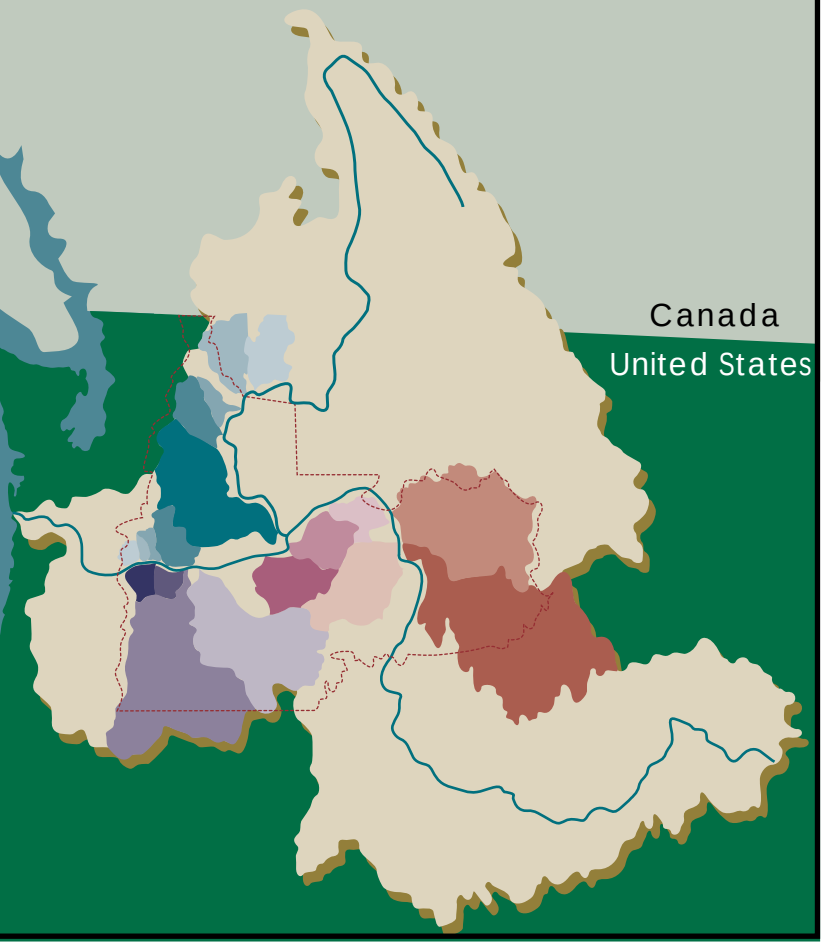
United States

WY-KAN-USH-MI WA-KISH-WIT

Spirit of the Salmon

The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes



VOLUME II
Subbasin Plans

VOLUME II
SUBBASIN PLANS

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INTRODUCTION

Klickitat, Yakima, Imnaha, Umatilla, Walla Walla—many of the tributaries of the Columbia Basin retain the names of the people who inhabited their banks and fished their waters for no less than ten thousand years. Even those rivers renamed by white settlers remain within the territories where our ancestors, the people of the Umatilla, Nez Perce, Yakama, and Warm Springs tribes lived and died since time immemorial.

Prior to treaty signing in 1855, our Indian people traveled throughout our territories in the Columbia Basin to places where we knew fish and game were available for sustenance and livelihood. In the treaties, which opened the basin to white settlement, we reserved the right to travel to all of these usual and accustomed fishing places to take fish while also reserving the exclusive right to take fish on our reservations. For its part, the United States agreed to secure these rights.

For almost a century following the treaty councils, federal policy generally ignored the treaties by allowing the salmon populations of the basin to decline through over harvest and upper basin development and by misusing mitigation authorities such as the Mitchell Act and the Lower Snake River Compensation Plan in a discriminatory manner. But in 1968, with the initiation of the lawsuit now called *U.S. v. Oregon*, we acted to protect our birthright.

Twenty-seven years later, *U.S. v. Oregon* is still on the federal district court docket and provides a means of dispute resolution when discussion and negotiations fail between our tribes, the United States, and the states of Oregon, Idaho and Washington.

Since 1968, the federal, state and tribal governments created or used other institutions to address the problem of declining salmon stocks. These included the Northwest Power Planning Council (NPPC), the Pacific Salmon Commission, the Columbia River Fish Management Plan adopted by the federal court in *U.S. v. Oregon,* and the consultations conducted by the National Marine Fisheries Service (NMFS) under the Endangered Species Act (ESA).

The NPPC was created under the Northwest Power Act of 1980 to protect, mitigate and enhance salmon in the basin. After determining the magnitude of salmon losses, the NPPC adopted a Fish and Wildlife Program amendment setting forth a program to restore salmon through individual tributary plans (subbasin planning) with implementation slated for 1990.

The Pacific Salmon Commission was created in 1985 under the Pacific Salmon Treaty to rebuild chinook salmon runs and allocate harvests between United States and Canadian fisheries.

The Columbia River Fish Management Plan was approved by the Federal District Court of Oregon in 1988 to address production and harvest issues among the federal, state, and tribal governments. Provisions included the development of subbasin plans to achieve the earliest feasible rebuilding of basin salmon stocks.

In 1991 the National Marine Fisheries Service listed certain Snake River salmon stocks as threatened or endangered, shifting attention to the preservation of fragmented and isolated populations in the Snake River, its tributaries and Redfish Lake. During the Salmon Summit, a series of citizen/industry/government meetings convened in the early 1990s to confront the salmon crisis, key participants rejected the approach that included subbasin restoration programs in favor of a focus on Endangered Species Act listings.

The NMFS listing also restricted the ability of fishery managers to use propagation as a tool for rebuilding by including the "evolutionarily significant unit" (ESU) policy, a severe restriction on the ability of fishery managers to utilize propagation techniques that were included as elements of the subbasin plans and the Columbia River Fish Management Plan.

Regrettably, the ESA designation of Snake River salmon set back efforts to restore the basin's declining salmon populations throughout the basin—efforts that were mandated under *U.S. v. Oregon*, the Pacific Salmon Treaty and the NPPC's Fish and Wildlife Program. However, scientific research

indicates now that numerous non-listed populations will be lost unless protection and restoration efforts are begun immediately in every Columbia Basin tributary.

Since the passage of the Northwest Power Act in 1980, the basin's treaty fishing tribes have worked with their neighbors in certain watersheds to restore fisheries for the benefit and enjoyment of all users.

In the Umatilla, the Confederated Tribes of the Umatilla Indian Reservation, in cooperation with the State of Oregon and local irrigators, implemented a program of habitat improvement and outplanting of appropriate stocks that returned chinook salmon and coho to the river for the first time in seventy years.

In the Imnaha, a tributary of the Snake, the Nez Perce Tribe worked with Wallowa County residents to maintain a program for habitat protection and artificial propagation that, in 1992 and 1993, resulted in a ten-fold increase in adult spring chinook returns, then the only increasing trend for spring chinook in the Snake above eight dams.

In the Yakima, the Yakama Indian Nation secured federal legislation to provide enhancement of water quantity as a means to implement an ambitious program of salmon restoration that has been in the NPPC's Fish and Wildlife Program since 1982.

In the Hood River, the Confederated Tribes of the Warm Springs Reservation of Oregon are working closely with the Oregon Department of Fish and Wildlife and with local interests to rebuild spring chinook and steelhead through a program of habitat improvement and supplementation of natural production.

The plans that follow are our tribal proposals to protect or restore salmon populations in each tributary above Bonneville Dam through the implementation of detailed subbasin actions that address both habitat protection and fish production. These subbasin plans are a refinement of the plans completed by the fishery agencies and tribes in 1990—plans that defined watershed habitat and production problems and proposed remedies. They represent the cultural and geographic knowledge of our tribes and, in combination with the life cycle survival framework, scientific hypotheses and recommendations in Volume I of Wy-Kan-Ush-Mi Wa-Kish-Wit, offer the best scientific knowledge available on the use of habitat protection and fish restoration in each watershed. Further, the plans are based upon a thorough technical evaluation of habitat conditions and proper broodstock sources for supplementation where appropriate.

But they are not cast in concrete. Instead the plans that follow are intended to engage our neighbors in the challenge of salmon restoration through cooperative efforts at the watershed and regional level. Such cooperative efforts guiding state and federal government actions are preferable to mandated programs arising from lawsuits and court orders or from state capitals and national offices in Washington, D.C.

Federal, state and tribal governments each have a role to play in Columbia Basin salmon restoration based upon each sovereign's specific authorities and functions. Through the *U.S. v. Oregon* process, the three classes of sovereign governments learned to resolve disputes by defining and answering technical questions in a manner that provided a firm basis on which policy representatives could then find solutions. We believe these same methods can be applied at both the regional and watershed levels so that restoration proceeds on a cooperative basis, thereby avoiding mandated solutions from one government or another.

The watersheds of the basin are both the biological and social neighborhoods in which we live. During the next twelve months, we call upon the stakeholders of each watershed to comment upon these proposals and meet with us in a spirit of neighborly cooperation to address salmon restoration. Institutions such as local governments, municipal and public utility districts, schools and irrigation districts are key players in this effort and their review is especially important.

We call upon state and federal government agencies to assist this effort by supplying technical and financial resources and by constructively participating, along with tribal representatives, in watershed approaches. Certain activities are already under way: Oregon, Idaho and Washington are undertaking various watershed health initiatives under state authorities. In its most recent Fish and Wildlife

Program amendments, the NPPC, whose members are appointed by state governors, called for BPA to fund and fish managers to develop emergency production and habitat actions to protect adult spawners in 1995 and 1996. The four Columbia River tribes and the Shoshone Bannock tribe together with the Earth Conservation Corps and the U.S. Department of Energy are putting young people to work fencing off riparian habitat, restoring streambank vegetation and related projects as a part of Salmon Corps, an AmeriCorps division. The Small Watershed Program, administered by the Natural Resources Conservation Service under P.L 83-566, provides authority for federal technical assistance while, at the same time, directing federal agencies to cooperate with states and local entities to plan ways to minimize erosion, flood and sediment damage. Coordinating these activities on federal lands with local watershed efforts will improve their effectiveness.

On a regional, basinwide level, NMFS and NPPC actions need to be coordinated with one another and with tribal initiatives that reinforce the objectives of the *U.S. v. Oregon* Columbia River Fish Management Plan. Most importantly, coordination requires a means of dispute resolution that recognizes the critical distinction between technical assessments and policy decisions.

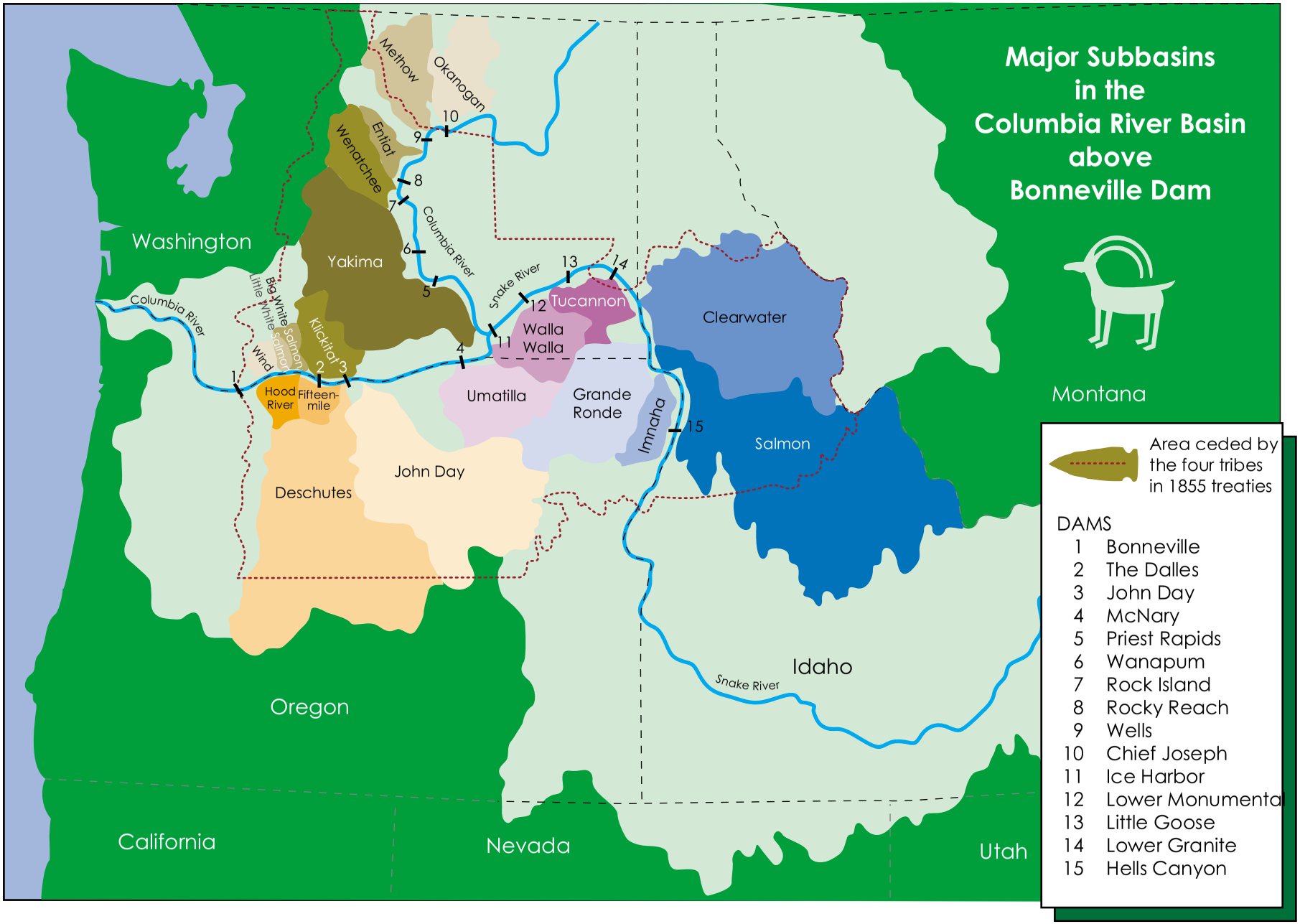
At the basin level, we also call upon the managers of the mainstem Columbia and Snake river projects and the managers of ocean and inriver harvest to recognize their own responsibilities to honestly deal with the impacts they cause to salmon populations both after the salmon leave the watersheds and before they return to spawn. Tribal efforts at developing a life cycle framework for allocating the conservation burden and measuring success are aimed in this direction and have the purpose of providing a scientific context for implementing watershed-based recovery. Without protection of salmon at each stage of its life cycle, the benefits of watershed salmon restoration will be delayed or even eliminated.

