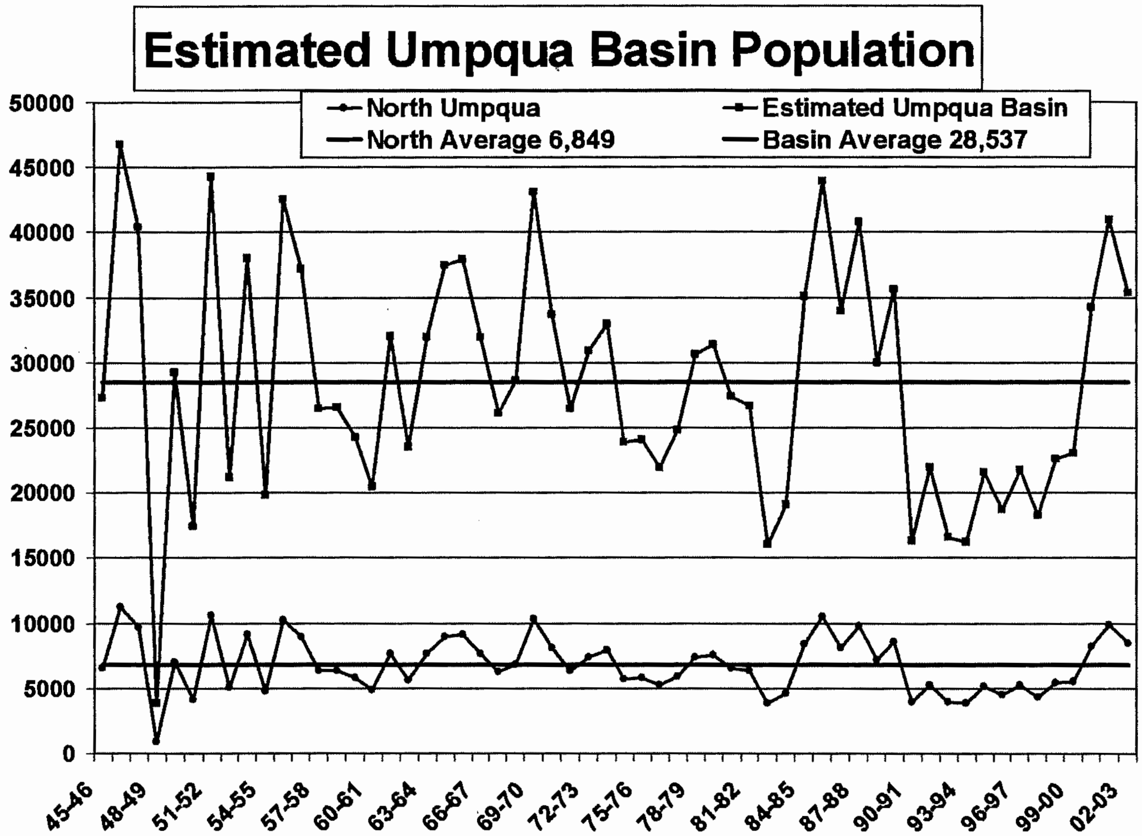


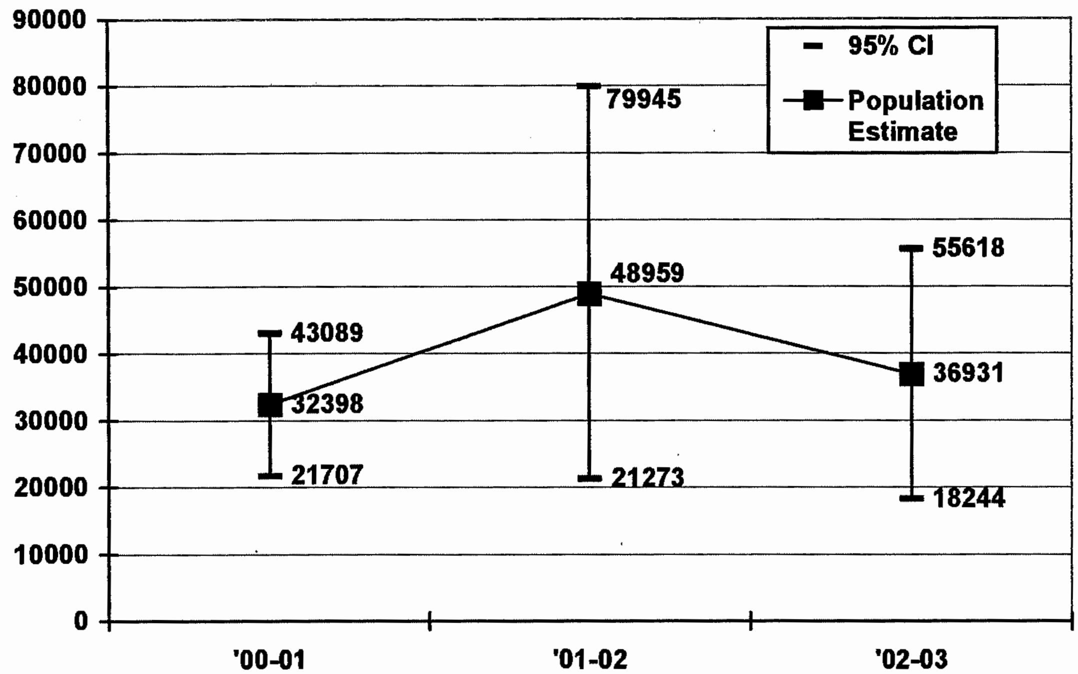
Figure 10. Umpqua Basin Population Estimates based on Telemetry and Winchester Dam Counts as a segregate (excluding Smith River.)



Peterson Mark-Recapture

A Peterson Mark-Recapture population estimate was conducted for the run years 2000-01, 2001-02, and 2002-03. Similar to the radio-tagging study, the district floy-tagged winter steelhead in the lower Umpqua River and then counted the migrating floy-tagged fish while they passed through the ladder at Winchester Dam. The estimated population in 2000-01 was 32,398 wild winter steelhead in the Umpqua River Basin. The 95% confidence interval (CI) for this period was a low of 21,707 and a high of 43,089. During the 2001-02 return year, the population estimate was 48,959 with a 95% CI of 21,273 and 79,945. Results from the last year of the study (2002-03) produced an estimated population of 36,931 with 95% CI ranging from 18.244 to 55,618. Figure 11 displays the estimates for the three-year study.

Figure 11: Umpqua Basin Wild Winter Steelhead Population Estimates Based on Mark- Recapture, 2000-2003.

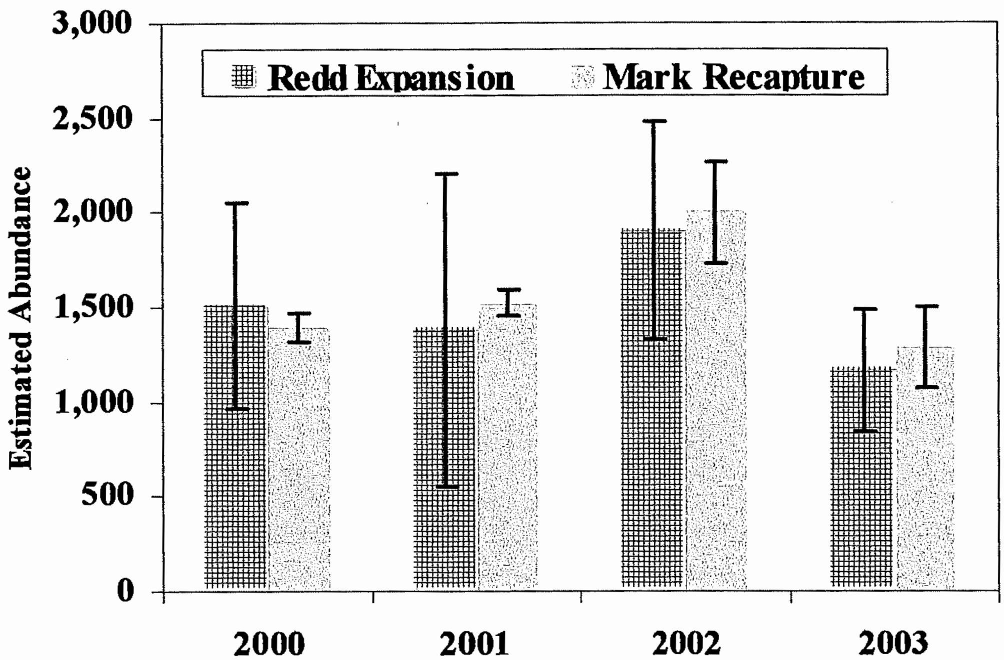


AUC Spawning Surveys

The Department also conducts winter steelhead spawning ground surveys with the Umpqua and Smith River basins. Random spawning surveys are conducted on streams throughout the Umpqua River Basin from January through May to develop Area Under the Curve (AUC) population estimates. Streams are surveyed every 10 to 14 days throughout the steelhead spawning season. Surveys are conducted on larger water with boat surveys while smaller tributaries are conducted by foot. Spawning redds and live fish are counted, and the identification of spawning steelhead for determination of hatchery/wild origin through mark identification of the missing or intact adipose fin.

Spawning survey population estimates and Mark/Recapture population estimates have both been conducted on the Smith River (Figure 12.) Figure 12 demonstrates the population expansions are very similar, and adds validity to the AUC survey methodology.

Figure 12. Relationship Between Mark/Recapture and Population Expansions from Redd Counts in the Smith River 2000-2003.



Spawning survey results are currently only available for run year 2002-03. ODFW estimated 15,641 redds in 2003 with a 95% confidence interval ranging from 10,437 to 20,845 (Table 3). The North Umpqua is not surveyed because we utilize actual Winchester Dam counts. Figure 13 compares the 2003 redd densities between the various meta-populations of the winter Steelhead ESU. Figure 14 shows the winter steelhead population estimates between the same meta-populations. The Umpqua Basin population estimate for 2003 was 16,898 and with the North Umpqua Winchester Dam count of 8,716 (minus 759 wild catch) for a total Umpqua Basin estimate of 25,614. This estimate is post-harvest.

Table 3. Estimated Redd Counts for Winter Steelhead on the Umpqua River in 2003.

Area	Number of Sites	Estimate	Standard Deviation	Lower 95% Conf. Bound	Upper 95% Conf. Bound
Tribs	41	8,201	1,181	5,887	10,516
4-5 Order	13	5,266	2,336	687	9,844
Intermediate	5	1,068	423	239	1,898
Smith Tribs	35	999	136	733	1,266
Smith River	24	106	32	44	168
Total		15,641	2,655	10,437	20,845
Precision		33.3%			
Hatchery Influence		2.5%			

Figure 13. Winter Steelhead Redd Density Counts.

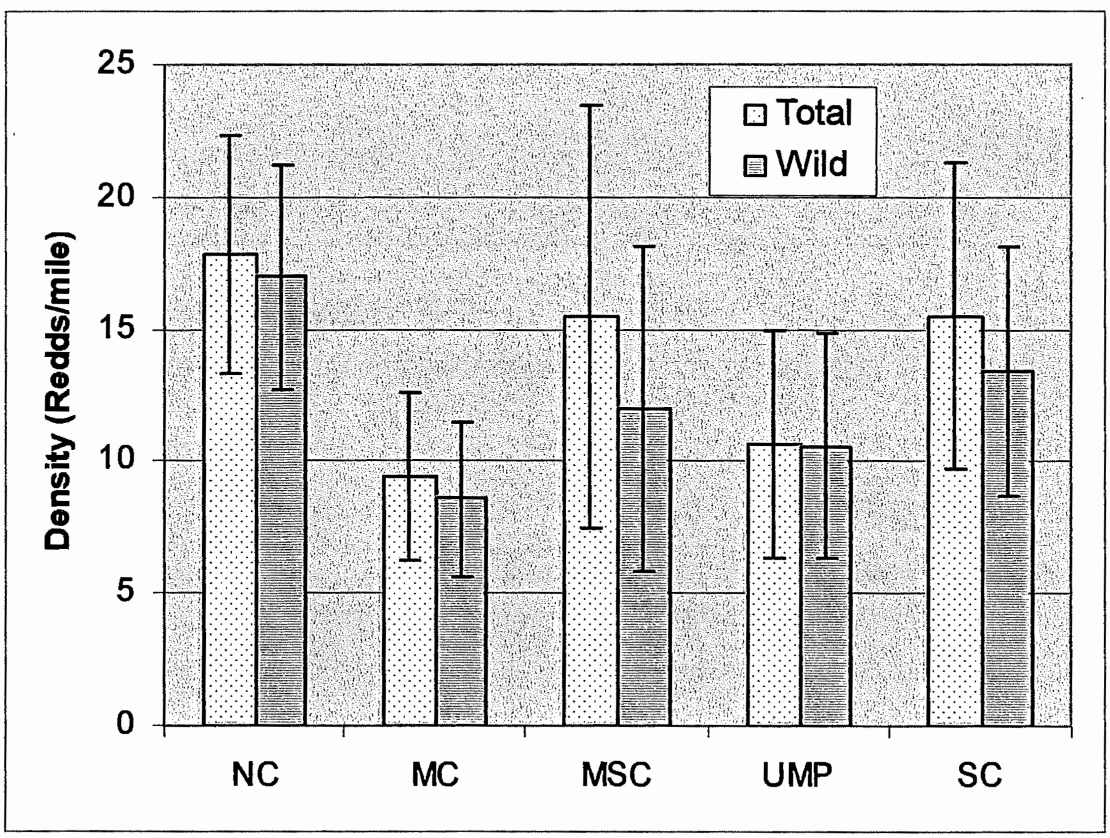


Figure 14. Estimated Number of Coastal Winter Steelhead in 2003.