On a coastwide level, tribal, state and federal governments need to develop institutional arrangements to support local watershed approaches and coordinate local objectives with regional land use and water development policies. *For the Sake of the Salmon,* a cooperative state, federal, tribal project, is an important coastwide Pacific salmon restoration initiative.

We are calling for a moratorium on salmon posturing and an end to the impasse that has marked salmon restoration since the listing of Snake River stocks in 1991. From the tribal perspective, the progress that marked salmon rebuilding efforts that began in the mid- 1970s was halted as interests suspended constructive dialogue. We believe that most citizens of the Northwest are hopeful that salmon can recover, not only as sustenance for humans and other creatures but also as a cultural symbol of the Columbia River Basin.

Adult return goals for each subbasin and species should be considered interim and will be reviewed periodically as part of the adaptive management process. Habitat-based methods indicate the possibility of achieving larger adult returns over the long term.

Table 1 provides the annual cost estimates for the tribal restoration programs proposed in the individual subbasin plans.


Major Subbasins in the Columbia River Basin above Bonneville Dam
Washington
Montana
Idaho
Oregon
California
Nevada
Utah
Columbia River
Snake River
Methow
Okanogan
Wenatchee
Entiat
Yakima
Klickitat
Big White Salmon
Little White Salmon
Wind
Hood River
Fifteen-mile
Deschutes
John Day
Umatilla
Walla Walla
Tucannon
Grande Ronde
Imnaha
Clearwater
Salmon
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Area ceded by the four tribes in 1855 treaties
DAMS
1 Bonneville
2 The Dalles
3 John Day
4 McNary
5 Priest Rapids
6 Wanapum
7 Rock Island
8 Rocky Reach
9 Wells
10 Chief Joseph
11 Ice Harbor
12 Lower Monumental
13 Little Goose
14 Lower Granite
15 Hells Canyon

LOWER COLUMBIA RIVER MAINSTEM (Bonneville to McNary)

Prepared by the Columbia River Inter-Tribal Fish Commission and the Yakama Indian Nation

Introduction

The lower Columbia River mainstem is that section of the river from Bonneville Dam to McNary Dam. This section of the river flows eastward forming the border of Oregon and Washington. The principal tributaries in this section of the river, which have been described individually in these subbasin plans, include the Wind, Little White Salmon, White Salmon, Klickitat rivers in Washington and the Hood, Deschutes, John Day and Umatilla rivers and Fifteenmile Creek in Oregon. In addition to these major rivers, minor tributaries, such as Rock Creek, Eagle Creek, Herman Creek, Mosier Creek, Viento Creek and Willow Creek enter the Columbia River in this stretch of mainstem. (WDF et.al., 1990).

Fish Population Status/Goals

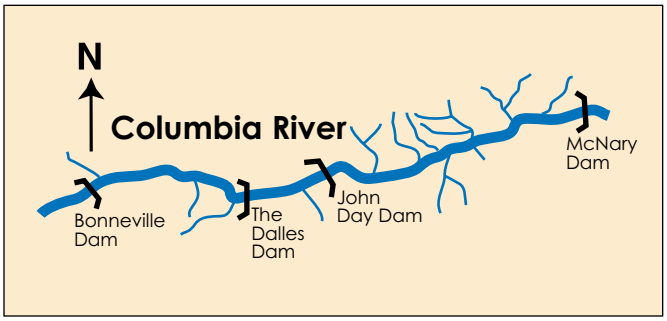
Currently a small number of fall chinook spawn in the minor tributaries of this section of the Columbia River. Those tributaries include Rock Creek (Bonneville Pool), Collins Creek, Eagle Creek, Herman Creek, Linsey Creek and Rock Creek (John Day Pool) (Ibid). Inundation of natural habitat by dam construction significantly affected fall chinook spawning in the mainstem Columbia River.

Minor natural spawning by coho and winter and summer steelhead occurs in the tributaries such as Rock Creek, Eagle Creek, Herman Creek and others (Ibid).

Numerical objectives have not been developed for any of the natural spawning stocks in this section of the Columbia River or the minor tributaries.

Problems Impacting Fish Resources

The major habitat problems in this section of the river continue to be passage and flows at the mainstem dams. In addition, subbasin planners noted that some of the minor tributaries such as Mosier Creek, Willow Creek, Viento Creek and Rock



Creek have problems such as natural barriers, agricultural water diversion, culvert blockage and cattle grazing (Ibid). A major loss of habitat also occurred through inundation when the dams were constructed.

Also found in this section of the Columbia River are large irrigation pumps. These pumps, when not properly screened, attract downstream migrants out of the mainstem and into irrigation systems where they die. Table 1 shows the problems impacting the lower Columbia River.

Compensation programs for the losses incurred by the construction of the mainstem dams have been limited, improperly placed or non-existent.

Ongoing Actions In The Lower Mainstem Columbia River

A recently completed study described the extent of mortality associated with improperly screened irrigation pumps and recommended corrective actions. The recommended actions should be taken.

Hatchery production of tule fall chinook in the lower Columbia River typically takes place at Spring Creek National Fish Hatchery (NFH), Oxbow Hatchery, and Bonneville Hatchery. Bright fall chinook production takes place at Bonneville Hatchery. Adult trapping currently occurs at Bonneville and Spring Creek hatcheries. In recent years, tules have also been trapped from the remaining natural runs or shipped downriver from the Spring Creek facility to meet lower river hatchery needs. Additionally, bright fall chinook are provid-

ed from Priest Rapids Hatchery as they are needed or become available. Juvenile releases occur at the hatcheries.

Spring Creek National Fish Hatchery is located on the Columbia River near Underwood, Washington. The facility was improved in 1949 as part of the Mitchell Act Program. The facility was modernized in 1972 as part of the John Day Dam mitigation program. Tule fall chinook were then substituted for the bright fall chinook which spawned in that reach of the Columbia River. Broodstock for the Spring Creek program was originally trapped in the Big White Salmon River. The current release program for tule fall chinook is 15,000,000 fish. Releases occur at the hatchery with adults expected to return to the hatchery to provide the needed broodstock. Due to depressed runs in recent years broodstock has also been acquired by trapping adults at Bonneville Dam and transporting them to the hatchery.

With the exception of some of the recent yearly returns, Spring Creek National Fish Hatchery has been considered the most successful fall chinook hatchery on the Columbia River. Not only did it provide for harvest, the facility also routinely provided eggs for Klickitat, Little White Salmon and Abernathy hatcheries.

The success of the station can be further examined by its contribution to other programs during the 1960s. For example in 1965, eggs and fry were sent to Big White Salmon Rearing Pond, Eagle Creek, Entiat, Leavenworth and Carson National Fish hatcheries, the Western Fish Nutrition Laboratory and the Hanford Atomic Energy Laboratory for research, the Klickitat, Washougal and Grays River hatcheries of Washington, the Gnat Creek and Cedar Creek hatcheries of Oregon. In addition, a large number of fry from Spring Creek were released into the John Day River and Willamette River system. Adults were also sent to Little White Salmon Hatchery for their program.

The Bonneville Hatchery was initially improved under the Mitchell Act. The hatchery's bright fall chinook program was further modernized in the mid-1970s when half of the John Day Dam mitigation program was implemented at Bonneville Hatchery. The modernization included the construction of rearing facilities to provide for 95,000 pounds of production at 90 per pound or 8,500,000 subyearlings. Broodstock for the program was acquired by trapping adults at Bonneville Dam and from Priest Rapids Hatchery. Currently the broodstock are acquired from adult returns to the hatchery or from Priest Rapids. Trapping adults at Bonneville Dam no longer occurs. Over the years the hatchery has experimented with different sizes of release.

Recommended Actions For The Lower Mainstem Columbia River

(1) Irrigation pumps that are out of compliance should be immediately screened to conform to the screening criteria of the tribal and state fishery managers. State laws requiring screening should be enforced.

(2) Tributary problems such as those noted in the subbasin plan should be corrected. Riparian areas should be restored and impacts such as grazing be eliminated or restricted.

(3) The following changes are recommended for the release of bright fall chinook from Bonneville Hatchery. The majority of fish are to be released in existing natural production areas for fall chinook. Included in these releases are up to 8,000,000 subyearlings into the Hanford Reach of the Columbia River at Ringold Ponds and Hanford K Ponds, and help ensure the 1,700,000 release programmed for the Yakima River. In addition to the releases into the natural production areas, it is recommended that 500,000 fish be released into Rock Creek utilizing net pens. These releases will all provide additional opportunities for tribal fisheries and if necessary, following mixed stocked fisheries, the tribes could provide a small terminal fisheries in Rock Creek. Broodstock for the program would come from the existing and planned bright fall chinook adult trapping

programs in the Hanford area and Yakima River. Releases should occur at the existing final rearing and/or acclimation facilities in the natural production areas.

Because the Spring Creek NFH program plays such an integral part in the harvest management of chinook salmon in the Pacific Northwest major rearing and release changes are not recommended except for the small release to the Wind River.

(4) A program to restore lamprey in the tributaries should be developed by the relevant fishery managers. This program should be under the overall leadership of the tribes.

Table 2 shows the tribal recommended actions needed to restore the fish resources of the lower Columbia River system.

Table 1
Problems Impacting the Lower Columbia River Fish Resources

	Mainstem	Tributaries
Fish Screens	•	
Tributary Problems		•
Inadequate Production Compensation	•	

Table 2
Recommended Actions for the Lower Columbia River System

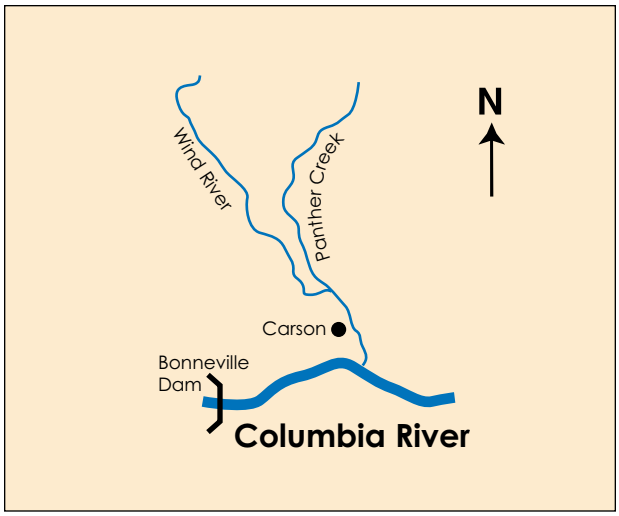
Problem	Recommended Action
Fish Screens	(1) Enforce state and federal screening requirements
Tributary	(2) Evaluate, correct, and restore riparian areas
Inadequate Production Compensation	
Fall chinook	(3) Implement new broodstock programs, release programs, and production programs
Lamprey	(4) Develop and implement programs in tributaries

WIND RIVER

Prepared by the Yakama Indian Nation

Introduction

The Wind River originates in the Gifford Pinchot National Forest in southwestern Washington. It is approximately 30.5 miles long and drains about 225 square miles. The subbasin is in the Cascade Mountains with elevation changes ranging from 3,200 feet at the source to 72 feet at the mouth (WDW, et. al., 1990). It flows southward and enters the Columbia River near Carson, Washington. Principal tributaries include Panther Creek, Trout Creek,Little Wind River, Bear Creek, and Paradise Creek.



Fish Populations Status/Goals

Carson National Fish Hatchery is located about 17 miles from the mouth of the Wind River. As part of the Mitchell Act program, it was constructed by the Corps of Engineers in 1952 and is operated by U.S Fish and Wildlife Service. The facility was designed and constructed to rear 2,600,000 spring chinook to yearling size.

The hatchery also serves as a trapping location for spring chinook. The facility has the unique history of being developed as the station that was to provide spring chinook eggs from upper Columbia River streams for transplanting to the lower Columbia River Mitchell Act hatcheries and tributaries. The program began with the trapping of adults at Bonneville Dam. This program was necessitated after the attempt to trap spring chinook in the upper Salmon River failed in the earlier 1950s.

Natural spawning of spring chinook in the upper Wind River did not occur until passage facilities were built at Shipherd Falls in 1956. As passage was restored and a spring chinook run established at the Carson National Fish Hatchery, natural spawning began in habitats above and below the hatchery. Juvenile chinook have been found in tributaries of the Wind River including Compass, Crater, Planting, Trout, and Trapper creeks. Existing habitat is in relatively good condition in the mainstem Wind River, although some tributaries have been rated fair to poor.

Natural spawning of tule fall chinook in the Wind River occurs in the mainstem below Shipherd Falls. Spawning also may occur in the Little Wind River, but surveys have not been completed for this tributary. Completion of Bonneville Dam inundated some habitats in the lower Wind River. Because tule fall chinook in the Columbia Basin are managed for hatchery production, any contribution from the natural production is minimal. Straying from the Spring Creek National Fish Hatchery is also likely occurring.

Natural spawning of summer and winter steelhead in the Wind River occurs primarily in the mainstem, but spawning also occurs in Trout Creek and Panther Creek. Juvenile steelhead have been found in several tributaries, including Trout, Panther, Bear, Trapper, Dry, and Paradise creeks. Prior to the passage at Shipherd Falls, only steelhead were known to pass the falls successfully. Exact locations and sizes of spawning populations are not well documented. The historic run size was estimated at 2,500 fish, while the present population is approximately 370 fish. Examination of steelhead hatchery release records reveals that steelhead from Beaver Creek, Goldendale, Skamania, and Vancouver

hatcheries have been released nearly every year since 1957. Releases were stopped in 1980 when an outbreak of infectious hematapoietic necrosis virus (IHN) at the Skamania Hatchery eliminated the stock. Releases have been and continue to be mostly smolts, even though the naturally spawning steelhead population is otherwise managed as a wild stock. Natural runs probably consist of offspring from the annual releases and the original stock that inhabited the system.

A small spawning population of coho persists in the Wind River. As in all tributaries except the Umatilla River, no attempt is being made to increase the natural spawning populations of coho in the Wind River. Straying from hatcheries is most likely the primary source of any natural production.

Numerical objectives for natural production of anadromous salmonids was not developed by subbasin planners. The recommended objectives were for tribal and sport subbasin harvests of 2,000 hatchery-released summer steelhead 200 hatchery-released winter steelhead, 5,000 spring chinook, and no subbasin harvest of fall chinook or coho. Table 1 shows the existing fish species, population status, and production goals for the Wind River.

Problems Impacting Fish Resources

Existing salmonid habitats in the Wind River system are in relatively good condition. Problems that were noted in the late 1940's were corrected as part of the Mitchell Act program. Most notable of the habitat improvements was the provision for fish passage at Shipherd Falls in 1956. Habitat problems noted in the subbasin plan are mainly related to timber harvesting practices. Throughout the subbasin there continues to be a need to restore riparian vegetation, reduce sediment delivery to streams, and ensure continuous recruitment of large woody debris into the system.

Management of fish resources for hatchery production has delayed restoration of natural populations. Hatchery production programs for the system were developed following construction of the fish passage device at Shipherd Falls. Spring chinook broodstock for Carson hatchery were trapped at Bonneville Dam. Programs to restore fish to natural habitats have been limited, improperly designed, or non-existent. Losses of some species have not been mitigated in any manner (for example, tule fall chinook and coho). Table 2 shows the problems impacting the Wind River system.

Ongoing Actions In The Wind River System

Progress has been made toward correcting habitat problems and providing improved timber harvest management through the Timber/Fish/Wildlife process (a cooperative natural resource arrangement among tribal, state and private land owners in Washington state).

Hatchery production of spring chinook in the Wind River occurs at Carson National Fish Hatchery. Releases mainly occur at the hatchery and at final rearing ponds on the Big White Salmon River. Broodstock are expected to return and be trapped at the hatchery. Over the years, Carson has been used to provide broodstock throughout the Columbia River system. Due to disease problems in recent years, the transfer of eggs and/or fish has decreased.

Summer run steelhead are currently released into the Wind River system as full-term reared smolts. Hatchery production of steelhead takes place at Skamania Trout Hatchery using Skamania stock. Past releases of steelhead in the Wind River also included releases from Carson National Fish Hatchery.

Recommended Actions For The Wind River System

(1) A diversion on Trout Creek is used to provide water for Wind River Nursery. The diversion dam has created fish passage problems, low water flows, and high water temperatures. The diversion dam should be removed and a well installed.

(2) Riparian vegetation throughout the watershed has been impacted by logging and development. The riparian vegetation should be restored. Logging and development in the riparian areas should be eliminated or

restricted to maintain water temperature, bank stability, nutrient delivery, and channel stability.

(3) Large woody debris is removed during logging and clearing of the riparian area. Large woody debris should be retained or restored to help maintain stream integrity.

(4) Sedimentation due to logging occurs throughout the system. Roads, yarding of logs, and mass wasting from timber harvest all contribute to sediment delivery. Other types of streamside development also may introduce substantial amounts of sediment to streams. Logging practices should be made to conform with strict water quality standards or else logging must be prohibited from the watershed.

(5) Runoff from the Wind River Nursery creates water quality problems in Martha Creek. The runoff from the nursery should be treated.

(6) Establish naturally-spawning populations of chinook, coho, and steelhead through supplementation. The existing hatchery program should be changed to begin developing a broodstock source from naturally-spawning populations in the Wind River. Adult holding capabilities at Carson hatchery must be modified to allow separation of adults. The use of the existing hatchery trap should be compatible with maintaining the existing genetic make-up of spring chinook above that location because the naturally spawning fish are derived from hatchery strays. Final rearing and/or acclimation facilities should be constructed in the natural production areas above and below the hatchery.

(7) Reprogram Spring Creek National Fish Hatchery to provide tule fall chinook for release into the natural production area of the lower Wind River. An annual release of up to 1,000,000 smolts should be started. Broodstock should continue to be acquired from the Spring Creek hatchery return.

(8) Reprogram Skamania Trout Hatchery to use Wind River broodstock for supplementation of the naturally spawning summer steelhead population. The hatchery located on the North Fork of the Washougal River near Washougal, Washington, was the first steelhead hatchery constructed as part of the Mitchell Act mitigation program for the Corps of Engineers mainstem dams. The facility is operated by the Washington Department of Fish and Wildlife and currently has the capacity to rear 650,000 smolts. Funding for the operation is provided by National Marine Fisheries Service. The Vancouver Hatchery, located near the I-205 Bridge in Vancouver, Washington, is operated as a satellite for the Skamania facility which allows the National Marine Fisheries Service to also fund that facility. Smolts are released in the Wind River. Broodstock for the program originated mainly from trapping adults in the Washougal River.

The existing broodstock collection does not provide for the use of naturally spawning stocks. To ensure the program is more responsive to the natural runs, new adult traps and final rearing and/or acclimation facilities should be constructed in natural production areas of the Wind River. These facilities could be used in conjunction with the spring chinook program.

(9) Release up to 500,000 juvenile coho from the Willard National Fish Hatchery. This program is to be coordinated with other proposals for Willard coho. Utilize final rearing and/or acclimation facilities for the release program in the natural production areas. Develop adult recapture facilities in the Wind River.

(10) The Carson hatchery water supply should be improved to expand hatchery capacity by 1,800,000 spring chinook yearling smolts.

(11) A program to restore lamprey should be developed by the relevant fishery managers. This program should be under the overall leadership of the tribes.

Table 3 shows the actions needed to restore the fish resources of the Wind River System.

Table 1
Wind River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	350[1]	5,000[2]
Steelhead	1,410[1]	2,000[2] S 200[2] W
Coho	NA	NE
Fall Chinook	1,800[3]	NE
Lamprey	NA	NE

[1] Based on 1985 - 1989 redd counts. Assumes 2.5 fish per redd. Rounded to the nearest tenth.
[2] Sport and tribal harvest
[3] Based on 1982 - 1986 redd counts. Assumes 6 fish per redd.

NA — Information not available
NE — None established

Table 2
Problems Impacting the Wind River Fish Resources

	Basinwide	Trout Creek	Martha Creek
Migration Barrier			•
Irrigation Diversions			•
Riparian Degradation		•	
Lack of Large Woody Debris	•		
Sedimentation	•		
Water Pollution			•
Inadequate Production Compensation		•	

Table 3
Recommended Actions for the Wind River System

Problem	Recommended Action
Migration Barriers	(1) Construct passage facilities
Irrigation Diversions	(2) Change to well system
Riparian Degradation	(3) Restore riparian vegetation
Limited Large Woody Debris	(4) Retain woody debris
Sedimentation	(5) Eliminate or restrict logging, streamside development
Water Pollution	(6) Treat runoff
Inadequate Production Compensation	
Spring chinook, Fall chinook, Steelhead, Coho	(7) Implement new broodstock programs, release programs, production programs
Lamprey	(8) Develop and implement programs

LITTLE WHITE SALMON RIVER

Prepared by the Yakama Indian Nation

Introduction

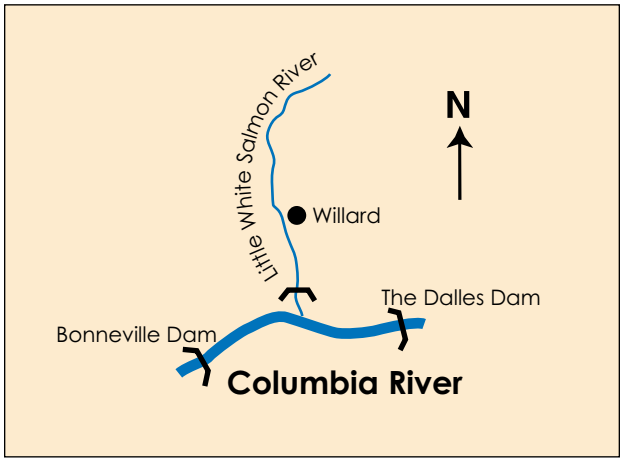
The Little White Salmon River originates in the Gifford Pinchot National Forest west of Monte Cristo Peak in southcentral Washington (WDW et.al., 1990). It drains approximately 134 square miles and flows south for 19 miles and enters the Columbia River near Cook, Washington.

Fish Populations Status/Goals

Prior to the construction of Bonneville Dam in 1938, a limited amount of natural production by anadromous fish occurred in the Little White Salmon River below a falls located approximately 2 miles above the mouth of the river. That section of the river was inundated by the construction of Bonneville Dam. Historically, fall chinook, spring chinook, coho and steelhead are believed to have utilized the area.

Currently only hatchery reared fish return to the river. Little White Salmon National Fish Hatchery was built in 1898 and is one of the oldest on the Columbia River system. It is operated by the U.S. Fish and Wildlife Service and is located approximately two miles above the mouth of the Little White Salmon River near Cook, Washington. The hatchery was modernized as part of the Mitchell Act Program in 1949.

Current spring chinook program goals provide for on-station releases of 500,000 yearling and 500,000 zero age juveniles. Spring chinook eggs for this program initially came from a variety of sources, including Carson National Fish Hatchery, Eagle Creek National Fish Hatchery, South Santiam Hatchery, and Klickitat Hatchery. The program is currently self-supporting, as broodstock are guided into the hatchery by a barrier dam. In recent years, the hatchery has become an exporter of eggs to other spring chinook stations. Current releases occur at the hatchery.



The fall chinook program at the Little White hatchery provides 1,700,000 pre-smolts for acclimation and release into the Yakima River and 1,800,000 for on-station release. Broodstock for the program are trapped at the hatchery rack. This program also is mostly self-sustaining.

Willard National Fish Hatchery is a Mitchell Act facility located upstream of the barrier falls on the Little White Salmon River at Willard, Washington. The hatchery currently produces 2,800,000 early run coho for direct release into the river. Returning adults are trapped at Little White Salmon hatchery and eggs are transported for incubation, rearing, and release at Willard hatchery.

Subbasin planners did not address natural production objectives for fish resources in the Little White Salmon River. However, salmon habitats in the upper watershed were characterized as good to excellent. Planners recommended sport and tribal harvest objectives of 2,000 spring chinook, and 200 bright fall chinook and coho. Table 1 shows the fish populations, status and goals.

Problems Impacting Fish Resources

Anadromous fish resources are impacted by the continual blockage at the falls and the barrier dam constructed to trap adults. The upper basin continues to be impacted by logging activities which have

resulted in passage problems created by improper culvert placement, sedimentation from logging and road building, and harvest of riparian trees.

Production programs have been designed to return fish to the hatchery with no natural production of anadromous salmonids in the system. Table 2 shows the problems impacting the Little White Salmon River.

Ongoing Actions In The Little White Salmon River System

Habitat management is being coordinated through the efforts of the Timber/Fish/ Wildlife process.

There are no efforts at present to introduce natural production of anadromous fish to the watershed above the barrier falls. Salmonid habitats are considered to be extensive and of high quality for spring chinook, steelhead, and coho.

Hatchery production of spring chinook at the Little White Salmon National Fish Hatchery currently supports a moderate sport and tribal harvest opportunity in Drano Lake. Over the years, Little White Salmon hatchery has also provided broodstock to hatcheries throughout the Columbia River system. Adults returning to the hatchery which are in excess of broodstock needs are also provided to the Yakama Indian Nation for subsistence use, particularly by those tribal members who no longer have access to fishing sites.

Hatchery production for coho in the Little White Salmon River takes place at Willard National Fish Hatchery. Fish are released at the hatchery with broodstock trapped at the barrier dam at the Little White Salmon hatchery.

Hatchery production of bright fall chinook also occurs at the Little White Salmon hatchery. Adult trapping currently occurs at the hatchery. In addition, bright fall chinook can be provided from Priest Rapids Hatchery and Bonneville Hatchery if shortfalls occur. Releases occur at the hatchery and Yakima River acclimation facilities.

Recommended Actions For The Little White Salmon River System

(1) Passage into the upper watershed should be provided at the natural falls and hatchery barrier dam for adult spawners. Improperly placed culverts in the upper watershed should be replaced.

(2) Sedimentation due to logging occurs throughout the system. Eliminating or restricting logging activities, including road construction, is necessary.

(3) The loss of the riparian area is occurring due to logging. Logging should be eliminated or restricted in the riparian area to allow the vegetation to recover.

(4) The hatchery spring chinook program should be replaced by a supplementation program to restore natural production to the Little White Salmon River above the barrier falls. The zero-age spring chinook program has not been successful and should be terminated. The available hatchery space should be used to rear additional spring chinook smolts or another species such as fall chinook. Broodstock would be acquired by trapping at the barrier dam.

(5) Coho produced at Willard national hatchery should be used to restore natural coho production in mid-Columbia tributaries and Wind River.

(6) A program to restore lamprey should be developed by the relevant fishery managers. This program should be under the overall leadership of the tribes.

Table 3 shows the tribal recommended actions needed to restore the fish resources of the Little White Salmon River system.