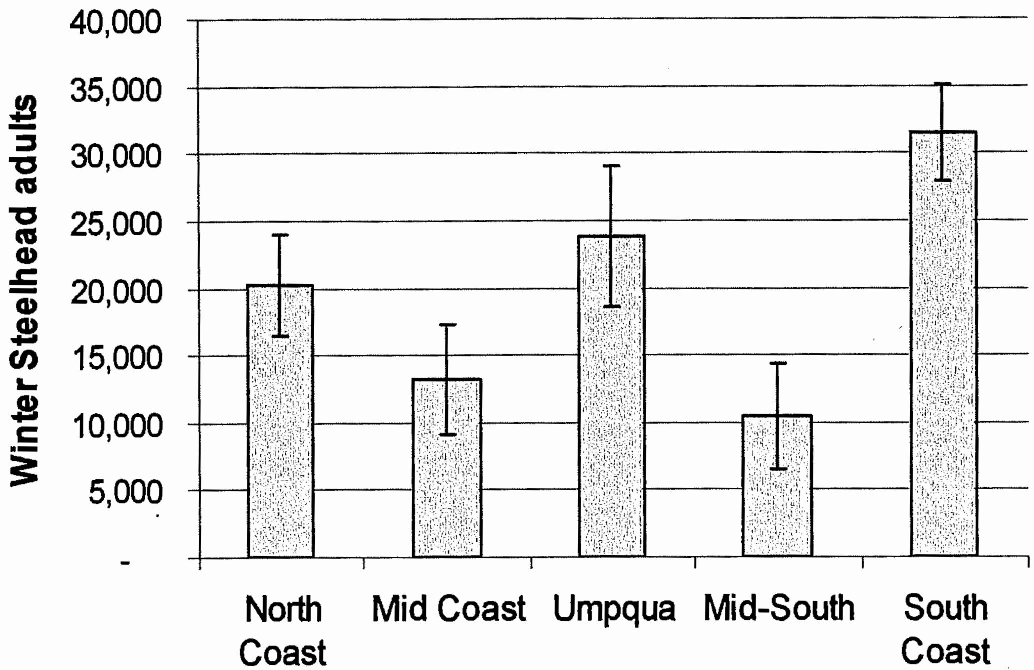


Table 4 compares the population estimates for the various study designs conducted on the Umpqua Basin. The estimates for the population on run year 2002-03 are statistically similar, all within the 95% confidence interval. Our sample size for the telemetry and Peterson Mark/Recapture studies were limited due to budget constraints. These studies need to be conducted over several years and with larger samples. The district has the most confidence in the AUC spawning survey methodology. Whatever the study method, the counts at Winchester Dam are real time and extremely accurate. Therefore, the Telemetry and Peterson Mark/Recapture are reflective of Winchester Dam counts and thus adds further validity to these study population estimates.

Table 4 Comparison of the various population estimates for run year 2002-03.

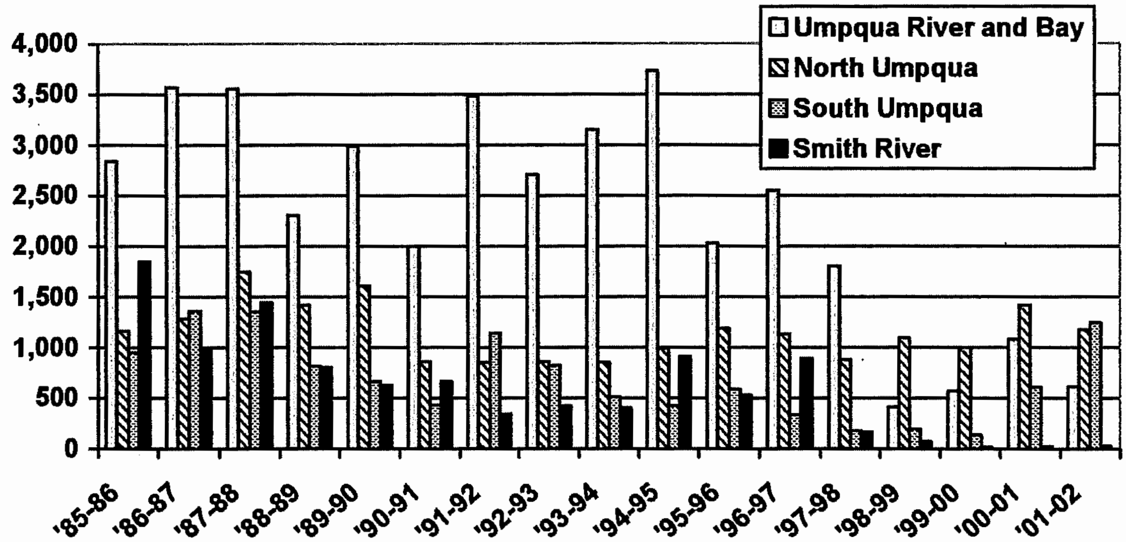
Study Method	Population Estimate for the Umpqua Basin.	95 % CI
Telemetry	**35,313** (pre-harvest)	30,268 to 47,083
Peterson Mark/Recapture	**36,931** (pre-harvest)	18,244 to 55,618
AUC Spawning Surveys	(24,739 post harvest) + (3198 average harvest) = **27,812** (pre-harvest)	22,155 to 33,469

IV. Wild Winter Steelhead Impacts

The public has proposed a 1 wild fish per day, 5 wild fish per year bag limit for the mainstem Umpqua River and Bay (091P.) This proposal is similar to the current regulation on the North Umpqua. This regulation would allow the angler to retain up to two hatchery fish a day, or 1 wild fish and 1 hatchery fish combined. The angling review board passed the public recommendation for commission review at the August and September Commission meetings. This section of the Biological Assessment is written to evaluate the stock status and affects of the proposed harvest.

The punch card data collected for the Umpqua River is listed in Figure 15. This data includes both hatchery and wild fish harvested. The harvest of winter steelhead on the North Umpqua has ranged from a low of 853 fish in 1991-92 (and 1993-94) to a high of 1,749 fish in 1987-88, with an average catch of 1,147 fish. The harvest of the winter steelhead on the South Umpqua River has ranged from a low of 179 fish in 1997-98 to a high of 1,360 fish in 1986-87, with an average of 656 fish. The harvest of winter steelhead on the mainstem Umpqua River has ranged from a low of 410 fish in 1998-99 to a high of 3,567 fish in 1986-87, with an average of 1,080 fish.

Figure 15. Winter Steelhead punch card data on the Umpqua River for the years 1985 to 2002.



In 1997 the North Umpqua regulations were modified to allow 1 wild winter steelhead to be retained per day, and only 5 wild fish to be tagged on the North Umpqua in a given year. In 1999, catch and release for wild winter steelhead was implemented in the South Umpqua, Umpqua River and Bay, and the Smith River. Tributaries to the South Umpqua, North Umpqua, Umpqua River, and Smith River were closed to all salmon and steelhead fishing (Cow Creek remains open).

Wild fish harvest estimates for the Umpqua Basin are shown in Table 5. Winchester Dam counts have shown that an average of 88% of the winter steelhead counted is wild. We assumed that catch rates are similar for wild and hatchery, and therefore estimated wild catch rates on the North Umpqua from the punch card data by removing the hatchery catch of 12%. These calculations are probably high due to the fact that anglers usually retain all hatchery fish while voluntarily releasing wild fish; and that hatchery fish hold in the North Umpqua near the popular Rock Creek Hatchery hole and thus are more vulnerable to higher harvest rates.

Table 5. Numbers of wild winter steelhead harvest in the Umpqua Basin.

Year	North Umpqua	South Umpqua	Umpqua River and Bay	Total
1985-86	1,025	545	2,298	3868
1986-87	1,130	782	2,889	4801
1987-88	1,539	776	2,880	5195
1988-89	1,246	467	1,865	3578
1989-90	1,414	380	2,417	4211
1990-91	758	247	1,621	2626
1991-92	751	653	2,817	4221
1992-93	758	473	2,193	3424
1993-94	751	295	2,553	3599
1994-95	869	244	3,024	4137
1995-96	1,045	338	1,647	3030
1996-97	998	191	2,066	3255
1997-98	773	103	1,459	2335
1998-99	962	closed	closed	962
1999-00	882	closed	closed	882
2000-01	1,248	closed	closed	1248
2001-02	N/A	closed	closed	N/A
2002-03	N/A	closed	closed	N/A
2003-04	N/A	closed	closed	N/A

ODFW performed a creel survey on the South Umpqua in 2003-2004, and determined the wild catch on the South Umpqua is 57.5%. We assume again that wild and hatchery harvest are caught equal and removed 42.5% of the hatchery catch from the punch card data on the South Umpqua. The acclimation site for hatchery fish is located on Canyon Creek near the city of Canyonville. Again, most hatchery fish hold near the mouth of Canyon Creek and are more susceptible to higher harvest than wild fish.

ODFW performed a creel survey on the mainstem Umpqua River in 2004. The creel showed that 19% of the catch was hatchery fish, and thus we applied this catch rate from the punch card data to determine the number of wild fish caught.

Population estimates for the Umpqua Basin were previously described in section III of this report. A combination of telemetry distribution data and the North Umpqua Dam counts were utilized to determine the abundance of wild winter steelhead in the South Umpqua and mainstem Umpqua River. These estimates were back-calculated and are shown in Table 6.

Table 6. Wild fish estimates for the Umpqua Basin from 1986- 2002.

Year	North Umpqua	South Umpqua	Umpqua, Bay, and Tributaries	Umpqua Basin
1985-86	10,530	9,653	23,693	43,875
1986-87	8,153	7,474	18,344	33,971
1987-88	9,775	8,960	21,994	40,729
1988-89	7,187	6,588	16,171	29,946
1989-90	8,537	7,826	19,208	35,571
1990-91	3,928	3,601	8,838	16,367
1991-92	5,263	4,824	11,842	21,929
1992-93	3,994	3,661	8,987	16,642
1993-94	3,886	3,562	8,744	16,192
1994-95	5,188	4,756	11,673	21,617
1995-96	4,498	4,123	10,121	18,742
1996-97	5,232	4,796	11,772	21,800
1997-98	4,375	4,010	9,844	18,229
1998-99	5,432	4,979	12,222	22,633
1999-00	5,536	5,075	12,456	23,067
2000-01	8,216	7,531	18,486	34,233
2001-02	9,829	9,010	22,115	40,954
2002-03	8,475	7,769	19,069	35,313
2003-04	12,673	11,617	28,514	52,804
Average	**6,677**	**6,120**	**15,022**	**27,819**

Exploitation rates for wild fish harvest per basin are shown in Table 7. The exploitation of wild winter steelhead on the North Umpqua has ranged from a low of 14.97% in 1985-86 to a high of 35.08% in 1993-94, with a average exploitation of 26.74%. The exploitation rate of the winter steelhead on the South Umpqua River has ranged from a low of 8.73% in 1997-98 to a high of 20.64 %in 1991-92, with an average of 13.97%. The exploitation of winter steelhead on the mainstem Umpqua River has ranged from a low of 5.24% in 1985-86 to a high of 15.77% in 1993-94, with an average of 9.68%. The overall exploitation rate for the Umpqua River (excluding the Smith River) has ranged from a low of 8.82% in 1985-86 to the high of 22.23% in 1993-94 with an overall average exploitation of 15.43%.

Table 7. Exploitation rates for wild winter steelhead for Umpqua Basin (not including hooking mortalities for released fish.)

Year	North Umpqua	South Umpqua	Umpqua River	Umpqua Basin
1985-86	14.97%	9.23%	5.24%	8.82%
1986-87	22.36%	15.83%	8.51%	14.13%
1987-88	22.82%	14.14%	7.07%	12.76%
1988-89	23.57%	12.75%	6.23%	11.95%
1989-90	23.36%	10.46%	6.80%	11.84%
1990-91	29.19%	13.86%	9.90%	16.04%
1991-92	27.11%	20.05%	12.85%	19.25%
1992-93	32.15%	20.64%	13.18%	20.58%
1993-94	35.08%	16.70%	15.77%	22.23%
1994-95	30.75%	12.51%	13.99%	19.14%
1995-96	32.01%	15.88%	8.79%	16.16%
1996-97	28.55%	10.84%	9.48%	14.93%
1997-98	25.66%	8.73%	8.00%	12.81%
1998-99	17.71%	0.00%	0.00%	4.25%
1999-00	15.93%	0.00%	0.00%	3.82%
2000-01	15.19%	0.00%	0.00%	3.65%
2001-02	N/A	0.00%	0.00%	N/A
2002-03	N/A	0.00%	0.00%	N/A
2003-04	N/A	0.00%	0.00%	N/A

Presently, the highest exploitation rates for the wild winter steelhead occur on the North Umpqua River. The proposed fishery on the lower Umpqua River mainstem will not affect the Smith River, but exploitation rates will significantly increase on the North and South Umpqua. The average exploitation rate for the North Umpqua with a wild fishery in both the mainstem Umpqua River and the North Umpqua is estimated to average 26.74%. The present average harvest on the North Umpqua for the years 1998-99 to 2000-01 is 16.27%. Therefore, the expected increase from the proposed regulation is estimated to increase the exploitation of the North Umpqua wild winter steelhead an additional 10%.