Table 1

Little White Salmon River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	0	2,000[1]
Steelhead	0	NE
Coho	0	200[1]
Fall Chinook	0	200[1]
Lamprey	NA	NE

[1] Sport and tribal harvest

NA — Information not available
NE — None established

Table 2

Problems Impacting the Little White Salmon River Fish Resources

	Basinwide	Upper L. White	Lower L. White
Migration Barrier			•
Sedimentation	•		
Riparian Degradation	•		
Inadequate Production Compensation	•		

Table 3

Recommended Actions for the Little White Salmon River System

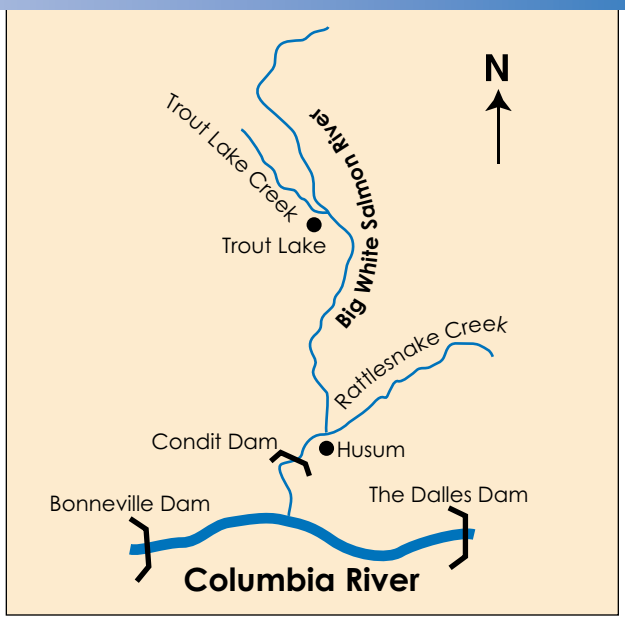
Problem	Recommended Action
Migration Barriers	(1) Construct passage facilities
Sedimentation	(2) Eliminate or restrict logging
Riparian Degradation	(3) Restore riparian vegetation
Inadequate Production Compensation	
Spring chinook, Fall chinook, Coho	(4) Implement new broodstock programs, release programs, production programs
Lamprey	(5) Develop and implement programs

BIG WHITE SALMON RIVER

Prepared by the Yakama Indian Nation

Introduction

The Big White Salmon River originates in the Gifford Pinchot National Forest in south central Washington along the southwest slope of Mount Adams. It drains approximately 386 square miles and flows south for 45 miles and enters the Columbia River at Underwood, Washington. Elevation ranges from the 12,307 foot Mount Adams down to 72 feet at the mouth. Principal tributaries include Trout Lake, Buck and Rattlesnake creeks (WDW, et.al., 1990).



Fish Populations Status/Goals

Natural production of anadromous salmonids in the Big White Salmon River is limited to the lower 3.3 miles downstream of Condit Dam. Condit Hydroelectric Project was constructed in 1913. Efforts to maintain fish ladders failed and the upper watershed was lost to anadromous fish by 1917. Based on oral records provided by longtime residents of the basin, tule fall chinook supported a vigorous tribal fishery at Husum Falls at river mile (RM) 8, and spring chinook, steelhead, coho, and perhaps chum salmon also were seasonally abundant in the upper watershed prior to dam construction.

Spring chinook currently are outplanted and released from U.S. Fish and Wildlife Service (USFWS) rearing ponds near Underwood. These fish are Carson stock taken for this purpose at Carson National Fish Hatchery on the Wind River. Stray adults are often observed in the river up to the splash pool below Condit Dam. Natural production is probably negligible due to lack of spawning habitat.

Prior to the construction of the dam, it is likely that fall chinook used the habitat up to a falls at approximately RM 16. Tule fall chinook natural production now is limited by the absence of suitable spawning and rearing habits below Condit, and by management of tule stocks for hatchery production. Straying from Spring Creek national hatchery probably contributes to some of the natural production.

Currently, there is a small, remnant spawning population of coho in the Big White Salmon River below Condit Dam. Past releases of hatchery fish into the Big White Salmon most likely are the source of any remaining natural production. Historically, coho most likely would have utilized the system above Condit Dam, including the tributaries of Buck Creek and Rattlesnake Creek. Detailed information on the historical distribution of coho in the system, other than the verbal reports cited above, is lacking.

Steelhead are believed to have been found in Trout Lake Creek and the upper Big White Salmon. Principal tributaries above the dam which also could have supported steelhead include Buck Creek, Little Buck Creek, Mill Creek, Spring Creek, Rattlesnake Creek, and Indian Creek. Natural spawning runs of summer and winter steelhead currently are limited to the lower 3.3 miles of river below Condit Dam. Restored passage or removal of Condit Dam would once again open the upper drainage to steelhead.

Harvest objectives established by subbasin planners for sport and tribal fisheries in the White Salmon River were 500 spring chinook, 100 fall chinook, 100 coho, 4,800 summer steelhead, and 800 winter steelhead. However, it is important to note that these objectives were not based on the potential for anadromous fish production in the upper watershed. In addition, note that most summer steelhead harvested in and at the mouth of the White Salmon River are not produced in the basin. Steelhead migrating to upriver tributaries of the Columbia River typically "dip in" to the cooler waters of the White Salmon. Natural spawning objectives were not addressed by the subbasin planners. Table 1 shows the fish populations, status and goals.

Problems Impacting Fish Resources

The major habitat impediment for restoration of the Big White Salmon River anadromous fish continues to be Condit Dam. Aside from being a barrier for anadromous fish passage to upriver habitats, the dam also is a barrier to the natural downstream movement of gravels that create and maintain spawning and rearing habitats in the lower river. Lack of spawning gravels is a major constraint to natural production of fall chinook and steelhead in the lower river. In addition, hydroelectric operations create instream flow fluctuations in the bypass reach of the river between the dam and the powerhouse 1.3 miles downstream that may strand and dewater juvenile salmonids.

In comparison to other subbasins in the upper Columbia, the White Salmon watershed has been characterized as being moderately developed. Subbasin planners identified logging and associated road building, unscreened irrigation diversions, land development, and riparian grazing as constraints to fish production in the upper watershed. These problems have resulted in increased sedimentation, reduced riparian vegetation, loss of large woody debris, reduced instream flow in the upper watershed, and increased summer temperature in the tributaries.

The 8.3-mile section of river above Condit Dam has been included in the federal Wild and Scenic River program. However, this section is mostly narrow canyon and does not suffer the extensive habitat disturbances cited above.

Ongoing Actions In The Big White Salmon River System

There has been virtually no mitigation for losses of fish production and fisheries in the Big White Salmon River. Existing programs call for releases of spring chinook at USFWS Big White Salmon Ponds and steelhead from net pens operated by a local recreational fishing group. These release programs are to provide only for fisheries. There are no programs to actively rebuild natural production of any stock in the basin. Table 2 shows the problems impacting the fish resources of the Big White Salmon River system.

Hatchery spring chinook juveniles are reared and released into the Big White Salmon River at Big White Salmon Ponds. This program is a discretionary use of broodstock from Carson National Fish Hatchery that are in excess of on-station and other identified program needs.

Hatchery steelhead smolts, including both summer and winter runs from Skamania or Vancouver hatcheries, are released on an annual basis in the Big White Salmon River to provide for sport fisheries. In addition, the Washington Department of Fish and Wildlife provides a local sport group with steelhead to be reared in net pens in Northwestern Lake. These fish are then released below Condit Dam. Broodstock for the programs has been acquired from Skamania and Beaver Creek hatchery stocks.

The Condit Hydroelectric Project is currently being reviewed for relicensing by the Federal Energy Regulatory Commission (FERC). A major part of the required consultation between PacifiCorp and the fish and wildlife managers in the relicensing process involves planning for the mitigation of lost fishery resources in the basin. To date, PacifiCorp has proposed no mitigation other than continuation of the status quo, with the exception of increasing the level of spring chinook releases from Big White

Salmon Ponds. The fishery agencies are agreed, however, that restoration of passage for anadromous salmonids into the upper watershed must be a condition of relicensing. The FERC is now preparing an Environmental Impact Statement for the project which should be available in fall of 1994.

Recommended Actions For The Big White Salmon River System

(1) Condit Dam continues to be the most serious habitat problem in the subbasin. Passage should be provided. The most biologically appropriate method is dam removal. Passage facilities should also be constructed at a natural falls located at RM 16.3.

(2) Instream flow levels should be designated, and irrigation diversions should be screened according to the criteria developed by the fishery managers.

(3) Protection of the riparian area is necessary to reduce the introduction of sediments into the river, maintain large woody debris, and restore riparian vegetation. Streams should be fenced to preclude grazing, and logging in the riparian area should be prohibited to allow recovery of large trees and riparian vegetation. Development should be severely restricted within riparian areas.

(4) The Big White Salmon Ponds are operated as a satellite facility of the Carson National Fish Hatchery and are funded by the Mitchell Act. They have the capacity to rear 1,450,000 spring chinook yearlings. Releases from the Big White Salmon Ponds should be terminated and the releases directed to natural production areas in the Big White Salmon River and other natural production areas as determined by the fishery managers. The broodstock for the Big White Salmon Ponds should be acquired from those tributaries that will be supplemented and the progeny separately reared.

Skamania and Vancouver Trout hatcheries have the capacity to rear 650,000 smolts. Funding for the operation is provided by National Marine Fisheries Service. Smolts from these facilities are released into the Big White Salmon River. The existing broodstock collection protocol does not provide for the use of naturally spawning stocks. To ensure the program is more compatible with the natural runs, new adult traps and final rearing and/or acclimation facilities should be constructed in natural production areas of the Big White Salmon River.

(5) A program to restore lamprey should be developed by the relevant fishery managers. This program should be under the overall leadership of the tribes.

Table 3 shows the tribal recommended actions needed to restore the fish resources of the Big White Salmon River system.

Table 1

Big White Salmon River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	NA	500[1]
Steelhead	NA	4,800[1] S 800[1] W
Coho	NA	100[1]
Fall Chinook	NA	100[1]
Lamprey	NA	NE

[1] Sport and tribal harvest

NA — Information not available
NE — None established

Table 2

Problems Impacting the Little White Salmon River Fish Resources

	Basinwide	Upper Big White	Lower Big White	Tributaries
Migration Barrier		•		•
Irrigation Diversions	•		•	
Riparian Degradation		•		
Lack of Large Woody Debris	•			
Sedimentation		•		
Inadequate Production Compensation		•		

Table 3

Recommended Actions for the Big White Salmon River System

Problem	Recommended Action
Migration Barriers	(1) Construct passage facilities, remove Condit Dam
Irrigation Diversions	(2) Screen diversions
Riparian Degradation	(3) Restore riparian vegetation
Limited Large Woody Debris	(4) Retain woody debris
Sedimentation	(5) Eliminate or restrict logging, grazing
Inadequate Production Compensation	
Spring chinook, Fall chinook, Steelhead, Coho	(6) Implement new broodstock programs, release programs, production programs
Lamprey	(7) Develop and implement programs

HOOD RIVER

Prepared by the Confederated Tribes of the Warm Springs Reservation of Oregon

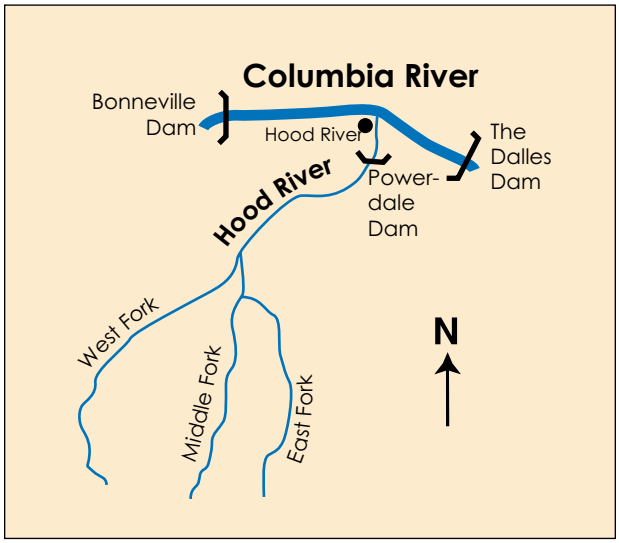
The Hood River, located in north central Oregon, flows in a northeasterly direction to enter the Columbia River at approximately river mile (RM) 169. The subbasin covers 352 square miles, approximately 225,352 acres.

The Hood River subbasin supports naturally producing populations of spring and fall chinook salmon, coho salmon, and summer and winter steelhead. Pacific lamprey were sighted in the river at the time Powerdale Dam was built in 1925. Salmonids must pass one mainstem dam on the Columbia River and one dam 4.0 miles up the Hood River mainstem. The entire Hood River subbasin is located within the ceded lands of the Confederated Tribes of the Warm Springs Indian Reservation of Oregon and thus the fisheries resources are co-managed by the Confederated Tribes of Warm Springs and the Oregon Department of Fish and Wildlife.

Today many of the anadromous species present in the Hood River subbasin are considered to be depressed. This could be due to a combination of watershed problems, water quality, over-harvest and unscreened or poorly screened irrigation diversions.

Land in the Hood River subbasin is owned by the U. S. Forest Service, Hood River county, Pacific Power and Light and other private landowners. Much of the subbasin has been used in the past for timber production and fruit orchard production.

Restoration of the anadromous fish populations in the Hood River subbasin will need to incorporate a combination of improved natural fish production and supplementation with cultured fish. Improved natural production could occur through improvements in the screening of irrigation diversions, habitat restoration and passage restoration. Supplementation with cultured fish will enhance production in areas that are not currently fully seeded.



Restoration Actions

1. Screen the East Fork Irrigation District diversion and improve other screens.
2. Implement the Hood River Production Project (supplementation).
3. Continue collection of data for the Hood River Production Project.
4. Enforce water quality standards.
5. Restore in-stream flows.
6. Acquire in-stream water rights for fish.
7. Continue habitat restoration projects in the subbasin.

Benefits: Run Size Goals

Species Produced	Naturally Produced	Hatchery	Total
Spring Chinook	400	1,300	1,700
Summer Steelhead	1,200	6,800	8,000
Winter Steelhead	1,200	3,800	5,000

Harvest guidelines will be determined by policy decision by the Confederated Tribes of Warm Springs and the Oregon Department of Fish and Wildlife.