V. Productivity, Habitat Capacity, and Conservation Status

The possible impact of fisheries on the conservation of a fish population, under different regulation schemes, can be assessed in a variety of ways. However, for the purposes this assessment of Umpqua steelhead, two of the most commonly considered population factors were used: habitat capacity and intrinsic productivity. The concept of habitat capacity is the more intuitive of the two. The more habitats a population has available for its use, the larger will be the population in terms of the number of returning adults. Because a large population has a better cushion against fluctuations in environmental conditions and local habitat disturbances, it less likely to be at risk. In contrast, a small population, in a more restricted habitat, is more likely to be vulnerable to extinction. The second important factor considered in this assessment was productivity. Productivity in this case refers to the number of adult offspring (recruits) that are produced from a given number of parents (spawners). Essentially, this is ratio of how many recruits will be produced for each spawner "invested" in natural production. Such estimates can be obtained from simple counts of fish returning to a basin, matching up a parental count with an offspring count that returns in some later time period. This is a relatively simple exercise for a species like coho because of their relatively simple life history. Coho that spawned in 1997, for example, are the parents of the offspring that returned in 2000 (ignoring the jacks in this case). For steelhead, with many more age classes that overlap, the problem is more complex, but still resolvable if the ages of returning fish are accounted for and associated with the proper parental year.

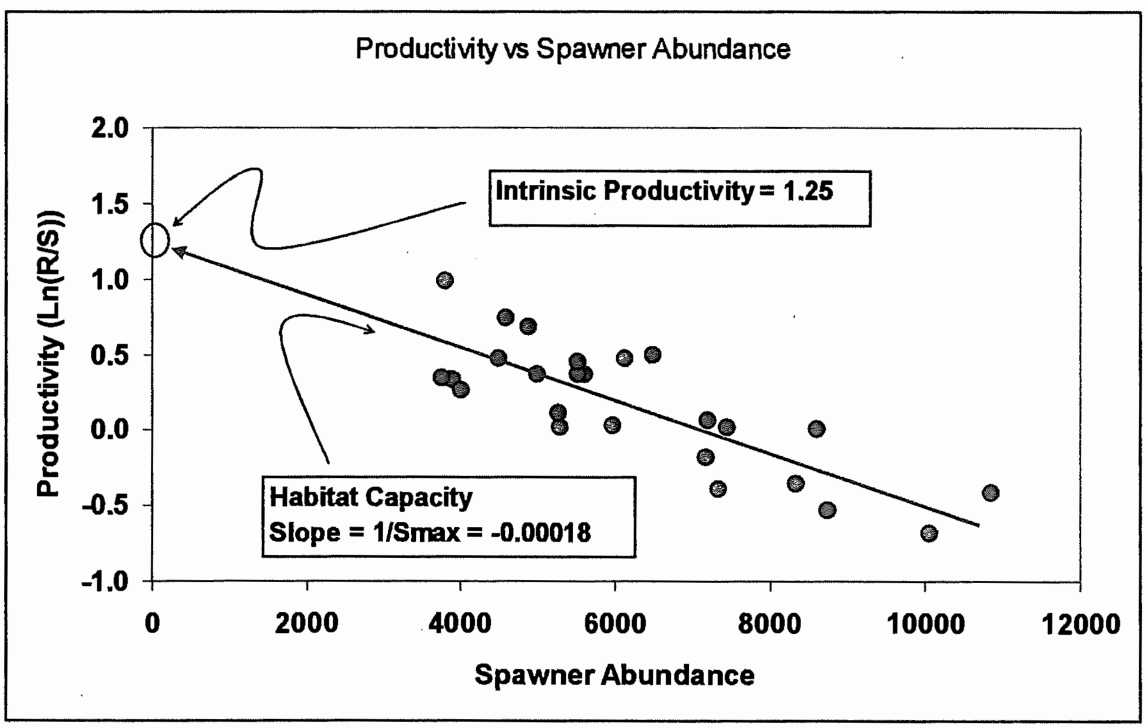
In this assessment 'intrinsic productivity' rather than simply 'productivity' was used. The distinction is that intrinsic productivity is meant to be specific to the recruits per spawner when the density of spawners if very low. When spawner density is low, the eggs hatch and fry enter an environment with very few competitors for the available habitat. Therefore, a maximum number of smolts per female are produced because the juveniles do not have to compete with each other for habitat. When this is played through an entire life cycle it translates into a high value for the ratio of adult recruits per spawner. In contrast, as the density of spawners increase, the habitat for juvenile fish becomes more and more crowded and fewer of the fry that emerge survive to become smolts. This causes the calculation of recruits per spawner to decline.

The use of intrinsic productivity in this analysis has two advantages. First, it standardizes the recruits per spawner calculation (productivity) to a common reference point (low density). More importantly, it provides a good indication of how fast a population is likely to rebound when it is reduced to a low abundance by adverse fluctuations in the environment. A population with a high intrinsic productivity will be resilient and rapidly rebuild in a generation or two upon reversal of poor environmental conditions or cycles. However, a population with low intrinsic productivity when reduced to low abundance will be slow to respond even after environmental conditions become more favorable. A population that responds slowly not only is at risk during this longer rebuilding period, but it is also possible that it will not have fully recovered by the time the next poor survival cycle strikes. It is notable that in assessments of other salmonid populations as well as other species, intrinsic productivity is probably the most frequent factor affecting conservation status.

The assessment described here focuses on the winter steelhead population in the North Umpqua based upon counts of fish at Winchester dam from 1974 to 2003. A summary of how these data were used to perform an evaluation of the impact of mortality from fisheries follows.

A model was constructed for how a population responds to an environmental stress (in this case mortality from fishing) under a variety of assumptions concerning habitat capacity and intrinsic productivity. As stated earlier, intrinsic productivity is the number of recruits per spawner that would be expected when the spawner density is very low. The 'engine' of this model was a program routine to simulate the production of recruits from different levels of spawner abundance. For this purpose a Ricker recruitment function was used. The Ricker recruitment function is basically an equation that uses estimates for habitat capacity and intrinsic productivity to predict the number of recruits produced from different levels of spawners. As a baseline the habitat capacity and intrinsic productivity were estimated for the North Umpqua winter steelhead population from available spawner and recruit data. As illustrated in Figure 16, intrinsic productivity was estimated as the y-intercept in the regression of natural log of recruits per spawner (Ln(R/S)) on spawner abundance (S). Habitat capacity, the other parameter

Figure 16. Plot of natural log of recruits per spawner versus spawner abundance for brood years 1974 to 1998 for North Umpqua winter steelhead.

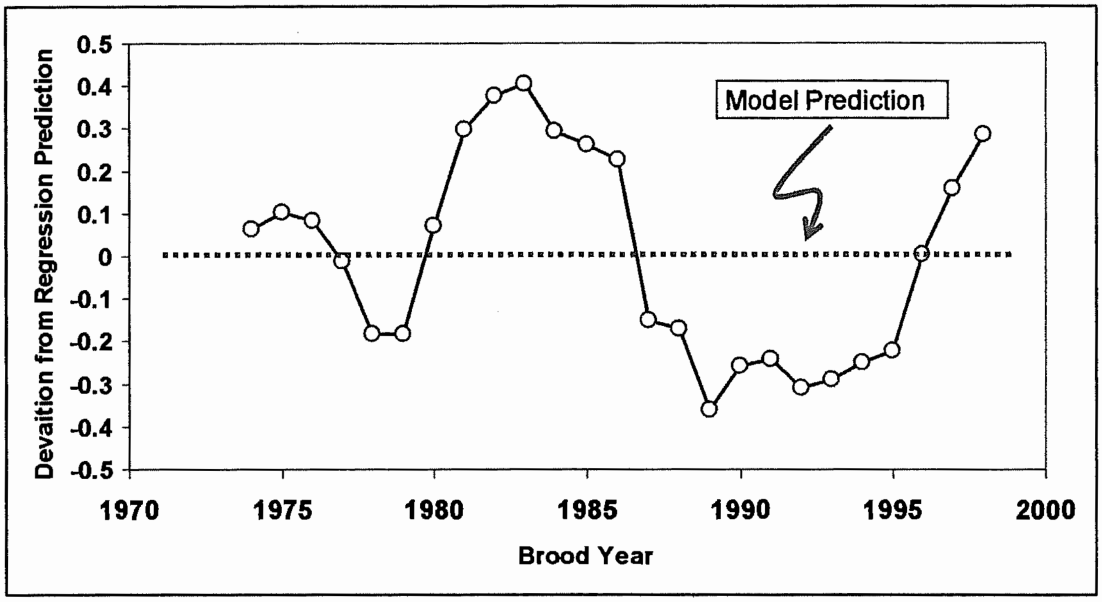


in the Ricker equation is estimated from the slope of the regression line, which in Figure 16 is -0.000175 (rounded off in the graph to -0.00018). The way the math works out, the inverse of this slope, 1/(0.000175) = 5,757, is the number of spawners needed to produce the maximum number of smolts from the currently existing habitat. This value is often referred to as Smax. Finally as an aside, note that in Figure 16 the relationship between increasing spawner abundance and decreasing productivity is clearly demonstrated. This confirms the hypothesis that as the density of spawners and therefore emergent fry becomes greater, the chances of these fry surviving to become smolts declines. This declining relationship carries forward to when the offspring return as adults. Therefore, this is a case where empirical evidence agrees with theory.

Population viability models, like the one constructed to perform this analysis, produce results in terms of the probability a population will be remain above some critical abundance threshold over a period of time into the future. Frequently, a test period of 100 years is used. This is accomplished through a computer program that simulates the natural production of a steelhead population through a period of 100-years, approximately 20 generations. In the case of this simulation, each model run was started with population abundance equal to the assumed habitat capacity of the basin. Because there is considerable variation in how the recruitment process works from year to year, the program was build to accommodate this important characteristic. It should be noted that if all of the points in Figure 16, fell exactly on the regression line this step would not be necessary. However, clearly the points for the regression vary about the regression line in a manner that needs to be considered. The way this variation is incorporated into the computer program means that the results from any single 100-year model simulation will very likely be different from the next 100-year model simulation. This is because the values for the Ricker recruitment equation are drawn at random from the distribution of points about the regression line in Figure 16 and not drawn directly from the regression line its self. Therefore, for each test of viability, the computer program is run for 250, 100-year simulations. The number of these simulations where population abundance is found to fall below the abundance threshold is then divided by the total number of simulations (250) to yield a probability of threshold failure. So for example, if the population abundance for 25 of the 250 simulations run fell below the threshold, the probability of failure would be 25/250 = 0.10.

The other key consideration that was included in the viability model was the influence of ocean survival cycles. Good ocean conditions will produce higher than average recruits per spawner, whereas under bad ocean conditions recruits per spawner will be lower. Although this variation is contained in the scatter of points illustrated in Figure 16, what is not illustrated in this figure is the fact that good and poor ocean years do not truly occur at random. They tend to run in strings of good years and strings of bad years. Since a string of bad years represents the situation most likely to drive population abundance below the critical threshold, it was critical the model was constructed in such a way as to capture the reality of this situation. This was accomplished by using the deviations from the regression in Figure 16, but structuring them over a temporal sequence as illustrated in Figure 17.

Figure 17. Observed deviation from relationship between Ln(Recruits/Spawners) and Spawners predicted from regression line equation fit to data for North Umpqua Winter Steelhead, 1974 to 1998 brood years.



The pattern of deviations in Figure 17 (regression residuals) was incorporated in the model to represent the temporal sequence of cyclic ocean conditions. Since this pattern is only for a 25-year time sequence, it was simply repeated 4 times to obtain the necessary sequence for each 100 year model run. Obviously, this is an overly simplistic approach to the problem of ocean cycles. The actual cycle of good and bad years during the next 100-year time period will be not be a simple repeat of the pattern in Figure 17. However, other methods for generating future ocean cycles also have the same problem and the clear advantage of using the approach described here is that it was based on actual observations rather than a mathematical formula. In summary, each time the recruitment from a given spawner number was calculated in the model simulations, the value for recruits per spawner was randomly drawn from a distribution of points about a mean value, adjusted by the deviation value corresponding with which year in simulation the brood year occurred.

The results of the viability analysis are dependent on the accuracy of the estimates of both productivity and habitat capacity for North Umpqua winter steelhead. To assess the significance of errors in measuring either of these two parameters, the viability model was run under a wide range of different combinations of both intrinsic productivity and habitat capacity. A matrix of 40 possible values for habitat capacity ranging from 57,000 to 100 and 30 possible values for intrinsic productivity ranging from 0.14 to 3.00 was tested. In other words, a model run was made for each combination of a 40 by 30 matrix of values for habitat and intrinsic productivity. For each cell of this matrix (there were 1200 cells) the probability that the population would fall below the critical abundance threshold was estimated based upon 250 iterations of a 100-year simulation for each combination. Therefore, the result was a 40 by 30 table with 1200 entries for the probability of the population falling below the critical abundance level.

The critical abundance level used in these model runs was selected to represent the lower boundary of a healthy population. The NFCP interim criterion for abundance was selected for this purpose which is "25% of the 30-year average". For North Umpqua wild winter steelhead this value is 1,664. It is important to note is that with a value this high the viability model is not testing the question of extinction risk or listing potential. To do this a lower abundance would be used as the test threshold perhaps in the range of 50 to 500. Finally, it should be noted that rather than a one year occurrence below this threshold level, population failure was defined as when any 6-year average in the 100-year sequence of spawner abundance fell below the test threshold (1,664).

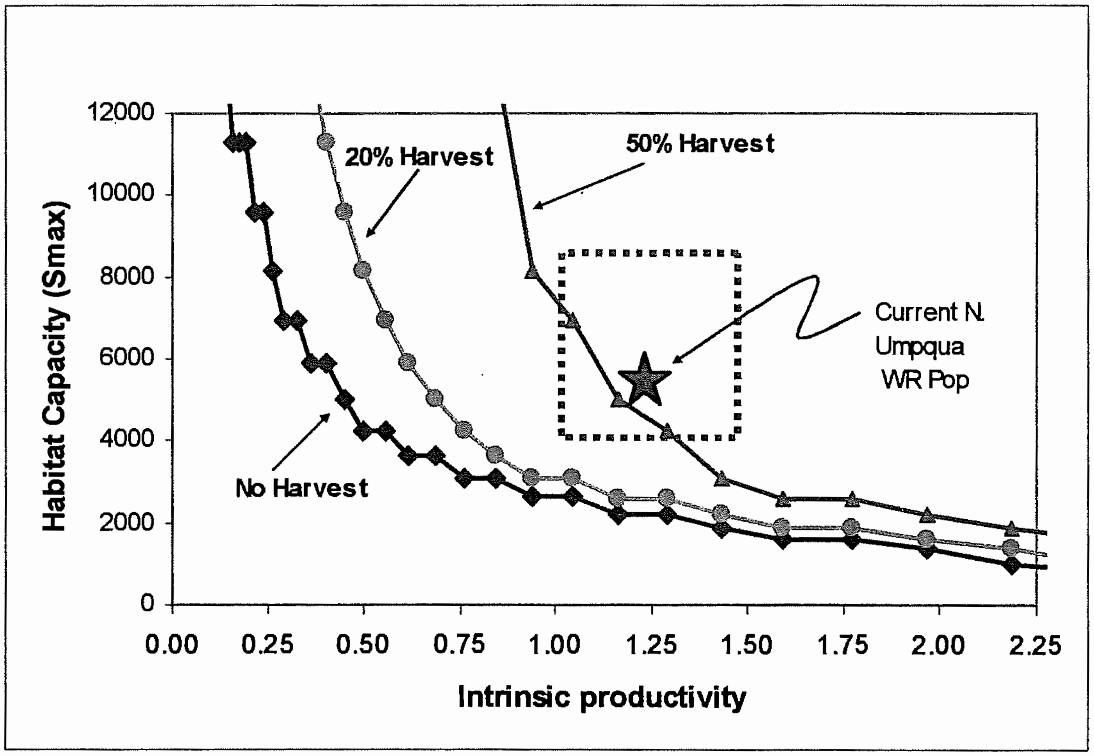
To test the impact of different fishing mortality rates each 40 by 30 matrix of possible values for habitat capacity and intrinsic productivity was run under 7 different assumptions concerning harvest rate. These harvest rates were 0%, 5%, 10%, 15%, 20%, 30%, and 50%. Therefore, when the modeling was complete, the result consisted of 7 tables, each tested at different harvest impact rate and each containing 1200 cells representing the probability of population abundance failure under different combinations of habitat capacity and intrinsic productivity.

To simplify the description of the results, these tables were graphically summarized in the following manner. First, to reduce illustration clutter, only the results for the 0%, 20%, and 50% harvest rates were presented. Second, rather than present the entire matrix, only those cells where the probability of population abundance failure was equal to 5% were presented. This second step essentially took the 5% 'contour' out of each of the three tables and placed it on a graph as a curved line corresponding to a harvest rate of 0%, 20%, or 50% (Figure 18). So for example, looking at the line for "No Harvest" in Figure 18, any combination of intrinsic productivity and habitat capacity that is below this blue line means that probability of a 6-year average abundance during a 100-year future time period being less than the critical level (1,664) is more than 5%. Conversely any combination of productivity and capacity that falls above the line means that the probability of abundance failure is less than 5%. From a management and conservation perspective the latter zone (above the line) is preferable to the former (below the line). The use of 5% probability for these curves is somewhat arbitrary, other probabilities could have used as well (e.g., 2% or 20%). However, the 5% in 100 years has almost become the accepted standard for PVA analyses and conservation risk assessments, so it has been used here.

Figure 18 displays the results for model output from 3 different assumed harvest rates, as represented by the 3 curves. As might be expected, the higher the harvest rate, the higher must be habitat capacity and intrinsic productivity if the population is to stay out of the abundance failure zone. Also, notice that as intrinsic productivity goes up the lines tend to converge.

The blue star in Figure 18 represents the location on the graph for the actual values estimated for habitat capacity (5,757) and intrinsic productivity (1.25) for the North Umpqua winter steelhead population. Recall these specific values were estimated from fitting observed spawner and recruit data to a Ricker recruitment model (see also Figure 16). Of importance, is that the North Umpqua population, represented by the blue star, is above the conservation curve for even the highest tested harvest rate, 50%. Since the proposed regulation change will not yield impact rates at this level, the analysis suggests that the proposed regulation change will not cause the population to become unhealthy.

Figure 18. Results of viability analyses on North Umpqua winter steelhead with curves showing those combinations of habitat capacity and intrinsic productivity that yield a 5% probability of abundance failure (see text) in a 100-year forecast period under 3 different scenarios of mortality rates imposed by fisheries



However, this analysis and conclusion are contingent on having complete faith in the estimates of both intrinsic productivity and habitat capacity for the current population. In reality, both of these metrics are difficult to accurately estimate using real, field collected data. Therefore, considerable uncertainty exists as to their accuracy. The potential for estimation error exists. Therefore, the evaluation needs to weigh this error potential in drawing any final conclusions as to the impact of the proposed harvest rates.

An attempt was made to incorporate the parameter estimation error problem in the analysis. This is best described in the following discussion related to the "error box" drawn Figure 18 around the point estimate for the population (blue star). This box very roughly represents the space defined by the 95% confidence intervals for both parameters (intrinsic productivity and habitat capacity). Notice that the lower right-hand portion of this box takes in values that are below the 50% harvest conservation line. Since this is the zone managers would be trying to avoid, implementing fishery regulations that resulted in a 50% mortality rate would be unadvisable. However, notice that for a lesser rate (i.e., 20% harvest rate) the entire box is above the conservation line.

These results and analyses support the proposition that the North Umpqua winter steelhead population could sustain at least a 20% mortality rate (and perhaps even a 30% rate) without suffering any long-term adverse consequences.

VI. Reproductive Independence

HISTORY

History of STW Hatchery Releases in the Umpqua Basin

Stocking of hatchery winter steelhead juveniles first began in the Umpqua Basin in 1947 (Figure 19). Rock Creek Hatchery was built in 1955 with the first releases of winter steelhead into the Umpqua Basin in 1957. The Broodstock used for propagation purposes of the Umpqua Basin Program have come from a variety of sources. Willamette, Rogue and Alsea Rivers as well as in-basin stocks have been used over time to supplement the wild winter steelhead run. The Willamette and Rogue stock were used on few occasions, but the Alsea stock was used heavily from 1971-1993 (Figure 20.) Hatchery winter steelhead have been released as fry, yearlings and smolts in all 4 of the basins within the Umpqua (N.Umpqua, S.Umpqua, Smith River, mainstem Umpqua).

Figure 19. Umpqua River Basin and major tributaries

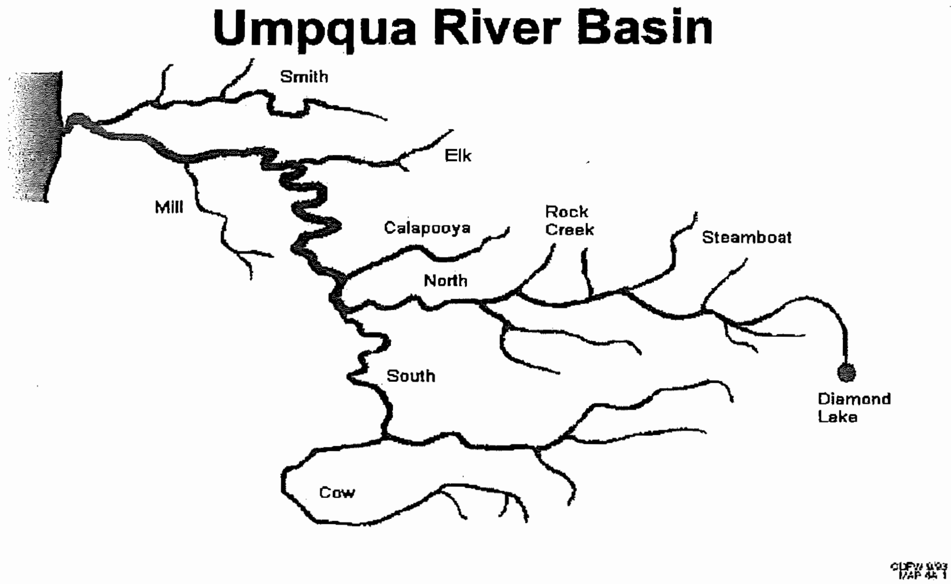
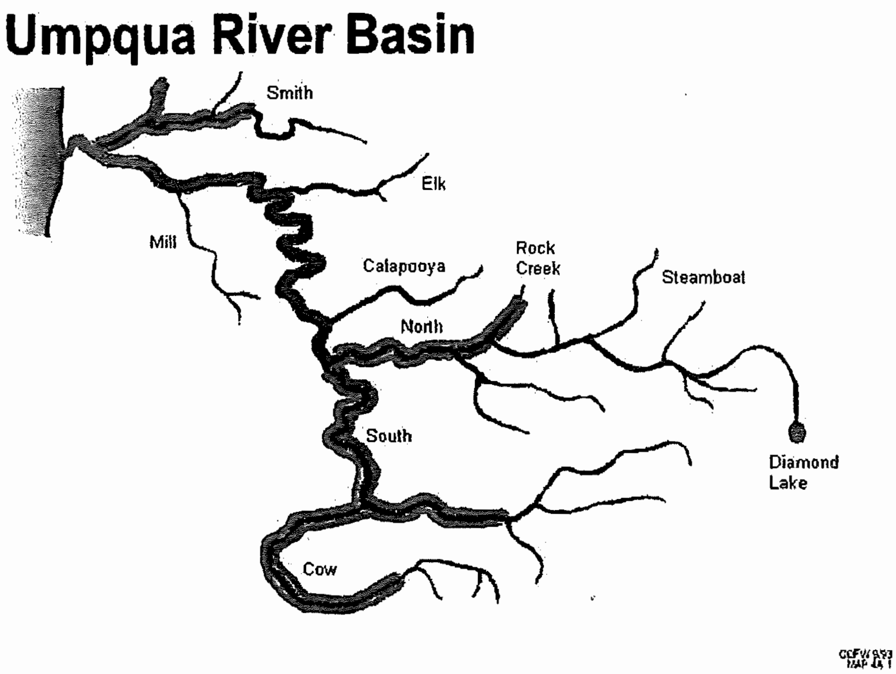


Figure 20. 1973 Hatchery Program Alsea Stock



Smith River Basin

The Smith River basin received the first winter steelhead stocking in the Umpqua Basin in 1947. From 1969-1996 approximately 20,000-80,000 smolts were released each year (Table 8.) All parent stock used were from the Alsea River. This stock was chosen due to the proximity of the rivers and similarities in run timing. Stocking of hatchery winter steelhead was terminated in 1997 due to concerns from stray rates into other coastal river basins and budget reductions in hatchery programs. Currently the entire Smith River basin is considered a wild fish sanctuary.