Table 1

Recent Escapement to Powerdale Dam (River Mile 4.0)

Run Year	Species	Unmarked	Hatchery	Stray
1992	Spring Chinook	35		411
1993	Spring Chinook	530[1]		156
1992-93	Summer Steelhead	484	1,682	56
1991-92	Winter Steelhead	662	245	32
1992-93	Winter Steelhead	392	185	29
1992	Coho	23	0	80
1993	Coho	0	0	32

[1] Scale analysis is not complete.

KLICKITAT RIVER

Prepared by the Yakama Indian Nation

Introduction

The Klickitat River originates at 4,400 feet along the east slope of the Cascade Mountains in south central Washington. It bounded on the west by Mount Adams, the north by Goat Rocks and the Simcoe Mountains on the east (YIN, et.al., 1990). It drains an area of 1,350 square miles. It flows generally southward for 95.7 miles and enters the Columbia River near Lyle, Washington. Principal tributaries include the West Fork of the Klickitat, Big Muddy, Summit, and Outlet creeks, and the Little Klickitat River.

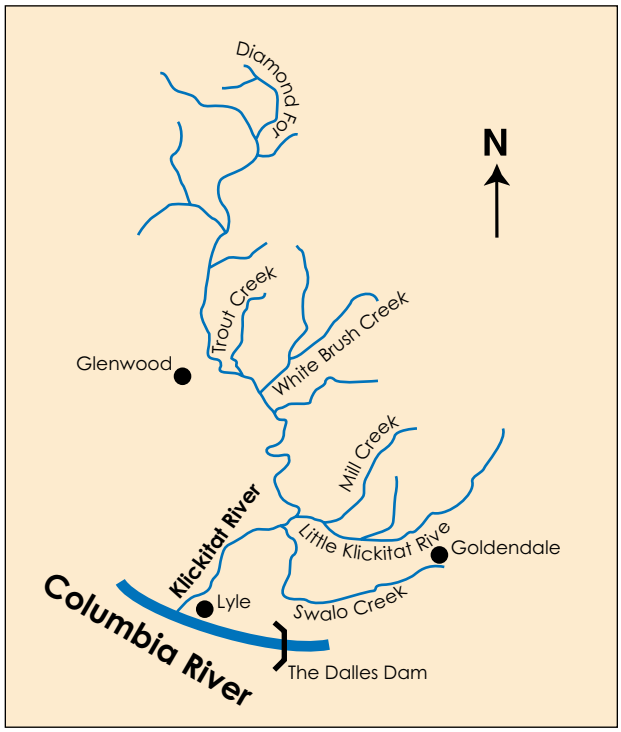
Fish Population Status and Goals

Spring chinook spawning has been documented in the mainstem as far upstream as river mile (RM) 84, although little spawning occurs above Castile Falls at RM 64. Tributary spawning by spring chinook is not known to occur, although juveniles have been found in the lower reaches of several tributaries.

Natural production of hatchery-origin fall chinook evidently occurs in the Klickitat River. Since the termination of tule releases from the Klickitat Hatchery in 1987 (see below), slightly over half of this run appears to have been upriver brights.

There is a small spawning population of coho in the Klickitat subbasin, probably derived from hatchery releases. Currently no attempt is being made to increase the natural spawning populations of coho in the Klickitat River. Few efforts have been made to determine the size of the natural run through redd counts or other means. Straying from hatcheries continues to be the primary source of any natural production.

The Klickitat River is one of the major steelhead rivers in this section of the Columbia River. A large spawning population is believed to have been present in the river historically. Escapements today



probably average less than 1,000 adults.

Subbasin planners' recommended objectives are to increase the spring chinook run size to 20,000 fish, the fall chinook run by 40,000 fish, coho by 50,000 fish and summer steelhead to 25,000 fish (subsequent plans call for 12,000 steelhead). Table 1 summarizes fish population status and goals.

Problems Impacting Fish Resources

Adult passage improvements in the Klickitat River have not been very effective, particularly at Castile Falls. Spring chinook access to habitat in the upper Klickitat River is also impacted by a barrier dam at the Klickitat Hatchery. In addition, poor design and maintenance of forest road crossings inhibits passage of steelhead and resident salmonids in tributaries.

Castile Falls (RM 64) presents a serious obstacle to upstream migration of spring chinook, despite passage improvements. Irregular fishway maintenance prior to 1988 doubtless contributed to the problem.

In addition to a lack of maintenance, fishway design may be faulty. Adult migrants during summer and fall have no alternative to the tunnel, as a dam was constructed at the uppermost falls to divert water into the tunnel intake.

The deeply incised lower Klickitat River has remained relatively isolated and has few of the problems with diking, channelization, shoreline development or irrigation withdrawals that are common to rivers east of the Cascade crest. The mainstem is affected by intrusion of roads into its narrow floodplain, and its lower tributaries are heavily grazed. Among the lower tributaries, the Little Klickitat drainage is heavily logged and roaded in its upper reaches, and is grazed and diverted further downstream. Nutrients from farming and a sewage treatment outfall cause excessive algal growth in the Little Klickitat. Smaller tributaries share many of the same problems.

Much of the Klickitat subbasin is forested and most of that lies within the Yakama Indian Reservation. On the reservation, logging, construction and use of logging roads, and cattle grazing are the principal activities affecting the Klickitat River and its tributaries. Streams in the forested portion of the subbasin, both on and off the Yakama Indian Reservation, have suffered from past forest practices, including timber harvest and road construction in riparian areas, poor design and maintenance of roads and crossings, skidding on steep slopes and upstream channels, off-season use of wet roads with resulting erosion, and facilitation of overgrazing by providing cattle access over logging roads to riparian areas. In spite of more regulation, most of these problems are continuing to some degree.

The Klickitat River, Diamond Fork and Piscoe Creek contain nearly 30 miles of accessible fish habitat, most of it in the Klickitat River. The Upper Klickitat River flows through McCormick Meadow in the tribally designated Primitive Area, which has been heavily grazed for many years. Aerial photographs reveal that the river channel in this meadow and others nearby has been seriously damaged during 50 years or more of cattle use. In spite of its remoteness, this section of river is now poor habitat for resident or anadromous fish. It can be restored, but not as long as cattle are present. Cattle can be kept out of this steep-sided valley without interfering with tribal hunting, fishing and other cultural uses. In fact, these uses will be enhanced, with benefits to many tribal members, if the valley is protected.

Big Muddy and Little Muddy creeks drain glaciers on the east slope of Mount Adams. During the warmest months, the sediment plume from these tributaries colors the Klickitat River from the West Fork to the Columbia River 63 miles downstream. Glacial melt and landslides in the Big Muddy Creek watershed add significant amounts of fine particles to Klickitat River gravels during the summer when velocities in the river are too low to flush fine particles and when spring chinook are ascending the river to spawn. Table 2 summarizes problems impacting fish resources.

Ongoing Actions In The Klickitat River System

Some passage improvements have been made at natural barriers at Lyle Falls and Castile Falls. Reconstruction is needed at both locations to facilitate fish passage and broodstock collection. Livestock grazing has been eliminated in part of the west half of the subbasin, within the closed area of the Yakama Indian Reservation.

The Klickitat Hatchery was the first facility authorized for construction in 1948 as part of the Mitchell Act Program. Construction funds were provided by the Corps of Engineers as part of their mainstem dam construction. It is operated by the Washington Department of Fish and Wildlife and is located on the Klickitat River near Glenwood, Washington. It currently rears 600,000 spring chinook smolts for release at the hatchery.

The Klickitat Hatchery continues to rear spring chinook, bright fall chinook and early coho, releasing them as smolts at the hatchery. Returns to the facility are the main source of spring chinook eggs, while transfers from other facilities are usually necessary to meet fall chinook and coho egg take requirements.

The original spring chinook program at the Klickitat Hatchery began with eggs from Carson hatchery and adults trapped in the Klickitat River. Adults are diverted into the hatchery by a barrier dam. Some adults are able to pass the barrier dam and spawn in natural production areas above the hatchery site. While field observations indicate crossbreeding between natural-origin and hatchery-origin spring chinook, genetic analysis indicates a degree of separation between the two groups.
Harvest of spring chinook in the Klickitat River is currently managed to provide adequate escapement to Klickitat Hatchery. The fisheries are intended to be conservative because of difficulties in forecasting the run. General non-treaty angling regulations are published annually by the Washington Department of Fish and Wildlife and are subject to in-season emergency action, if necessary.

The dip net fishery in the Lyle Falls reach of the Klickitat River has been an important fishery to Indian people since before the arrival of the first white settlers. This fishery continues to play an important role in meeting the subsistence needs of Yakama Indians, in providing income from fish sales during commercial seasons, and in fulfilling the treaty share of tributary spring chinook harvest in the Columbia Basin. The Klickitat provides one of the few opportunities for spring chinook harvest by tribal members while other Columbia Basin spring chinook stocks remain at low levels of abundance. Enhancement objectives must take into account the need for a significant harvest of spring chinook concurrently with efforts to rebuild the run.

The Klickitat fall chinook program was originally developed to rear tule fall chinook from the Spring Creek hatchery. When the Spring Creek program failed to provide the necessary eggs, the program was changed to bright fall chinook. This program also was intended to provide a better quality fish for the tribal terminal fishery in the lower Klickitat River. The Klickitat program has the capacity to rear 4,000,000 fall chinook smolts for release at the hatchery. Broodstock for the program comes from a variety of sources including Priest Rapids Hatchery, Lyons Ferry Hatchery and Bonneville Hatchery.

The Klickitat Hatchery rears 1,350,000 early-run coho for release from acclimation ponds at the facility. Skamania Salmon Hatchery, located on the Washougal River, also releases late coho into the Klickitat River. The late-run coho releases provide for a late fall terminal fishery, as part of the *U.S. v. Oregon* Columbia River Fish Management Plan.

The current Skamania program calls for rearing 2,500,000 late- run coho for release at RM 26 of the Klickitat River. Broodstock are trapped at the Skamania Hatchery or are provided from other Washington Department of Fish and Wildlife hatcheries. Acclimation facilities for these releases are being developed.

Summer-run steelhead from the Skamania Trout Hatchery and Vancouver Hatchery are currently released directly into the Klickitat River. Broodstock is made up of Skamania Hatchery returns, although founding broodstock for the Skamania stock included adults trapped in the Klickitat River. Like the Wind River, the Klickitat River has had releases from the Skamania Trout and Vancouver hatcheries for over 30 years, averaging about 100,000 smolts per year. Releases were also made from the Beaver Creek Hatchery, Goldendale Hatchery, and Naches Hatchery. Unlike the Wind River where steelhead releases were terminated because of infectious hematopoietic necrosis virus (IHN), releases in the Klickitat were only decreased. Steelhead releases in the Klickitat are mainly to provide for sport fisheries in the river.

The *U.S. v. Oregon* management plan stipulates that steelhead harvest shares be based on the aggregate of mainstem and tributary catches by tribal and recreational fisheries and, further, that neither the treaty share nor the non-treaty share shall exceed 50 percent of the aggregate harvestable steelhead. Within this framework, each season's regulations for the Klickitat River are developed through consultation between the Washington Department of Fish and Wildlife and the Yakama Indian Nation.

Along with Klickitat spring chinook, the Klickitat summer steelhead harvest is important to the subsistence fishing needs of Yakama tribal members. Enhancement objectives must take into account the

need for continued treaty harvest while runs are being rebuilt.

Hatchery releases in the Klickitat River have failed to restore natural runs of spring chinook and steelhead. The Yakama Indian Nation initiated planning in 1982 to restore natural runs through supplementation. However, the Klickitat portion of the Yakima/Klickitat Fisheries Project has not proceeded beyond the planning stage.

Recommended Actions for the Klickitat River Subbasin

(1) Implement the Klickitat portion of the Yakima/Klickitat Fisheries Project, retaining the following elements:
(a) use of natural broodstock, (b) final rearing and/or acclimation facilities in natural production areas, (c) supplementation of natural escapement to a level consistent with subbasin carrying capacity, and (d) development and use of excess hatchery production to augment harvest.

(2) Acclimate coho smolts released in the Klickitat River under the U.S. v. Oregon agreement to improve their homing characteristics and survival to terminal fisheries.

(3) Correct problems with fish passage in the Klickitat mainstem. At Castile Falls, this will include increasing attraction flow, adding a sluice gate, and modifying some of the falls. The Lyle Falls fishway must be modified to allow effective broodstock collection under the planned Yakima/Klickitat Fisheries Project.

(4) Improve forest roads and stream crossings. On the Yakama Indian Reservation, a maintenance and rehabilitation program should be funded by commercial users of forest roads.

(5) Improve monitoring of forest practices and their effects on fish habitat. The Bureau of Indian Affairs, in keeping with their trust responsibilities on the Yakama Reservation, must fully implement the environmental protection policies in their 1993 forest management plan.

(6) Change grazing management to allow the restoration of wet meadows and riparian areas. Specifically, close the upper Klickitat River to cattle grazing with a cross fence above the Diamond Fork. Exclude cattle from the trampled meadows at the upper and lower ends of Piscoe Creek. The Bureau of Indian Affairs and the Washington Department of Natural Resources must fund enforcement of range regulations to prevent concentration of cattle in sensitive areas.

(7) Strengthen regulations and their enforcement to deal with point-source and nonpoint-source pollution of lower Klickitat River tributaries.

(8) If shown to be feasible, construct a hydroelectric facility at Big Muddy Creek in conjunction with a sediment removal system to make generation possible and also benefit natural production of chinook.

Table 3 summarizes recommended actions needed to restore fish resources of the Klickitat River system.