Table 8: Umpqua District Winter Steelhead Releases for the Smith River Basin (1996-1969)

Species	Year	Smolt Release	Fry Release	Stock Origin
STW	1996	20,000	--	Alsea
STW	1995	35,000	--	Alsea
STW	1994	65,000	--	Alsea
STW	1993	65,000	--	Alsea
STW	1992	--	43,474	Alsea
STW	1991	64,113	12,693	Alsea
STW	1990	89,914	65,317	Alsea
STW	1989	65,004	58,881	Alsea
STW	1988	64,790	53,734	Alsea
STW	1987	64,901	45,459	Alsea
STW	1986	70,893	60,000	Alsea
STW	1985	44,296	95,000	Alsea
STW	1984	67,037	68,000	Alsea
STW	1983	67,975	136,000	Alsea
STW	1982	70,013	--	Alsea
STW	1981	67,046	--	Alsea
STW	1980	79,898	--	Alsea
STW	1979	69,687	--	Alsea
STW	1978	65,204	--	Alsea
STW	1977	59,195	--	Alsea
STW	1976	69,950	--	Alsea
STW	1975	40,498	--	Alsea
STW	1974	35,000	--	Alsea
STW	1973	34,675	--	Alsea
STW	1972	47,900	--	Alsea
STW	1971	34,320	--	Alsea
STW	1970	55,000	--	Alsea
STW	1969	35,000	--	Alsea

South Umpqua River basin

The South Umpqua River basin received its first hatchery winter steelhead stocking in 1961. From 1971-1983 approximately 35,000-90,000 smolts were released each year from varying parental stocks (Table 9.) In 1978 Rogue River stock were released and in 1985 Willamette River stock were released. From 1984-1993 approximately 46,000-135,000 smolt releases primarily from South Umpqua and Alsea River stocks occurred within the basin. In 1994, management changes occurred due to concerns from stray rates into the North Umpqua River basin and use of out-of-basin stocks. Since 1994 all smolt releases have been from South Umpqua broodstock. An acclimation site on Canyon Creek, a tributary to the lower South Umpqua, was established in 1999. Currently the entire the upper South Umpqua River and Cow Creek sub-basins are considered wild fish sanctuaries.

Table 9. Umpqua District Winter Steelhead Releases for the South Umpqua Basin (2004-1961)

Species	Year	Smolt Release	Pre-smolt Release	Fry Release	Stock Origin
STW	2004	92,210	--	--	S. Umpqua
STW	2003	78,217	--	--	S. Umpqua
STW	2002	90,288	--	--	S. Umpqua
STW	2001	61,474	--	--	S. Umpqua
STW	2000	107,997	--	--	S. Umpqua
STW	1999	54,672	--	--	S. Umpqua
STW	1998	51,000	--	--	S. Umpqua
STW	1997	88,000	--	--	S. Umpqua
STW	1996	76,000	--	--	S. Umpqua
STW	1995	72,000	--	--	S. Umpqua
STW	1994	82,000	--	--	S. Umpqua
STW	1993	83,000 18,000	--	--	S. Umpqua Alsea
STW	1992	20,258 51,107	24,776 38,700	--	
STW	1991	108,453	--	71,134	Alsea
STW	1990	46,073	--	249,080	Alsea Umpqua
STW	1989	49,701 5,724	--	225,980	Alsea S.Umpqua
STW	1988	63,802	--	219,483 54,296	Alsea S.Umpqua
STW	1987	64,335	--	193,552	Alsea
STW	1986	99,598	--	81,000	Alsea
STW	1985	52,727	--	58,000	Alsea Willamette
STW	1984	66,339	18,000	49,000	Alsea
STW	1983	72,966	10,125	--	Umpqua N.Umpqua
STW	1982	50,924	9,964	--	N.Umpqua
STW	1981	41,107	--	--	N.Umpqua
STW	1980	54,997	--	--	Alsea
STW	1979	37,186	--	--	Alsea
STW	1978	35,023	--	--	Rogue
STW	1977	50,840	--	--	Alsea
STW	1976	35,150	--	--	Umpqua
STW	1975	34,686	--	--	Umpqua
STW	1974	34,700	--	--	Alsea
STW	1973	34,675	--	--	Alsea
STW	1971	89,397	--	--	Alsea

North Umpqua River Basin

Anecdotal information suggests the North Umpqua River was stocked prior to 1946, but numbers and stock origin have not been identified. The first recorded winter steelhead stocking of the basin was not until 1961. From 1961-1969 releases were from either mainstem Umpqua or North Umpqua stock (Table 10.) Releases varied in size from 22,000-135,000 smolts per year. There were no stockings of winter steelhead in the North Umpqua from 1970-1980. Stocking resumed in 1981 with parent stock out of the mainstem and North Umpqua except for 1984 when 45,000 Alsea River fry were released. Releases per year during this time varied from 10,000-170,000. The entire North Umpqua River and its tributaries are currently considered wild fish sanctuaries.

Table 10. Umpqua District Winter Steelhead Releases for the North Umpqua Basin (2002-1961)

Species	Year	Smolt Release	Pre-smolt Release	Fry Release	Stock Origin
STW	1992	--	--	16,556	N.Umpqua
STW	1991	--	--	71,667	N.Umpqua
STW	1990	--	--	9,882	Umpqua
STW	1989	--	--	72,163	N.Umpqua
STW	1988	--	--	64,303	N.Umpqua
STW	1987	--	--	168,440	N.Umpqua
STW	1986	--	--	100,000	Umpqua
STW	1985	--	--	157,000	N.Umpqua
STW	1984	--	--	21,000 45,000	N.Umpqua Alsea
STW	1983	--	--	16,000	N.Umpqua
STW	1981	--	22,550	--	Umpqua
STW	1969	36,800	838	--	N.Umpqua
STW	1966	36,700	15,100	--	Umpqua
STW	1965	44,800	20,500	--	Umpqua
STW	1964	13,000	8,700	--	Umpqua
STW	1963	25,310	40,090	--	N.Umpqua
STW	1962	73,095	49,100	3,468	Umpqua
STW	1961	10,789	--		N.Umpqua

Mainstem Umpqua River Basin

Releases of hatchery winter steelhead in the mainstem Umpqua River have been limited with only one year of recorded smolt release (1978) and only three years of recorded pre-smolt releases (1962, 1981, and 1990) (Table 11.) While the releases in 1962 and 1981 were of Umpqua stock, the release in 1978 was from the Rogue River. Fry releases from 1984 through 1990 and the pre-smolt release in 1990 were all of Alsea River stock. There has been no stocking of winter steelhead in the mainstem Umpqua River since 1990.

Table 11. Umpqua District Winter Steelhead Releases for the Mainstem Umpqua River Basin (1990-1962)

Species	Year	Smolt Release	Pre-smolt release	Fry Release	Stock Origin
STW	1990	--	10,052	165,088	Alsea
STW	1989	--	--	165,351	Alsea
STW	1988	--	--	109,531	Alsea
STW	1987	--	--	190,132	Alsea
STW	1986	--	--	90,000	Alsea
STW	1985	--	--	80,000	Alsea
STW	1984	--	--	67,000	Alsea
STW	1981	--	14,280	--	Umpqua
STW	1978	15,000	--	--	Rogue
STW	1962	--	25,325	40,123 (1)	Umpqua

STRAY RATES

Present Hatchery Program

Rock Creek Hatchery is located at Rock Creek, a tributary of the North Umpqua. The hatchery is approximately half a mile upstream of the confluence of the North Umpqua River (RM 35.5) and Rock Creek.

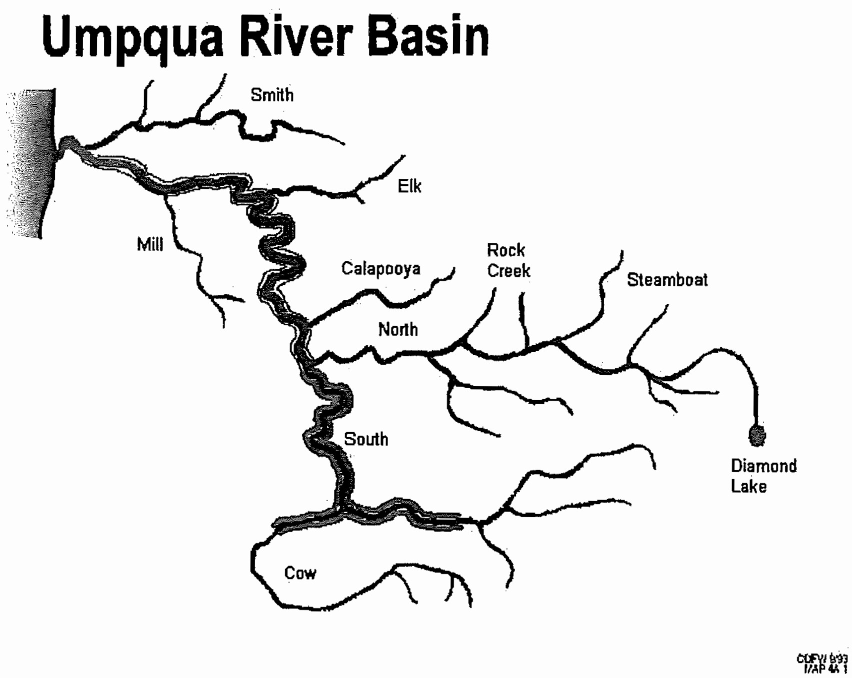
Before migrating to the ocean, juvenile steelhead imprint odors associated with their natal surroundings which guide their spawning migrations as adults. Thus, homing behavior of hatchery steelhead can be improved by acclimating fish for three weeks prior to release into the basin. Returning hatchery steelhead then return to the general area surrounding the acclimation site in which in turn is managed as intensive fisheries for the recreational sportsmen.

Rock Creek hatchery rears the juvenile hatchery winter steelhead in freshwater from Rock Creek. Hatchery winter steelhead are not released at Rock Creek (they are released in Canyon Creek), but this area of the stream becomes a zone of hatchery influence as the strong homing desire of winter steelhead override the imprinting of an acclimation release strategy and return back to Rock Creek. The Department is reviewing the rearing programs of Coho salmon at Butte Falls Hatchery and the winter steelhead at Rock Creek

Hatchery and the possible antidote for this misguidance. Coho salmon are presently released at Rock Creek Hatchery thus no increases in stray rates of returning Coho to other adjacent sub-basins would be expected. However, monitoring of Umpqua stock fish into the Rogue Basin would need to be watch closely with the winter steelhead rearing program switched to Butte Falls.

Currently, winter steelhead hatchery releases in the Umpqua Basin occur only in Canyon Creek, a tributary to the lower South Umpqua (Figure 21). The goal for the program is 120,000 smolts per year. In 1998, an acclimation facility was built at Canyon Creek. This facility was built to allow winter steelhead smolts to "better imprint" on Canyon Creek and the lower South Umpqua. Winter steelhead smolts were also acclimated at the base of Galesville Dam in the upper Cow Creek drainage up until 2002. In 2003, a second acclimation facility was completed on Canyon Creek. Since 2003 all smolts are acclimated and released into Canyon Creek. The current hatchery stock is derived from localized wild stock on the South Umpqua through collection of broodstock from angler donations (STEP) and the South Umpqua Falls Fish Trap.

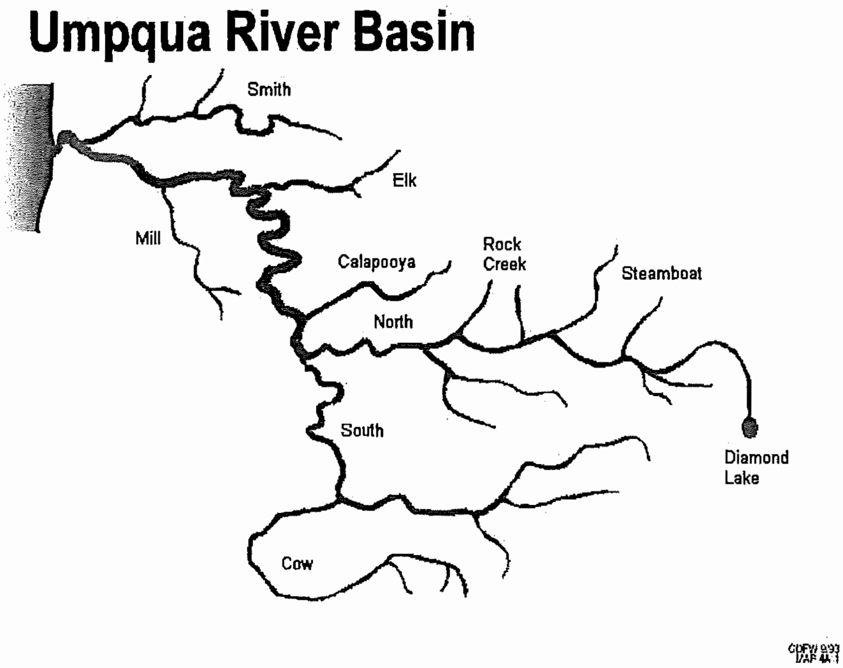
Figure 21. Current Area of Hatchery influence, South Umpqua Basin



Umpqua Basin Sanctuaries

A large portion of the Umpqua River Basin is considered a wild fish sanctuary for winter steelhead (Figure 22). These areas do not receive juvenile hatchery winter steelhead stocking and are managed for adult hatchery return rates below 10%.

Figure 22. Wild Fish Sanctuaries in the Umpqua Basin



For the last ten years hatchery returns to the North Umpqua basin have ranged from 1.4%-25% with an average of 12.3%, based on actual returns from the Winchester Dam (RM 7) counting station (Table 12).