Table 1
Klickitat River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	3,736	20,000
Steelhead	NA	25,000
Coho	7,054	50,000[1]
Fall Chinook	3,575	40,000[1]
Lamprey	NA	NE

[1] Goal includes ocean and inriver harvest
NA — Information not available
NE — None established

Table 2

Problems Impacting the Klickitat River Fish Resources

	Basinwide	Upper Klickitat	Lower Klickitat	Tributaries
Depressed Runs			•	
Migration Barriers				•
Forest Practices			•	•
Overgrazing			•	•
Poor Tributary Water Quality			•	
Glacial Sediment			•	

Table 3

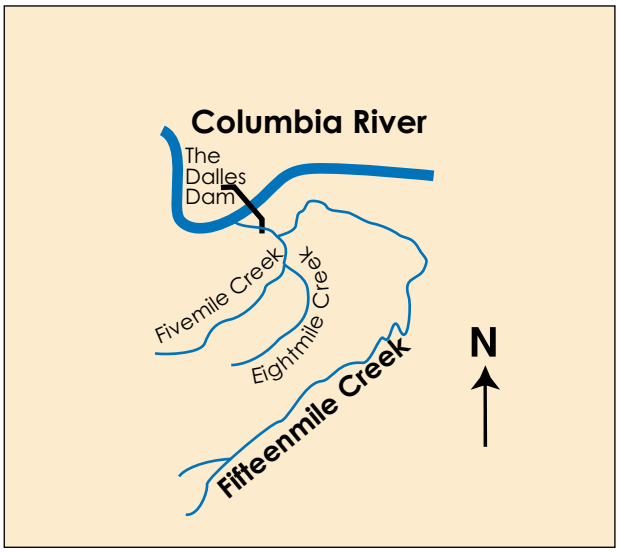
Recommended Actions for the Klickitat River System

Problem	Recommended Action
Depressed Runs	(1) Implement Klickitat Production Project, acclimate *U.S. v. Oregon* coho
Migration Barriers	(2) Improve Castile Falls and Lyle Falls fishways
Forest Practices	(3) Improve forest roads and stream crossings, monitor forest practices and their effects
Overgrazing	(4) Change grazing management, exclude cattle from sensitive areas
Poor Tributary Water Quality	(5) Strengthen pollution regulations and their enforcement
Glacial Sediment	(6) Investigate tributary hydroelectric plant with sediment removal system

FIFTEENMILE CREEK

Prepared by the Confederated Tribes of the Warms Springs Reservation of Oregon

The Fifteenmile Creek drainage, located in north central Oregon, heads in the Mount Hood National Forest just east of Mount Hood. Fifteenmile Creek flows in a northeasterly direction out of the timbered higher elevations before circling north through the dryland wheat country southeast of The Dalles to enter the Columbia River at approximately river mile (RM) 192. The Fifteenmile Creek drainage is bounded on the west by the Mosier, Mill, Threemile, and Hood River drainages; on the south by the White River drainage; and on the east by the Deschutes River drainage.



The Fifteenmile Creek drainage encompasses approximately 373 square miles. The mainstem of Fifteenmile Creek rises approximately 6,140 feet in the 49 miles from the mouth to its headwaters on Lookout Mountain. Fifteenmile Creek from the mouth to RM 43.6 is a relatively low gradient stream averaging approximately a 0.6 percent grade. From RM 43.6 to its headwaters, located approximately 5.4 miles upstream, the stream gradient increases markedly. The only other tributary streams with any significant year-round flow generally follow a similar pattern. Average stream gradient in the lower 25.5 miles of Eightmile Creek and all of Ramsey and Fivemile creeks is less than or equal to a 2 percent grade. Stream gradient in the upper 3.9 miles of Eightmile Creek and in the North, Middle, and South forks of Fivemile Creek is generally classified as moderate to high, averaging approximately 6.7 percent, 2.2 percent, 2.9 percent,and 3.4 percent, respectively.

The Fifteenmile Creek drainage supports the eastern most population of wild winter steelhead in the Columbia River system. Hatchery winter steelhead have never been released into the drainage. Biologists believe that the existing population is a unique stock of wild fish.

No quantitative and very little qualitative life history information exists on the Fifteenmile Creek stock of wild winter steelhead. It is assumed that the wild run has a life history cycle similar to that of winter steelhead in lower Columbia River subbasins. Winter steelhead return to the Fifteenmile Creek drainage from February through March, primarily as l-salt and 2-salt fish; spawn from March through April; emerge from early June through mid-July; and migrate as smolts during April and May, primarily as age-2+ and age-3+ juveniles. No data is available on age structure, sex ratio, length-weight ratio, fecundity, and egg-to-smolt and smolt-to-adult survival rates.

We assume that the run is presently in fairly good shape, but still at a low level. Based on what limited information is available on the spatial distribution of the population, managers believe that approximately 91 linear miles of suitable spawning habitat and 44 linear miles of suitable rearing habitat are currently available for use by winter steelhead in Fifteenmile Creek; Eightmile and Ramsey creeks, tributaries to Fifteenmile Creek; and Fifteenmile and Fivemile Creek, tributary to Eightmile Creek. The winter steelhead fishery currently harvests only a very limited number of fish. We do not have run size estimates; but the figure is probably 200 to 300 adults.

Production is limited by various land practices in the drainage:

- Intensive agricultural use and associated soil erosion, low summer flows and elevated water temperatures.

- Elimination and degradation of riparian zones due to dry land farming and open rangeland.

- Logging practices that have curtailed the systems ability to store water and regulate runoff.

- Artificial channelization from two major flood events.

Actions

1. Monitor run size (harvest and escapement).

2. Monitor smolt production.

3. Determine spatial distribution.

4. Gather life history information.

5. Estimate juvenile rearing densities.

6. Protect and enhance aquatic and riparian habitat.

7. Maintain and improve passage.

8. Encourage exceedance of the State Forest Practices Act guidelines.

9. Increase streambank cover, decrease water temperatures during the summer and increase streamflow.

DESCHUTES RIVER

Prepared by the Confederated Tribes of the Warm Springs Reservation of Oregon

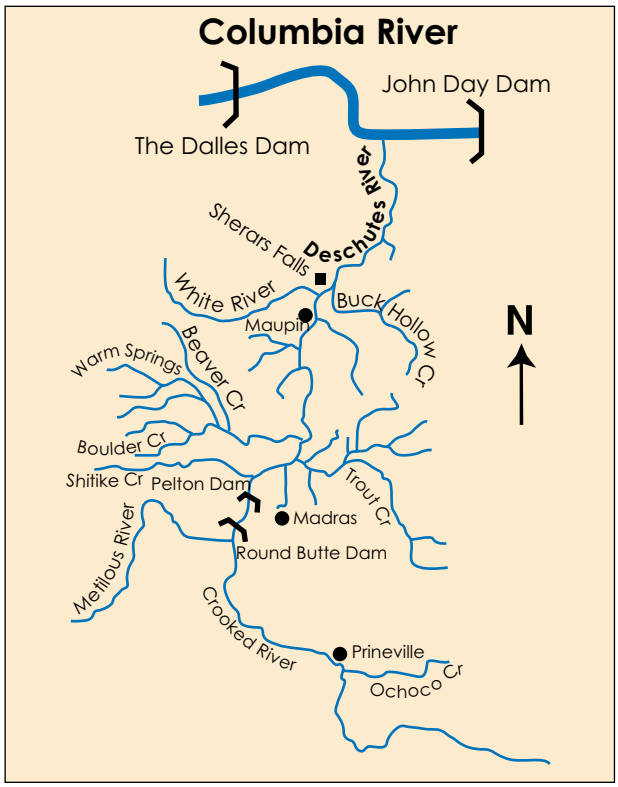
The Deschutes River subbasin covers approximately 10,500 square miles in north-central Oregon, and enters the Columbia River 205 miles from the ocean. The Deschutes River supports wild runs of spring and fall chinook salmon, sockeye salmon, summer steelhead, and Pacific lamprey. These species must pass two mainstem dams to enter the basin.

Land ownership in the lower Deschutes River subbasin is primarily private (62%), followed by tribal (21%). Agriculture is a major land use in the basin, and grazing is widespread.

Fish production potential in the subbasin is limited by physical and environmental factors and impacts of land and water uses. Constraints to fish production include low flow and high temperatures in tributaries during summer and fall, sediment in tributaries and the Deschutes River, and loss of fish at unscreened irrigation diversions.

Spring chinook salmon and steelhead spawned historically in the mainstem Deschutes River up to Steelhead Falls at river mile (RM) 128, in Squaw Creek, and in the Metolius River. Steelhead also spawned in the Crooked River. Summer and fall flows may have limited the distribution of fall chinook salmon to the 44 miles of river below Sherars Falls before a fish ladder was built at the falls in the 1940s. Sockeye salmon historically originated in Suttle Lake. Construction of a small power dam and installation of screens at the outlet of Suttle Lake in the 1930s reduced passage of sockeye salmon to and from the lake, but did not eliminate the run in the Deschutes River.

Construction of Pelton and Round Butte Dams at RM 100, completed in 1958 and 1964, respectively, included upstream passage facilities for adult spring chinook salmon and steelhead and downstream facilities for migrating juveniles. Downstream passage facilities at the dams proved insufficient to sustain natural runs above the dams.



Currently, natural production of spring chinook is limited to the Warm Springs River and Shitike Creek, both located on the Warm Springs Indian Reservation. Fall chinook salmon spawn throughout the Deschutes River from the river mouth to Pelton Reregulating Dam. Summer steelhead occur throughout the mainstem Deschutes River below Pelton Reregulating Dam and in most tributaries below the dam. Lake Billy Chinook now has a large population of kokanee. Currently, a small run of sockeye is maintained by incidental passage of smolts through the dam turbines.

The number of salmon and steelhead returning to the Deschutes River has been estimated annually since 1977 by creel surveys of the recreational and tribal fisheries at Sherars Falls and counts at Pelton trap and Warm Springs National Fish Hatchery (WSNFH).

Round Butte Hatchery (RBH) was constructed by Portland General Electric to mitigate for the lost production of salmon and steelhead above the Pelton-Round Butte hydroelectric project. Operation of RBH began in 1972. Smolts reared in Pelton Ladder have helped achieve increased adult returns to the Deschutes River (ODFW, CTWSR, 1991). The U.S. Fish and Wildlife Service operates WSNFH, located on the Warm Springs River nine miles upstream from its confluence with the Deschutes River. Production began in 1978. Since 1980, the return of spring chinook salmon hatchery fish to the Deschutes River has averaged 3,100, with a high return of 6,900 in 1989 and a low return since 1985 of 2,524 in 1993.

The Warm Springs River above Warm Springs National Fish Hatchery and Shitike Creek are currently managed for natural fish only. All fish released from RBH and WSNFH are externally marked to allow escapement of only natural fish above WSNFH. Returns of wild spring chinook salmon have ranged from a high of 3,895 in 1977 to a low of 968 in 1993, and have averaged 1,891. Based on a stock-recruitment model developed by Lindsay et al. (1989), the recommended escapement goal for wild spring chinook salmon above WSNFH is 1,300 adults.

The run size of natural summer steelhead averaged 7,780 through 1987. From 1988 to 1992, the run size of natural summer steelhead averaged 3,698 fish ranging from a low of 910 in 1992 to a high of 4,829. Three of the last five run years have been the lowest recorded since run size estimation began in 1977.

Returns of fall chinook salmon in the lower Deschutes River subbasin are entirely from the wild stock, and from 1977 through 1988 averaged 9,420 fish annually. From 1989 to 1992, the run size averaged 5,730 fish. In 1993, the largest run size of adult fall chinook salmon since 1977, 8,250 fish, returned to the Deschutes River. The return of jacks could not be estimated, but was believed to be very low. Only 13% of the total escapement in 1993 passed above Sherars Falls. From 1980 to 1992, escapement above Sherars Falls averaged 76% of the total escapement. The reason for the change in spawning escapement distribution is unknown.

Through 1988, the number of sockeye salmon returning to the Deschutes River has averaged 127 sockeye, ranging from 29 to 338 fish. Since 1988, the run has averaged only 44 fish. Only seven fish returned to Pelton trap in 1992 and one in 1993.

Very little information is available regarding Pacific lamprey in the Deschutes River subbasin.

Salmon and steelhead provide important fisheries for tribal and recreational fishers. There were no recreational or tribal fisheries for spring chinook salmon in 1981 and 1984. Because of the anticipated record low return of wild spring chinook in 1994, there will be no recreational fishery and the tribal fishery is likely to be severely restricted. Since 1991, recreational and tribal fisheries for fall chinook salmon at Sherars Falls have been severely restricted or closed, because of the low level of escapement above the falls. Retention of wild steelhead is forbidden in recreational fisheries. Tribal ceremonial and subsistence fisheries for sockeye salmon occurred historically in the Deschutes River. Currently, no target fishery for sockeye occurs, although incidental harvest occurs in fisheries at Sherars Falls.

Species	Average Run Size	Annual Harvest
Spring chinook:	8,500-12,000	5,500-8,000
Fall chinook:	10,000-12,000	4,000-5,000
Sockeye:	5,000	1,500
Steelhead:	16,000-22,000	5,000-11,000

Harvest is for both recreational and tribal fisheries combined, and includes adults and jacks.

The following goals were developed by subbasin planners for anadromous stocks in the Deschutes River:

Objectives for the subbasin are:

1. Maximize the protection and enhancement of aquatic and riparian habitat on all land bordering the Deschutes River and its tributaries to result in a net increase in habitat quantity and quality over time.
2. Maintain or improve watershed conditions for the sustained, long-term production of fisheries and high quality water.

3. Maintain or improve flow for fish production in the tributaries of the Deschutes River.

Strategies

1. Support enforcement of existing laws and regulations concerning habitat protection by agencies with enforcement authority.

2. Support implementation of existing land and resource management plans.

3. The Oregon Department of Fish & Wildlife should apply for instream water rights for fish protection.

Actions

Detailed recommended restoration strategies are found in the Deschutes River Subbasin Plan (1990). Below are four important strategies from that plan.

Spring Chinook - Strategy 5 - A combination of natural production enhancement in Shitike Creek and the Warm Springs River, expansion of natural production into the White River drainage above White River Falls, and production increases at Round Butte and Warm Springs hatcheries.