Table 12. Winter Steelhead counts at Winchester Dam on the North Umpqua from1994-2004.

Year	Wild Return	Hatchery Return	Total Return	Percent Hatchery Fish
03-04	12,888	1,619	14,507	11.16%
02-03	8,475	800	9,275	8.63%
01-02	9,829	1,257	9,829	11.34%
00-01	8,216	1,320	9,536	13.84%
99-00	5,183	1,766	6,949	25.41%
98-99	5,175	1,161	6,336	18.32%
97-98	3,818	838	4,656	18.0%
96-97	5,176	599	5,775	10.37%
96-95	4,827	68	4,895	1.39%
95-94	5,469	250	5,719	4.37%
Total	6,906	968	7,748	12.28%

Again the 12.3% average hatchery fish count expressed at Winchester Dam shows the strong homing desire from juvenile hatchery winter steelhead reared at Rock Creek Hatchery but released at Canyon Creek on the South Umpqua. Limited telemetry studies indicate a majority of steelhead spawning occurs within Rock Creek and the North Umpqua River below RM 36.5. This is considered the zone of hatchery influence.

The South Umpqua Falls trap (RM 96) is operated for broodstock collection in March-May. The trap is located near the town of Tiller just above the USFS boundary on the South Umpqua. Table 13 shows the trapping results at South Umpqua Falls from 1997-98 to 2003-04. The hatchery stray rate has ranged from a high in 2003-04 of 1.8% and averaged 1.5% over the last 7 years of sampling.

Table 13. South Umpqua Falls

Brood Year	**Dates Operated**	**Wild Return**	**Hatchery Return**	**Total Return**	**Percent Hatchery Fish**
03-04	**3/25-5/18**	**336**	**6**	**342**	**1.8%**
02-03	**3/17-5/19**	**244**	**4**	**248**	**1.6%**
01-02	**3/1-5/15**	**640**	**6**	**646**	**.9%**
00-01	**3/12-5/14**	**36**	**0**	**36**	**0%**
99-00	**3/14-5/15**	**288**	**2**	**290**	**0.7%**
98-99	**3/11-5/13**	**331**	**8**	**339**	**2.4%**
97-98	**2/19-5/12**	**25**	**0**	**25**	**0%**
Total		**271**	**4**	**275**	**1.5%**

The Smith River enters the Umpqua River Estuary at RM 11.5. The Smith River Falls trap site is at RM 29 and data has been gathered since the 1940's. For the last four years hatchery returns to the Smith River basin above the falls have ranged from 2.0%-4.5% with an average of 3.3% (Table 14.)

Table 14. Smith River Falls

Brood Year	Dates Operated	Wild Return	Hatchery Return	Total Return	Percent Hatchery Fish
03-04	Project discontinued due to lack of funding				
02-03	12/1-5/1	571	28	599	4.5%
01-02	11/1-4/30	742	15	757	2.0%
00-01	12/1-4/30	467	16	483	3.3%
99-00	12/1-5/25	1072	37	1109	3.3%
Total		713	24	737	3.3%

The Department also operates a trap at Nonpareil Dam located on Calapooya Creek (Table 15.) Calapooya Creek is a major tributary to the mainstem Umpqua River and is very close in proximity to the North Umpqua. The site serves as a district research project and has only been in operation for the last two years. The hatchery winter steelhead stray rates are very low.

Table 15. Nonpareil Fishway-Calapooya Creek

Brood Year	Wild Return	Hatchery Return	Total Return	Percent Hatchery Fish
03-04	643	8	651	1.2%
02-03	186	2	188	1.1%
Total	415	5	420	1.2%

The Department conducts Area Under the Curve (AUC) spawning counts for winter steelhead in the Umpqua Basin. The spawning surveys for the Umpqua River do not include the North Umpqua since accurate counts are already conducted at Winchester Dam. The hatchery stray rates during this monitoring effort throughout coastal Oregon are shown in Table 16. The Umpqua Basin is well below the conservation goal of 10%, and is amongst the lowest for hatchery strays on the Oregon Coast.

Table 16. Hatchery Influence during Winter Steelhead Spawning Surveys in 2003.

Monitoring Area	Marked	Unmarked	Unknown	Positive ID	% Hatchery
North Coast	21	217	714	25%	**8.8**
Mid Coast	17	186	448	31%	**8.4**
Umpqua	6	238	245	50%	**2.5**
Mid-South	19	95	171	40%	**16.7**
South Coast	20	151	1058	14%	**11.7**

The stray rates for the North Umpqua River on the actual spawning grounds are limited. The only known figures are the actual Winchester Dam counts and telemetry studies. However, the closest stream to the North Umpqua, the Calapooya River and its adult trap site at Nonpariel, recorded very strays. Therefore, from data collected from adult traps, telemetry, and AUC methodology surveys; the district has concluded the majority of the hatchery fish on the North Umpqua are returning to the hatchery influence area of Rock Creek.

VII. Habitat

WATER AS A LIMITING FACTOR

Water availability and quality is a major limiting factor for winter steelhead production within the Umpqua basin. DEQ is required by the federal Clean Water Act to maintain a list of stream segments that do not meet water quality standards. The 303(d) List is a portion of the Clean Water Act, and identifies those streams not meeting stated requirements. The most recent list for the Umpqua basin (2002) reveals that 384 miles of streams in the mainstem Umpqua (Smith included) sub-basin, 269 miles in the North Umpqua sub-basin, and 544 miles of streams in the South Umpqua sub-basin are exceeding temperature standards. There are approximately 2500 miles of available spawning, rearing and migration habitat for winter steelhead within the Umpqua basin and stream temperatures negatively impact approximately 48% of these available stream miles.

Water quantity is severely limited within the Umpqua basin. Within the watershed, the South Umpqua River basin is a major concern. A majority of the population centers within the Umpqua Basin lay within the South Umpqua River. Population centers such as Roseburg, Winston, Myrtle Creek, Canyonville and Glendale all draw their water from the South Umpqua and its tributaries. Agriculture is the predominant land-use type in the lower South Umpqua River. Galesville Dam was completed and began to fill in 1985 providing additional water storage for the South Umpqua Basin. Minimum stream flows from Galesville Dam to Cow Creek, a tributary of the South Umpqua, has provided additional water for spawning and rearing salmonids. Fall Chinook populations have benefited greatly by additional water flows from Galesville Reservoir. Ben Irving Reservoir is also located within the South Umpqua Basin, and provides additional water storage for water users in the lower basin. Both these facilities are operated by Douglas County.

Other reservoirs constructed throughout the basin are listed in Table 17. Cooper Creek and Plat I reservoirs are on Sutherlin Creek, a lower tributary of the North Umpqua.

Table 17. Significant Water Impoundments in Douglas County

Impoundment	Surface Area (AC-FT)
Berry Creek Reservoir	11250
Canyonville Reservoir (Win Walker)	300
Cooper Creek Reservoir	3900
Galesville Reservoir	42225
Plat I Reservoir	870
Yoncalla Reservoir	112

The North Umpqua, South Umpqua, mainstem Umpqua, and Smith River sub-basins all have ODFW instream water rights. A majority of these water rights are junior to other water right holders. The South Umpqua sub-basin is often regulated on a yearly basis for water rights senior to ODFW's instream water rights.

The Oregon Plan spurred a movement between ORWD (Oregon Water Resource Department) and ODFW to create stream flow restoration priority sites. Priorities for stream flow restoration and protection were established on the basis of OWRD's Water Availability Basins (WAB). Criteria includes the number of species present, their status, physical habitat conditions, water quality (affected by flow), natural low flow problems, human influences, water use, protection afforded by existing ISWRs, the optimism for fish population restoration if stream flow is restored and the optimism for restoration of stream flow (figure 21 WAB map and figure 22 Flow Restoration Priority map). Within the Umpqua basin, stream flow restoration requests covered over 90% of the South Umpqua Basin and 66% of the Umpqua River mainstem for the summer months.

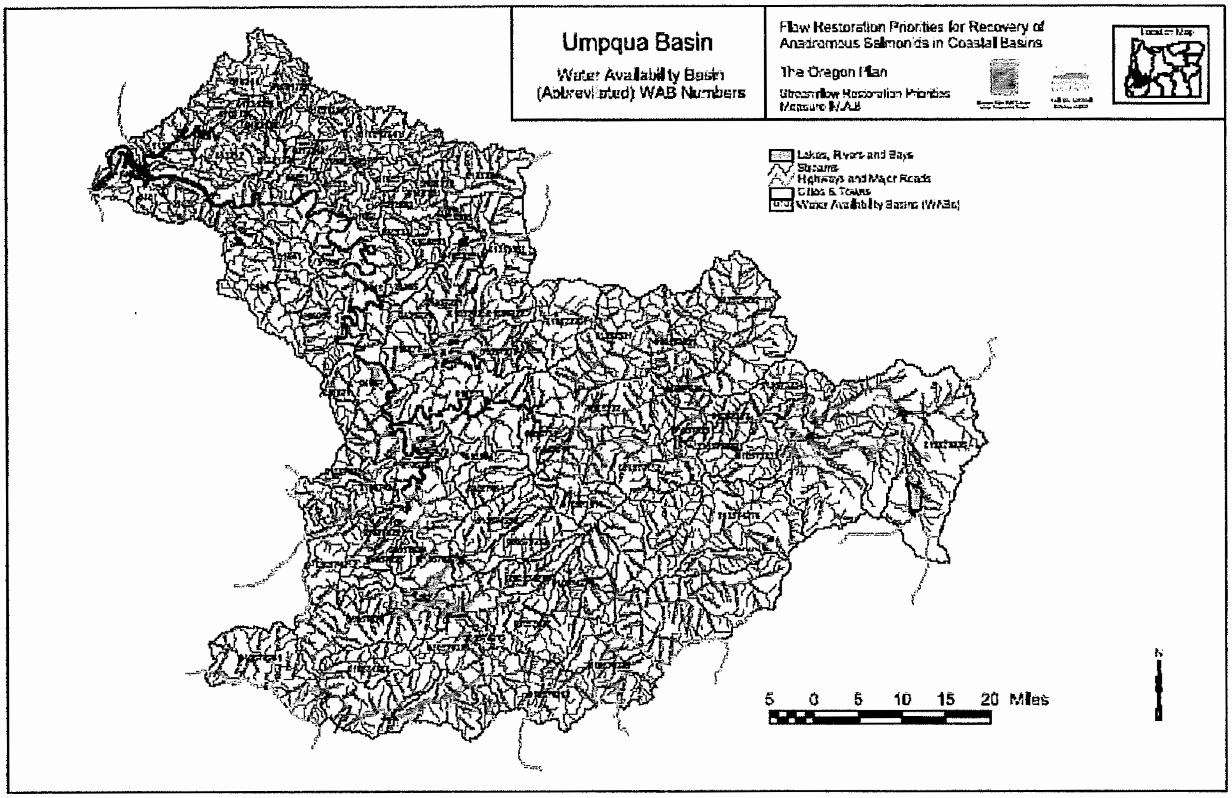
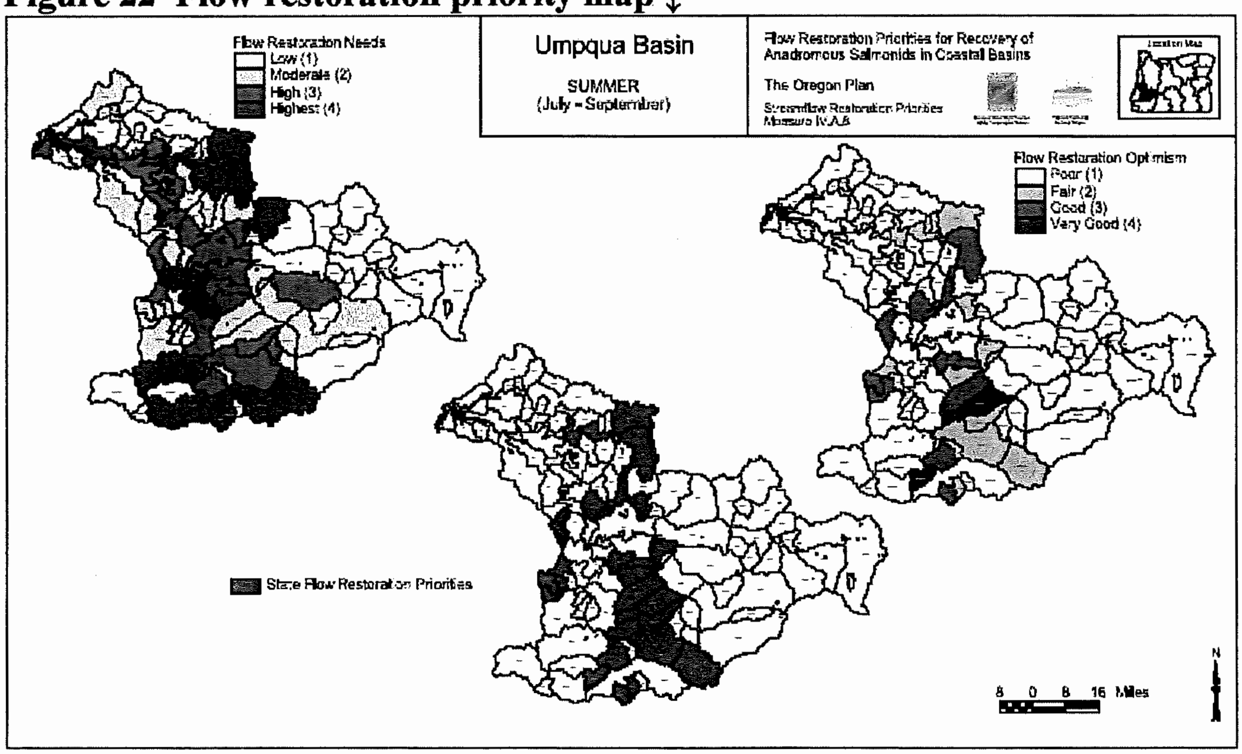


Figure 21 Water Availability Basin (WAB) numbers ↑

Figure 22 Flow restoration priority map ↓



The future demand on water resources will continue to mount as human population and activity increases in the Umpqua Basin. There are no new water rights available for allocation within the Umpqua basin except below Scottsburg (head of tidewater) on the main Umpqua (Dave Williams, Douglas County Water master, pers. comm.) Any future growth demands must be met through additional water storage facilities. Projects such as the Mill Town Hill project, which was a reservoir construction project, are very controversial and need to be resolved for future growth to occur. These types of storage projects (in channel) may also provide additional water for minimum instream flows, but at the detriment of fish passage to the upper reaches of a stream. The Oregon Department of Fish and Wildlife will continue to meet with the Douglas County Water Resources Advisory Board and explore new proposals for water impoundments and make the best decision based on sound biological science to ensure a net benefit to fish and wildlife resources.