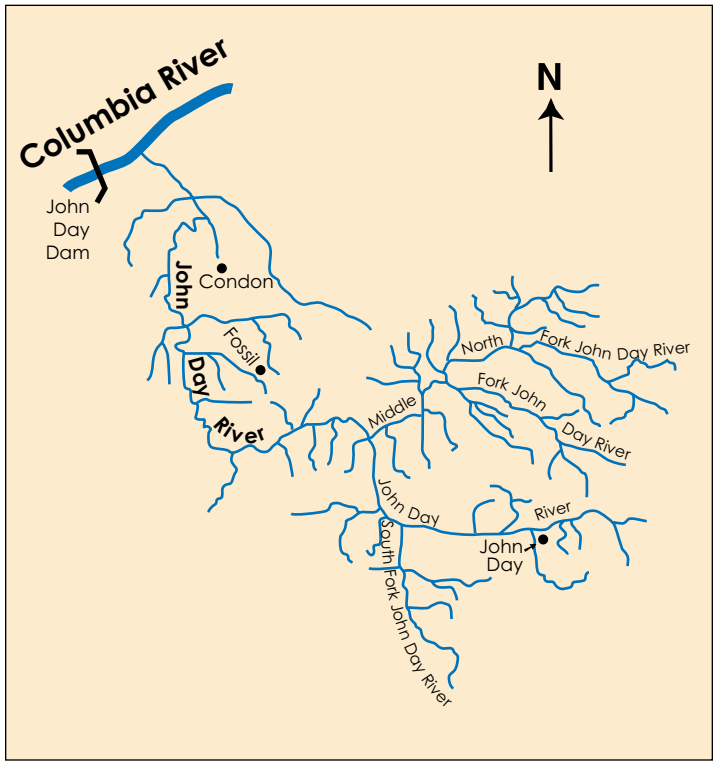
Fall Chinook—Strategy 2—This strategy enhances the riparian areas along the Deschutes River to 60% of the vegetative potential, and enhances the spawning gravel in the upper three miles of the mainstem. Fall chinook salmon will to be managed exclusively for wild fish.

Summer Steelhead - Strategy 3 - Enhance natural production in Trout, Shitike, Bakeoven, and Buck Hollow creeks, the Warm Springs River, and expand natural production into the White River drainage above White River Falls. Current natural production levels would be maintained in all other areas of the subbasin. Current hatchery production levels at Round Butte Hatchery would be maintained.

Sockeye - Recommended that a study be conducted to determine the feasibility of providing passage for sockeye salmon adults and juveniles past the Pelton-Round Butte hydroelectric project.

JOHN DAY RIVER

Prepared by the Confederated Tribes of the Umatilla Indian Reservation and the Confederated Tribes of the Warms Springs Reservation of Oregon



The John Day River drains nearly 8,100 square miles in east-central Oregon, the longest free-flowing river with wild anadromous salmon and steelhead in the Columbia River Basin. The basin covers 11 counties and is bounded by the Columbia River to the north, the Blue Mountains to the east, the Aldrich Mountains and Strawberry Range to the south, and the Ochoco Mountains to the west.

The mainstem John Day River flows 284 miles from its source at an elevation near 9,000 feet in the Strawberry Mountains to its mouth at river mile (RM) 218 on the Columbia River. The lower John Day River from Service Creek (RM 157) downstream to Tumwater Falls (RM 10) is included in the Federal and Oregon Scenic Waterways Systems. Major tributaries in the John Day Basin include the North Fork, Middle Fork and the South Fork. The North Fork, which enters the mainstem John Day River at Kimberly (RM 185) and extends upstream 117 miles to its headwaters in the Blue Mountains at elevations near 8,000 feet, is the largest tributary in the John Day Basin. Fifty-four miles of the North Fork, from Camas Creek upstream, were added to the Federal and State Wild and Scenic Rivers. The Middle Fork John Day River originates immediately south of the North fork and flows roughly parallel to it for 75 miles to its confluence with the North Fork at RM 32, about 31 miles above Kimberly. In 1988, the Middle Fork was added to Oregon's Scenic Waterway system. The South Fork John Day River, tributary to the mainstem near Dayville (RM 212), extends 60 miles to its headwaters in the area south of the Aldrich Mountains. Other major mainstem tributaries include Rock Creek (RM 22) and Canyon Creek (RM 248).

Historically, the John Day River was one of the most significant anadromous fish producing rivers in the Columbia River Basin. The basin continues to support one of the largest remaining runs of wild spring chinook salmon *(Oncorhynchus tshawytscha)* and summer steelhead trout *(Oncorhynchus mykiss)* with populations estimated to range from 3,000 to 4,000 spring chinook salmon and 25,000 to 30,000 summer steelhead. The basin also supports populations of fall chinook, Pacific lamprey (Lampetra tridentata) and other indigenous species. The management policy for the John Day Basin is designed to maintain native, wild stocks of salmon and steelhead, and to preserve the genetic diversity of the native salmon and steelhead stocks for maximum habitat use and fish production (Oregon Department of Fish and Wildlife et al. 1990).

Riparian habitat degradation is the most serious habitat problem in the John Day River Basin with approximately 660 degraded stream miles identified. Degraded fish habitat in the John Day River Basin is a result of low summer flows, high summer

and low winter water temperature, high spring flows, depressed beaver populations, accelerated streambank erosion, excessive stream sedimentation and reduced instream cover. The basin's ability to naturally repair itself from riparian habitat degradation and other impacts is slow in the John Day's semiarid environment and some areas are adversely affected by activities which ceased long ago. In other cases, poor management practices continue and problems are escalating. As soil erosion increases, flooding occurs and streambanks erode away, degrading habitat quality. In many tributary streams, excessive water volumes are deepening channels, thus lowering water tables in the immediate proximity (Oregon Water Resources Department 1986). Such loss of habitat quantity and quality, managers believe improved irrigation systems along with restoration of the uplands and riparian systems would provide the greatest long-term natural benefits for fish and improve late season stream flow as well.

Recommended Habitat Enhancement Actions for John Day Subbasin

I. Administrative

A. Laws and Codes, Enforcement & Revision

- State of OR/EPA complete TMDL for stream temps, sediment, other pollutants (Clear Water Act)
- Enforce OR fish screening statutes
- Enforce OR Forest Practices Act to be consistent with Upper Grande Ronde Anadromous Fish Habitat (UGR) Plan
- Upgrade Forest Service Land and Resource Management Plans consistent with UGR Plan to be in compliance with National Forest Management
- Revise mining laws to be consistent with production of high quality water and fish habitat

II. Instream Flow & Passage

A. Instream Flows Enhancement

- Purchase, exchange, lease, or seasonally rent water rights for selected fish habitat during critical low flow periods.
- Implement more efficient irrigation methods and water conservation practices benefitting landowners and instream flows.

B. Passage Needs

III. Watershed Management

A. Watershed Management

- Increase shade cover to reduce stream temperatures (increased downstream extent of temperatures <60°F)
- Reduce sediment from agricultural practices and unimproved roads
- Reduce nitrate, phosphates, bacteria and other contaminants related to agricultural practices

PRIORITIES: Upper South Fork. John Day and tributaries, Middle Fork John Day, upper mainstem John Day, Camas Creek

B. Riparian Restoration Needs

- Implement UGR Plan on State, Federal and Tribal lands
- Implement Best Management Practices, including stream buffers to benefit fish on private lands
- Acquire, lease or implement management agreement to restore natural floodplain habitat and function

PRIORITIES: Upper South Fork John Day and tributaries, Middle Fork John Day, upper mainstem John Day, Camas Creek

C. Range Management

- Revise and implement BMPS to be consistent with UGR Plan Standards and Guidelines (S&G's)
- Restrict/remove livestock in substandard areas
- Acquire, lease, develop projects in priority areas (see above)

D. Forest Management

- Upgrade, monitor, enforce Forest Practices Act consistent with UGR Plan S&G's on private lands
- Implement UGR Plan S&G's on State, Federal, Tribal lands
- Identify and implement active restoration projects

- Institute or continue protection of "good" habitat areas such as North Fork, upper mainstem John Day River tributaries, Vinegar Hill area

E. Mining Impact Reduction Needs

- Mitigate for impacts of mining tailings in North Fork John Day River System

Artificial Production Actions for John Day Subbasin

1. Evaluate historical status of coho and fall chinook salmon production in the subbasin. Determine current production potential in the subbasin for possible establishment of species including the need for adult capture and juvenile acclimation facilities.

2. Discontinue all catchable trout programs in areas where they may affect anadromous salmonid restoration activities.

3. A program to restore lamprey populations utilizing either transplantation or artificial propagation should be developed under the overall leadership of the affected tribes.

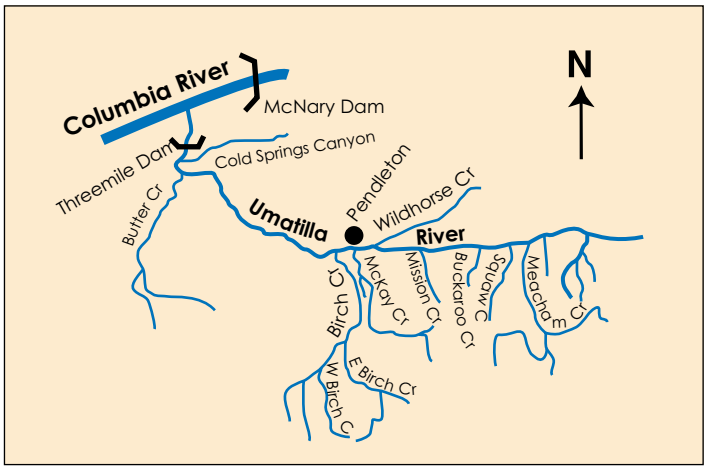
4. Monitor and evaluate all artificial production actions. Use adaptive management to determine whether program changes (i.e. release number, size, time, location, and/or life history) are needed in order to meet restoration objectives.

Benefits

Spring chinook average run size of 7,000 with an estimated harvest of 1,050. Summer steelhead average run size of 45,000 with an estimated harvest of 11,250. Fall Chinook activities to determine stock status. Pacific lamprey activities will also determine the current life history.

UMATILLA RIVER

Prepared by the Confederated Tribes of the Umatilla Indian Reservation



Introduction

The Umatilla River originates on the west slope of the Blue Mountains in the Umatilla National Forest. It flows northwesterly for about 115 miles and enters the Columbia River at river mile (RM) 289 near Irrigon, Oregon. The river drains approximately 2290 square miles with elevations ranging from 3000 feet along the Blue Mountains to 270 feet at the mouth. Its principal tributaries include the North Fork, South Fork, Meacham Creek, Birch Creek, McKay Creek and Butter Creek (CTUIR, et.al., 1990).

Fish Population Status/Goals

From the first decades of this century until 1988, spring chinook did not spawn in the Umatilla River. Then, a program designed to restore the spring chinook to their natural production areas, the Umatilla tribe and Oregon Department of Fish and Wildlife began a program of releasing spring chinook in 1986. Like the restoration of other anadromous runs in the Umatilla River, the restoration of bright fall chinook began with the efforts of the Umatilla tribe to restore salmon to the river. In cooperation with the Oregon Department of Fish and Wildlife, a restoration program began in 1982. Coho restoration is now occurring in the Umatilla River natural habitat. This is the only attempt being made to increase the natural spawning populations of coho in the Columbia River tributaries. Natural production of steelhead occurs throughout the basin and is the only anadromous population that was not extirpated earlier in the century.

The subbasin planners have recommended the return of 11,000 spring chinook to the river with a natural escapement of 1,000 fish and a harvest of 8,800. The recommended return for bright fall chinook is for 21,000 fish with a natural escapement of 11,000 and an inriver harvest of 5,400. The goal for coho is for a return of 6,000 adults to the river. The goal for summer steelhead is an annual adult return of 9,670 and a harvest inbasin of 5,460 fish. Table 1 shows the fish populations, status and goals.

Problems Impacting Fish Resources

Habitat problems in the Umatilla River system are related mainly to irrigation diversions, agricultural practices and timber harvest (Ibid). Many of the passage problems have been corrected under the Northwest Power Planning Council's Fish and Wildlife Program while others are proposed for correction.

Ongoing Actions In The Umatilla River System

Some measures have been implemented in the basin to correct habitat problems and in particular extensive work has been done on the mainstem irrigation diversion dams. Both upstream and downstream facilities have been constructed. Instream flows will be improved with the implementation of the Umatilla Basin Project. This measure will provide for the storage of water in the basin and the exchange of water from the Columbia River.

Hatchery production of spring chinook occurs at Umatilla, Carson and Bonneville hatcheries. In

addition to the major hatcheries, final rearing/acclimation ponds have been constructed at Minthorn Springs, Bonifer Springs and on the mainstem near Gibbon and at Thornhollow. Construction of three additional acclimation/release facilities is scheduled in the next two years.

Releases occur at the final rearing/acclimation ponds and release ponds. Broodstock is normally provided from the Carson National Fish Hatchery. Trapping broodstock will occur at the Threemile Dam trapping facility with holding/spawning to occur at a South Fork Walla Walla facility to be completed in 1996.

Bright fall chinook production takes place at Bonneville Hatchery and Umatilla Hatchery. Adult trapping currently occurs at Bonneville Hatchery and Threemile Dam Trapping Facility. Broodstock holding/spawning facilities will be completed at Threemile Dam in 1996. Fall chinook releases will be acclimated at the facilities mentioned above.

Hatchery production for coho takes place at Cascade Hatchery and Lower Herman Creek. Early run coho are reared and direct stream released into the natural production areas. Broodstock for the program is normally provided from trapping at Bonneville Hatchery. In recent years due to a shortage of broodstock, trapping has also occurred at Threemile Dam Adult Trap.

Current hatchery production of steelhead takes place at the Umatilla Hatchery. Umatilla stock summer run steelhead are currently being reared. Broodstock for the hatchery program is acquired by trapping at Threemile Dam Adult Trap. In addition to the hatchery, acclimation and release ponds have been constructed in the Umatilla River system. The existing program releases full-term reared smolts.