SUMMER AND WINTER REARING AS LIMITING FACTOR

The loss of winter rearing habitat is one of several limiting factors facing steelhead within the watershed. The problem arises with a loss of channel complexity as expressed through in-channel roughness features and off-channel habitat, which lowers the ability for natural production of winter steelhead. Historically, most Umpqua Basin stream systems were structurally complex with large in-stream wood, interactive flood plains, beaver ponds, braided channels, and coastal marshes and bogs. Human activities have altered these ecosystems, particularly by reducing their complexity and removing components that were essential to steelhead production. Habitat complexity has been lost in many sub-basins due to historic splash-dam logging practices and stream cleaning. Logging and road construction in the Coast Range and Cascade Mountains of the Umpqua Watershed has had widespread impacts on winter steelhead and has affected most of the winter steelhead populations. In the Umpqua Valley, agriculture and urban land use practices have degraded quality rearing and spawning habitat. These areas once contained critical over wintering habitat and typically determine juvenile winter steelhead survival.

Steelhead habitat requirements change as they go through different life phases. As adults return for their upstream migration, access to spawning gravels, which lack sedimentation and have adequate flows, are essential. Upstream passage at diversion dams and culverts dictate upper distribution of spawning adults. Habitat complexity slows water flows and aids in recruitment of gravel and large woody debris creating desirable spawning sites. Cover structures such as boulder clusters and root wads provide a refuge for spawning adults. Once out of the gravel, juvenile steelhead grow to a size in which pools become an important habitat type. The best pool habitats are those with abundant cover. Cover consists of logs, undercut banks, and deep pools.

During their first summer, juvenile steelheads are typically found in relatively shallow areas with cobble and boulder bottoms. They reside at the upstream and downstream ends of pools or in riffles less than two feet deep. Juvenile steelhead prefer areas with abundant cover including woody debris accumulations in addition to undercut banks, root masses, and large boulders.

Steelhead exhibit much the same life history strategies as Coho salmon. Preferred winter habitat for juvenile Coho salmon consists of quiet marginal or off-channel habitats with heavy cover. Steelhead emerge from redds to seek safety in the rearing refugia, where they will reside for 1-3 years (Coho 1 year) before smoltification. Winter rearing habitat is crucial to juvenile growth for both species, as they tend to populate the same general habitat.

Restoration projects with long term monitoring were completed in the East Fork Lobster and Tenmile Creek watersheds of the middle Oregon Coast. The primary purpose of this monitoring is to evaluate the affects of habitat modification on freshwater survival and abundance of salmonids. In both studies, the introduction of large woody debris, specifically the addition of key pieces, decreased velocity, increased sinuosity and increased channel complexity. In addition, the structures increased the surface area of all slow water habitats, increasing the carrying capacity and ultimately increasing juvenile production.

Instream restoration strategies like those mentioned above can be an effective management tool to increase natural production of salmonids. Juvenile survey data gathered from streams within the Umpqua basin indicate that the available habitat is fully seeded with young of the year winter steelhead juveniles. Available habitat has been greatly reduced from historic levels, thus production has been greatly reduced from historic levels as well. Prioritizing sub-basins in need of restoration is a top priority. Habitat biologists in the Umpqua Watershed have rated all fifth field HUC's for habitat quality. The average ratings for the sub-basins have indicated the West Fork Smith, Upper Smith River, North Umpqua River, and Cow Creek basins are prime candidates for instream restoration.

Habitat Surveys Within the Umpqua Basin

Habitat surveys within the Umpqua basin were conducted in the early 1950's. Physical and Biological (P&B) surveys were used to collect data during this time period. The surveys were conducted by Oregon Game Commission biologists and were completed in streams throughout the basin. The P & B surveys were conducted through the middle 1970's. The USFS and BLM began surveying in the 1980's on federal lands using the Hankin and Reeves methodology. Surveys conducted were limited in stream miles and area.

Beginning in 1993, ODFW began a project to inventory the entire stream habitat in the Umpqua Basin. Aquatic Habitat Inventories were conducted using ODFW developed methodology. As of 1998, approximately 500 streams have been surveyed within the Umpqua basin. Landowner denial of access to streams has limited the completion of habitat surveys for about 15% of the basin. Theses habitat surveys have been conducted on numerous land ownerships from federal to small private land holdings. Cooperators in the Aquatic Habitat Inventories project have been watershed councils, large agricultural landowners, large timber companies, small private agricultural and small woodlot timber owners, ODFW, and various volunteer groups.

Umpqua Fish Management District Guide to Restoration Site Selection

In 1996, a guide aiding in the identification of stream reaches within the Umpqua basin was published. A list of potential restoration stream reaches was created using data from ODFW Aquatic Inventory surveys and district biologist recommendations

Four watersheds (West Fork Smith, Upper Smith River, North Umpqua River, and Cow Creek) were identified as high priority for stream restoration. A total of 154 sites within the Smith River, Main Umpqua River, North Umpqua River, and Cow Creek basins were thought to have the greatest potential to improve winter steelhead survival. The majority of land ownership in the selected stream reaches is located on private timber and agricultural lands (58%), with the remainder on federal lands. Watershed councils, ODFW, federal and other state agencies are now prioritizing restoration efforts into these basins using Aquatic Habitat Benchmark Ratings (Table 18).

Table 18. ODFW Aquatic Habitat Benchmark Ratings.

		Scale 1-5	4-Excellent	3-Good	2-Fair	1-Poor
	Pools					
1	Pools area % (pctpool)	3	>44.99	30-44.99	16-29.99	<16
2	Residual Pool Depth (residpd)					
	a.) small (1-3 ordered)	4	>=.7	.5-.6	.3-.4	<.3
	b.) large (4th order or greater)	4	>=1.0	.8-.9	.5-.8	<.5
	Riffles					
3	Width/Depth (wdratio)	3	<=.10.4	10.5-20.4	20.5-29.4	>=29.5
4	Silt/Sand/Organics % area (rifsndor)	2	<=1	2-7	8-14	>=15
5	Gravel % (rifgrav)	3	>=80	30-79	16-29	<=15
	Reach Average					
6	Riparian Condition (ripv1) dom. species >=15cm	2	>= 45	30-44.9	16-29.9	<=15
7	Shade %					
	stream width < 12 m	2	>=80	71-79	61-70	<=60
	stream width > 12 m	2	>=70	61-69	51-60	<=50
	LWD					
8	Pieces/100 m stream (lwdpiece1)	3	>=29.5	19.5-29.4	10.5-19.3	<=10.4
9	Volume LWD/100m stream (lwdvol1)	3	>=39.5	29.5-39.4	20.5-29.4	<=20.4

Restoration Projects

Since 1985, state and federal agencies, private timber companies, and watershed councils have performed restoration work throughout the Umpqua Basin. Some of the earliest restoration work began in the middle of the 1980's on both U.S. Forest Service and BLM lands. By 1990, large timber companies began performing stream restoration work as well. In 1997 the Umpqua Basin Watershed Council was formed and began coordinating between timber companies, federal agencies, and small landowners to perform restoration work across multiple land ownerships. Early projects were done on a relatively small scale with logs being placed in densities of 20 logs per mile or less. Restoration projects within the basin benefited multiple salmonid species without specifically targeting winter steelhead.

Restoration within the North Umpqua basin began in 1985 with work completed in the Steamboat Creek basin and in Calf Creek. These projects covered approximately 3 miles of stream and consisted of cabled log "V" weirs, blast pools, and log sills. The work was funded by the Forest Service and designed and placement overseen by students from Humboldt State University. Beginning in the early 1990's, stream restoration efforts began again in the North Umpqua basin. Stream restoration took place in the Rock Creek drainage with logs being cabled into at least three tributaries.

Restoration continued in the Steamboat Creek and Calf Creek drainage's in the late 1990's and into 2001. Log placement was paid for by the USFS and outside granting sources with placement performed by helicopters. Some work was completed in lower tributaries of the North Umpqua. The Umpqua Basin Watershed Council (UBWC) funded restoration on these tributaries. Beginning in 1999, structure placement has consisted of logs anchored by means of riparian trees and relying on size of materials.

Stream restoration in the South Umpqua basin was initiated in the early 90's with much of the work being done in upper mainstem South Umpqua. Early restoration was done primarily on USFS lands, using local Salmon and Trout Enhancement Program (STEP) volunteers. These structures were placed primarily to recruit spawning gravels for spring Chinook but have benefited winter steelhead. Private timber companies in Cow Creek tributaries around this time completed restoration efforts as well. Structure placement consisted primarily of "V" weirs, sill logs, and angle logs cabled to bedrock. Since UBWC came into existence, a large number of restoration projects have been completed within the Cow Creek basin and mainstem South Umpqua tributaries. Projects in the South Umpqua basin have consisted of large wood placement, culvert replacements, riparian fencing and planting, and road decommissioning. The projects have been completed on both small private agricultural properties and large timber holdings.

Main Umpqua River stream restoration began in the early 90's with work being performed by a local STEP group. Restoration sites were located on private timber company and BLM lands consisting of sill logs, "V" weirs, and boulder weirs. Most of this work was completed within the Wolf Creek basin, which is a large tributary to the mainstem Umpqua River. Additional work has been completed in many of the mainstem

Umpqua River tributaries by the UBWC. These restoration projects have consisted of large wood placement, boulder placement, culvert replacement, riparian fencing and planting, and road decommissioning.

Smith River basin stream restoration was initiated on BLM lands in the middle 1980's. These projects consisted mainly of small logs cabled mid channel in conjunction with boulder weirs. Boulder weir projects were completed on West Fork Smith River, Smith River, and North and South Sisters. It wasn't until 1998 that stream restoration began again in the Smith River basin. These log placement projects consisted of sites placed via contractors using draft horses. Since then numerous culvert replacements, large wood, and boulder projects have been completed. These projects are located on both BLM and private timber holdings.

Oregon Plan

The mission of the Oregon Plan for Salmon and Watersheds (OPSW) is to restore native fish populations and their habitats back to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits. The OPSW consists of a broad-based effort of citizens, local watershed groups, Oregon State agencies, and federal agencies to restore healthy salmon populations and their watersheds.

The OPSW directs specific measures that address the factors resulting in the decline of fish populations and degradation of watershed health. These measures focus on actions to improve water quality and quantity and restore habitat. Private citizens, community organizations, interest groups, local governments, and state and federal agencies come together to organize, fund, and implement these measures.

Habitat restoration activities have been a key factor in the success of the OPSW. Habitat restoration addresses water quality, water quantity, improving channel complexity, flood plain interaction, and the quality of riparian habitats. Measures directly target improvement of fish passage (expanding available fish habitat), improvement of habitat complexity (reintroducing structure and complexity to stream channels), and improvement of riparian and upland restoration needs.

In addition to habitat restoration, the OPSW also plays and integral role in monitoring activities associated with salmonids. This monitoring includes adult salmon and steelhead spawning surveys, juvenile salmonid census, stream habitat assessment, salmonid life cycle monitoring projects, and stream health – Biotic Index Measurement surveys. This monitoring provides basic information on salmon and steelhead populations and conditions across large geographic areas. Since the inception of the OPSW, the design and completion of hundreds of stream habitat and watershed restoration projects have been accomplished within the Umpqua River Basin.

Watershed Councils

Watershed councils are locally organized, voluntary, non-regulatory groups established to improve the condition of watersheds within their local areas. Watershed councils offer support to local residents to evaluate watershed conditions and identify opportunities to restore or enhance watershed conditions. There are currently 89 active watershed councils within the state or Oregon.

Three active watershed councils operate within the boundaries of the Umpqua Basin. The Smith River Watershed Council (SRWC), established in 2001, is still in its infancy with regards to restoration and enhancement of watershed conditions. Current planning efforts include projects that will address the limiting factors of salmonids within the Smith River basin. The Elk Creek Watershed Council (ECWC), established in 2002, is also in the early stages of effectiveness with regards to restoration and enhancement efforts within the Elk Creek basin. Future projects will also attempt to address the limiting factors within the Elk Creek basin. The Umpqua Basin Watershed Council (UBWC) established in 1997, has been an active member in the restoration efforts for salmonids within the Umpqua Basin. Since 1998, the UBWC has been a partner with ODFW in approximately 100 projects that have benefited winter steelhead and other salmonids within the Umpqua basin. Fish passage improvements, in-stream habitat improvements, and riparian habitat restorations are a few of the projects completed by UBWC that benefit salmonids.

Habitat Biologist Positions

The Western Oregon Stream Restoration Program (WOSRP) provides direct technical support to watershed councils and landowners to implement the Oregon Plan. There are two restoration biologists assigned to the Umpqua Basin that are responsible for day-to-day implementation of the restoration projects targeted towards the enhancement of salmonid habitats. These biologists provide technical support on fish populations, and fish habitat needs, and expert advice on watershed restoration activities in support of the Oregon Plan for Salmon and Watersheds.

The biologists work with watershed councils and landowners cooperatively to develop watershed assessments, action plans, project planning, information on sources of potential funding, coordination with permitting and other agencies, project implementation, monitoring, and analysis of results.

The following are types of projects that enhance existing habitat or recreate historic habitats:

- Instream Habitat Enhancement: large wood placement, boulder placement, pool construction, and weir placement.
- Riparian /Upland Habitat Enhancement: riparian conifer restoration (future sources of large wood), riparian vegetation planting, riparian fencing (livestock exclusion), and upland erosion control (sediment reduction).

- Fish Passage Improvements: fish passage structures (weirs, ladders, etc.), correcting road /stream crossings (artificial barrier removal), tidegate improvement /removal, and dike breaching /removal, and fish screen improvement /replacement.
- Fish Habitat Construction: stream channel relocation, re-establishing historic stream channels, developing meanders and side channels, and creating off channel habitat such as alcoves and off channel ponds.

These projects are designed to meet the current needs of salmonid species within the Umpqua basin as well as to address issues of sustainability with regard to future habitat complexity and availability of quality components for future natural processes.

Land Use in the Umpqua Basin

The Umpqua River basin drains approximately 3.2 million acres (5500 square miles), which is essentially analogous to Douglas County. Drainage areas of the Umpqua River watershed are: the Smith River basin at 377 square miles, the North Umpqua basin at 1860 square miles, and the South Umpqua basin at 1804 square miles. Land use activities within the Umpqua Basin include forestry, agricultural, and urban. Douglas County Land Use Planning Department estimates that approximately 88 percent of the county is in forested lands, of which 51 percent is administered by the federal government. Agricultural land includes both crop and grazing lands and accounts for the remaining 10 percent of the county, with the remaining 2% classified as urban.

The upper reaches of the North Umpqua River are designated as a Wild and Scenic Area, primarily dominated by USFS lands. The area between Rock Creek and Soda Springs is designated as the "Fly Water", and protected both by ODFW as a wild fish sanctuary and by the USFS Forest Conservation Plan. The lower reaches of the North Umpqua are primarily dominated by agriculture. The North Umpqua River is known throughout the Northwest for its beauty and great salmonid fishery.

The upper reaches of the South Umpqua are also under USFS land protection. The mid-South Umpqua is BLM matrix lands with larger timber companies. The lower South Umpqua from Canyonville to Roseburg is grazed and mined for gravel.

The Mainstem Umpqua River is dominated by large timber, and BLM matrix lands. The Calapooya and Elk creeks are primarily grazed. Schofield Creek are in the Elliott State Land management, and Mill and Camp creeks are again under the matrix of BLM and large timber.

The Smith River is also dominated by the matrix of BLM and large timber, with the lower tidal sections of the river grazed by cattle.

Habitat Protection:

Habitat management/protection is a key component of the Native Fish Conservation Policy and will be a key component in the future to at least maintain current levels of habitat conditions, water quality/quantity and continued fish passage. ODFW has determined that urban growth and instream flow may be the toughest challenge for protection of winter steelhead into the future.

Habitat conditions in the urban areas will continue to degrade. As the population of Douglas County continues to grow, urban streams will continue to be impacted. Impacts include increased run-off and peak flows, which will incise stream channels and reduce flood plane interaction. As a result, a reduction in over winter habitat for winter steelhead will be lost. Demand for future water consumption will increase. A vast majority of streams within the Umpqua Basin do not have available water at the preferred time of consumption and off channel reservoirs will need to be constructed to meet this expanding demand. Habitat conditions in the agriculture areas are predicted to remain static and may improve as farming practices evolve over time. These lower gradient streams are the preferred areas for agriculture operations and often used (when habitat conditions are tolerable) by winter steelhead during their final year of rearing prior to ocean migration.

Habitat types within the upper reaches of the watersheds are often associated with forestry management. These upper stream reaches represent spawning and rearing habitats of winter steelhead. Habitat conditions in these areas are predicted to improve over time. These areas are often isolated and the focus of restoration efforts. Overall, habitat degradation and losses due to urban development may be offset by increases in the overall habitat conditions within headwater forestry areas.

The following are a number of protection rules, regulations and policies meant to address stream and riparian degradation to achieve a no net loss of available habitat.

The ODFW Habitat Mitigation Policy (OAR 635-415) allows ODFW to provide comments to permitting agencies to minimize, avoid or mitigate impacts to fish and wildlife species and their habitats depending on the category of habitat altered. ODFW has rules and regulations governing fish passage. When new or existing culverts are constructed under these fish passage guidelines, construction designs for fish passage criteria must be followed which do not inhibit fish passage. These fish passage guidelines are enforceable through other state and federal permitting agencies. ODFW also has recommended in water work periods established that would protect all fish species found within a project area.

Water quality and quantity are protected in a number of policies. Instream flows have been designated on a majority of larger streams within the Umpqua Basin. OWRD is responsible for issuing new waters rights, reservoir storage permits and water rights transfers through Oregon Water Law (OAR 690). New water rights are only recommended when instream water rights would not be violated or for human consumption exemptions. Reservoir storage permits are also subject to fill periods when the instream water rights are being met. Upstream water rights where instream water rights would be injured are only permitted when the injured party consents and then justification to a net benefit must be established. Past efforts to prioritize stream flow restoration has been completed by ODFW and OWRD. OWRD is also the lead agency in issuing water rights for hydroelectric projects. The Hydroelectric Application Review Team (HART) is a group of agency representatives that coordinates the State's response for protection, enhancement and mitigation projects in hydropower re-licensing projects. All new projects must meet stringent "no-kill" standards on fish and wildlife species.

The Oregon Department of Environmental Quality (ODEQ) issues 401 certification for fill and removal projects through the Division of State Lands. ODEQ is the state agency responsible for protecting Oregon's surface waters and groundwater to keep these waters safe for a wide range of uses, such as drinking water, recreation, fish habitat, aquatic life, and irrigation. ODEQ develops water quality standards for Oregon's waters. ODEQ has established a list of impaired water bodies (303 (d)). Using TMDL limits ODEQ provides permit conditions which when implemented avoid or minimize impacts to water quality.

The Oregon Department of Agriculture's Water Quality Management Program is responsible for developing and implementing agricultural pollution prevention and control programs to protect the quality of Oregon's waters. The Agricultural Water Quality Management Program has evolved in response to water quality programs and requirements under various state and federal laws, such as the Clean Water Act and Senate Bill 1010, passed in 1993 by the Oregon legislature

Land use activities are regulated for protection of fish and wildlife. Federal lands within Douglas County are regulated through the Northwest Forest Plan's Aquatic Conservation Strategy (ACS). The goal of the ACS is to maintain and restore the health of watershed and the aquatic ecosystems within them. The Elliot State Forest is managed under a Habitat Conservation Plan and the Elliot State Forest Management Plan. Habitat Conservancy Areas have been designated in riparian zones which limit forestry management activities. Private timberlands are protected by the Oregon Forest Practices Act. Protection standards are in place for fish bearing streams, road building, and other harvest related activities.

Lastly, the Division of State Land's Fill/Removal laws require permits for activities below the ordinary high water line. ODFW is responsible to review proposed actions and make recommendations through the ODFW Habitat Mitigation Policy. Douglas County also has protection standards for development adjacent to streams. A fifty-foot buffer from the high bank of Douglas County streams is required to prevent the placement of buildings or structures within the riparian area.

Summary of Habitat Conditions

Timber practices on county, federal, state, and private lands continue to improve in Douglas County. Urban growth is expected to expand in the Umpqua Valley area of

Roseburg. This area is already severely impacted by agriculture through loss of riparian habitat and overall impacts may not cause reduction in productivity to winter steelhead. The greatest concern therefore is the increased demand for water. ODFW must work with OWRD to construct new storage facilities that both meet fish passage requirements and create additional storage for both society needs and fish.

In general, ODFW perceives that salmonid habitat will not drastically change in the next ten years, but continued urban growth over a larger period of time (century) may lead to the decline in salmonid production.

VIII. Conclusion

ODFW Recommendation

The population of the North Umpqua winter steelhead is very robust. Data collected in the lower Umpqua River and South Umpqua has lead us to believe the Umpqua River population is tracking the North Umpqua in productivity and abundance. Habitat conditions in the Umpqua Basin are relatively stable, and should continue to produce a sustainable population of winter steelhead in the next 10 to 20 years. Habitat productivity and its long-term sustainability is the greatest concern when the Department was evaluating the health of the winter steelhead and impacts from increasing harvest of wild winter steelhead.

The winter steelhead fishery in the Umpqua Basin was 2 fish per day, 20 per year (wild or hatchery) until 1999. This fishery did not cause a decline in the health of the North Umpqua winter steelhead population. The proposed fishery of 1 fish per day, 5 per year is further restricted than past bag limit of two fish per day basin-wide. The highest exploitation rates were calculated to occur on the North Umpqua stock. These estimates are probably high due to the fact that punchcard data has been shown to over estimate harvest. The North Umpqua counts at Winchester Dam are real-time data, and are very accurate. Any signs of decline in the winter steelhead population in the North Umpqua will be quickly determined.

The Department recommends that the Commission adopt the fishery proposal of 1 wild fish per day, 5 per year on the mainstem of the Umpqua River. This fishery should be defined as the Umpqua River and Bay.

Future Monitoring

The Umpqua Fish District will continue to collect monitoring information on the health of wild winter steelhead populations in the Umpqua River watershed. The use of established long-term monitoring sites such as Winchester Dam (1946-present) will allow an annual data point looking at adult returns. Additional traps such as Smith River Falls, Nonpareil Dam, Canyon Creek Fishway, and South Umpqua Falls will be monitored to continue to evaluate the health of the winter steelhead run into the Umpqua Basin. In addition, spawning ground counts conducted throughout the Umpqua Basin will be conducted to determine Area Under the Curve estimates for population trends and to evaluate hatchery stray impacts to localized tributaries.

Winter steelhead juvenile production will be monitored using district smolt traps located throughout the basin. Data collected will be combined with USFS, BLM, and Oregon Plan Monitoring smolt traps thus allowing a broad district approach to long-term trends. Upper fish distribution surveys will be conducted as needed to determine if new habitat, which was once unavailable to steelhead, has been created. Periodic summer seeding level surveys for salmonids will be implemented to monitor past instream enhancement projects and to obtain an overall picture of salmonid population health in the basin.

The district has several red-flag indicators to monitor population health for winter steelhead. First, a reduction of the 6-year average in the Winchester Dam count to an average of 1,667 fish. Second, a continued downward trend in counts at Winchester Dam where other areas of the ESU for winter steelhead continue to remain stable. We will also utilize the AUC spawning counts to evaluate if the North Umpqua counts are tracking the population of the Umpqua Basin. We will seek additional funding for telemetry studies to also provide additional information to track the Umpqua Population and the correlation to the North Umpqua Counts.

Conservation Planning

This BA for winter steelhead is the beginning to the overall ESU Winter Steelhead Conservation Plan. Several management alternatives for conservation planning were identified during the BA process, and are listed below:

- Regulation change of the North Umpqua to catch-and-release for wild winter steelhead.
- Increase hatchery production in the South Umpqua
- Decrease hatchery production in the South Umpqua
- Reinstate a hatchery program in the Smith River

The development of a Conservation Plan is a public process. These alternatives will need public review, and other alternatives will be developed. However, this BA demonstrates that management strategies that rely on productive habitat, not hatcheries or habitat mitigation, will continue to produce strong runs of wild winter steelhead and add to Oregon's livability and coastal economy.

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