Recommended Actions for the Umatilla River System

Habitat Enhancement Actions for Umatilla Subbasin

I. Administrative

A. Laws and Codes, Enforcement & Revision

- State of Oregon (OR) Environmental Protection Agency complete Total Maximum Daily Load for stream temperatures, sediment, other pollutants (Clear Water Act)
- Halt water spreading in the lower Umatilla Basin
- Enforce OR fish screening statutes
- Upgrade OR Forest Practices Act to be consistent with Upper Grande Ronde (UGR) Anadromous Fish Habitat Plan
- Upgrade Forest Service Land and Resource Management Plans consistent with UGR Plan to be in compliance with National Forest Management Act
- Revise Umatilla instream water rights to acknowledge salmon needs
- Revise mining laws to be consistent with production of high quality water and fish habitat

II. Instream Flow & Passage

A. Instream Flows Enhancement

- Allocate saved water (from cessation of water spreading) for instream uses
- Operate Phase I Umatilla Basin Project (UBP) throughout irrigation season
- Implement Phase II, UBP as soon as possible
- Develop & implement Phase III, UBP (Westland Irrigation District exchange for increased fish flows from McKay Reservoir)
- Re-evaluate headwater project storage in upper Umatilla Basin for purpose of enhancing instream flows
- Revise Umatilla instream water rights to acknowledge salmon requirements
- Purchase, exchange, lease or seasonally rent water right for selected fish habitat during critical low flow periods

B. Passage Needs

- Continue fish "trap & haul" program in the lower Umatilla River
- Consolidate, eliminate or switch diversions to pumping operations (priorities: Wilson, Holeman, Forth, and Wyss dams)

III. Watershed Management

A. Water Quality Needs

- Increase shade cover to reduce stream temperatures (increased downstream extent of temperatures <60°F)
- Reduce sediment from agricultural practices and unimproved roads
- Reduce nitrate, phosphates, bacteria and other contaminants related to agricultural practices

PRIORITIES: Mainstem Umatilla River, Wildhorse Cr., Meacham Cr., Squaw Cr., McKay Cr., Birch Cr.

B. Riparian Restoration Needs

- Implement UGR Plan on State, Federal and Tribal lands
- Implement Best Management Practices (BMPs) including stream buffers to benefit fish on private lands
- Acquire, lease or implement management agreement to restore natural floodplain habitat and function

PRIORITIES: Wildhorse Cr., Squaw Cr., Meacham Cr., Birch Cr., Mainstem Umatilla River

C. Range Management

- Revise and implement BMPs to be consistent with UGR Plan Standards & Guidelines (S&Gs)
- Restrict/remove livestock in substandard areas
- Acquire, lease, develop projects in priority areas (see above)

D. Forest Management

- Upgrade, monitor, enforce Forest Practices Act consistent with UGR Plan S&G's on private lands
- Implement UGR Plan S&G's on State, Federal, Tribal lands
- Identify and implement active restoration projects
- Institute or continue protection of "good" habitat areas such as North Fork Umatilla and Birch Creek

E. Mining Impact Reduction Needs

No current problems

Artificial Production Actions for Umatilla Subbasin

1. The Umatilla Hatchery Master Plan has already identified production numbers required for restoration and enhancement of salmonid stocks in the Umatilla subbasin. The following action items identified in that plan need to be completed:

   a. Resolve water shortage problem at Umatilla Hatchery so that identified production goals can be met. If the water shortage problem cannot be corrected, production should be relocated or reprogrammed to other Columbia River hatcheries (including the South Fork Walla Walla facility) to meet Umatilla goals.

   b. Complete acclimation/release facilities at Mission, Pendleton, and Barnhart to increase smolt to adult survival rates.

   c. Complete adult holding/spawning facilities for fall chinook (Threemile Dam) and spring chinook (South Fork Walla Walla).

   d. Complete production facilities on the South Fork Walla Walla River as outlined in the Umatilla Hatchery Master Plan supplement for production of and release of 589,000 yearling spring chinook smolts into the Umatilla River. This production was outlined in the original Master Plan as required for meeting identified adult return goals.

2. Maintain summer steelhead program at 150,000. This level is reduced from the original

production level of 210,000 based on density evaluations conducted at Umatilla Hatchery.

3. Increase coho program from 1,000,000 to 1,500,000. Completion of the acclimation facilities identified in 1.b. will allow for acclimation of coho production.

4. Discontinue all catchable trout programs in areas where they may affect anadromous salmonid restoration activities.

5. A program to restore lamprey populations utilizing either transplantation or artificial propagation should be developed under the overall leadership of CTUIR.

6. Continue current monitoring and evaluation of all artificial production actions. Continue to use adaptive management to determine whether program changes (i.e. release number, size, time, location, and/or life history) are needed in order to meet restoration objectives.

Table 1

Species	Current Population	Adult Return Goal (Five-Year Average)
Spring Chinook	1,070[1]	11,000
Fall Chinook	580[1]	21,000
Coho	1,950[1]	6,000
Steelhead	1,990[1]	9,670
Chum	0	NE
Lamprey	NA	NE

[1] 1989 - 1993 Returns to Umatilla River. Rounded to nearest tenths.
NA — Information not available
NE — None established

MID-COLUMBIA RIVER MAINSTEM

Prepared by the Columbia River Inter-Tribal Fish Commission and the Yakama Indian Nation

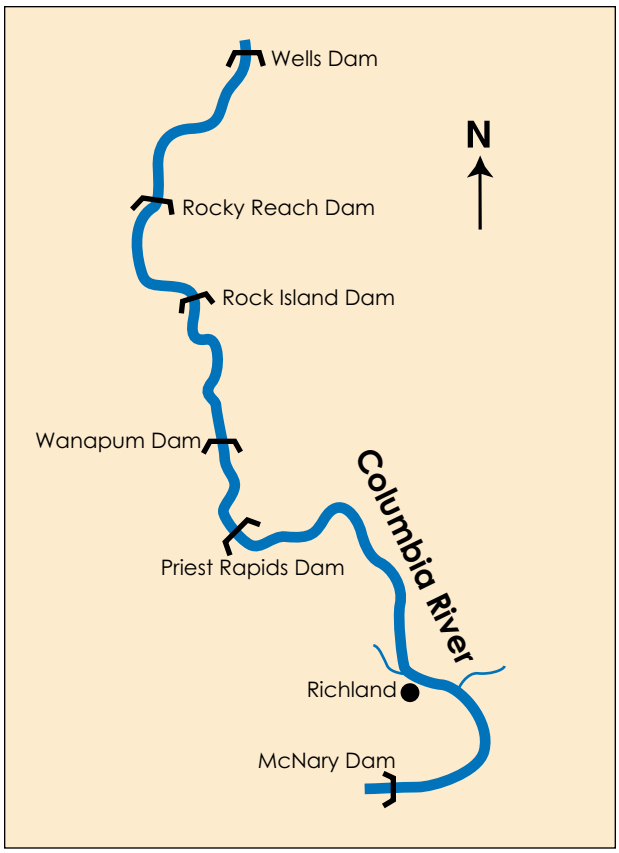
Introduction

The mid-Columbia River mainstem is that section of the Columbia River from Chief Joseph Dam downstream to McNary Dam. This section of the river generally flows southward through eastern Washington until it turns westward in the vicinity of Pasco, Washington. The principal tributaries in this section of the river, which have been described individually in these subbasin plans include the Okanogan, Methow, Entiat, Wenatchee, Yakima, Walla Walla and Snake River. In addition to these major rivers, minor tributaries, such as Crab Creek, enter the Columbia River in the Wanapum and Priest Rapids pools.

Fish Population Status/Goals

Currently natural spawning of fall chinook in the mid-Columbia River occurs mainly in the mainstem below Priest Rapids Dam. Small spawning populations also occur above Priest Rapids Dam and in small tributaries to Priest and Wanapum pools. Because of changes in hatchery programs at Wells Dam Hatchery and Turtle Rock Rearing Pond, more fall chinook have been released in the upper mid-Columbia in recent years. Thus, it is very likely that fall chinook are spawning in areas that have typically been identified as summer chinook habitat. This may be specifically occurring in the lower reaches of the Okanogan and Methow rivers due to the previous rearing and release of fall chinook at Wells Hatchery and existing program at Turtle Rock. Inundation of natural habitat by dam construction has significantly affected fall chinook spawning in the mainstem Columbia. Most of the small tributaries have suffered extensive damage from poor land and water management practices, in particular irrigation and grazing.

Natural production of steelhead occurs in the mainstem and other minor tributaries such as Crab



Creek. Redd counts for the mainstem and tributaries are nonexistent due partly to their locations, difficulty in surveying, and the lack of manpower to adequately survey the stream. Like the rest of the systems, Crab Creek is impacted by irrigation practices which create passage barriers and water quality problems. Correction of such practices is necessary.

The subbasin planners noted that the objective for fall chinook in this section of the Columbia River is 40,000 adults over McNary Dam. Numerical objectives for the other fish species were not established. Table 1 shows the fish populations, status and goals.

Problems Impacting Fish Resources

The major habitat needs in this section of the river continue to be passage at the mainstem dams. Existing Federal Energy Regulatory Commission

(FERC) settlements between the mid-Columbia Public Utility Districts (PUD) and tribes, state and federal fishery agencies continue to examine the passage options.

Compensation programs for the losses incurred by the construction of the mainstem dams has been limited, improperly placed or non- existent. Table 2 shows the problems impacting the fish resources.

Small tributaries that once supported numerous small populations of salmon are now inaccessible or uninhabitable. Grazing, irrigation withdrawal, and agricultural development have caused extensive riparian loss, sedimentation, channelization, and dewatering in most of these small watersheds.

Ongoing Actions In The Mid-Columbia River Mainstem

Protection of the last remaining free flowing section of the Columbia River is currently being carried out through the Vernita Bar Settlement Agreement between the fishery agencies, treaty tribes, Bonneville Power Administration and mid-Columbia PUDs. The agreement provides guidelines for flows in the Hanford Reach. This agreement should continue to provide the necessary guidelines for the continuing protection of the spawning, incubation and emergence of fall chinook. In addition, the possibility of inclusion in the national Wild and Scenic Rivers program would increase the level of protection for fall chinook in the Hanford Reach.

Priest Rapids Hatchery located below Priest Rapids Dam on the east bank of the Columbia River rears 100,000 pounds of fall chinook for release into the Columbia River. In addition, the facility has reared and released 1,700,000 fall chinook as part of the John Day Dam mitigation. Originally built as a spawning channel, Priest Rapids Hatchery was constructed by Grant County PUD as mitigation for Priest Rapids and Wanapum dams. After several years, the upper portion of the channel was modified to rear the existing poundage at 90 fish/pound. The facility is operated by the Washington Department of Fish and Wildlife. In recent years, they have modified the size of release from 90 fish/pound to 60 fish/pound and most recently to 50 fish/pound. This has reduced production numbers by nearly 50 percent.

The Rocky Reach Hatchery (Turtle Rock Rearing Pond) facility currently rears and releases 500,000 summer/fall chinook smolts at the facility. Eggs for the program are provided from the Priest Rapids Hatchery. Incubation and early rearing occurs at the Rocky Reach Hatchery located on the east bank of the Columbia River immediately below Rocky Reach Dam. Fish are then transferred to the Turtle Rock Rearing Pond facility, above the dam, where they are reared and released into the Columbia River. The practice of releasing fish at the rearing pond has resulted in an increase in straying of fall chinook to other locations in the mid-Columbia.

Adult fall chinook have also been trapped at Wells Dam. As noted above, it is likely they are also seeking out and utilizing summer chinook natural production areas as appears to be the case in the lower Okanogan and Methow rivers.

Additionally, bright fall chinook have been reared at the Little White Salmon Hatchery for release into the Hanford Reach. These rearing programs have all been developed and continue to utilize the mid-Columbia bright fall chinook as broodstock.

Current releases of fall chinook occur at the Priest Rapids Hatchery and Turtle Rock Rearing Pond. Beginning in 1994, fall chinook from Bonneville Hatchery were released into the natural production area of the Hanford Reach by the Yakama Indian Nation using the K-Ponds on the Hanford Reservation and at Ringold Hatchery.
Broodstock for the Priest Rapids program is trapped at the hatchery or as necessary at Priests Rapids Dam. Broodstock collection for the Turtle Rock program is provided from Priest Rapids Hatchery. Broodstock for Bonneville, and Little White Salmon National Fish hatcheries occurs at those facilities or eggs are provided from Priest Rapids Hatchery.

Hatchery production of steelhead takes place at several hatcheries and rearing ponds with most releases occurring off-station in the major tributaries.

Programs have been developed for the release of full-term reared smolts.

The facilities include Wells Hatchery, East Bank Hatchery (Turtle Rock Rearing Pond), Chelan Hatchery, and Ringold Trout Pond. Summer run steelhead are reared in these facilities. Broodstock has been acquired from numerous sources over the years including trapping at Priest Rapids and Wells dams and the use of the Skamania stock from the Skamania Trout Hatchery. An adult trap used to acquire broodstock for summer chinook at Wells Dam is also used for steelhead. Broodstock also return to Ringold Trout Pond and Wells Hatchery.

Recommended Actions For The Mid-Columbia Mainstem

(1) Expedite development of mainstem passage facilities under the FERC settlement agreements for the mainstem dams.

(2) Restore the riparian areas of the tributaries. Adopt and enforce tributary instream flow needs.

(3a) Fall Chinook

Trapping broodstock at Priest Rapids Hatchery should be continued. Trapping at Priest Rapids Dam should be discouraged and only be used if absolutely necessary. Releases should continue at the hatchery adjacent to the natural production areas.

Determine and implement the best option for rearing fall chinook at Turtle Rock (1) terminate the rearing program and improve the facility's water supply to allow the rearing of summer chinook as required in the 1979 interim FERC agreement for Rocky Reach Dam. If the water supply and disease problems are corrected, then additional production of early run coho can occur by utilizing the pond that is now used for fall chinook. (2) Continue to rear fall chinook but require all fish reared to be released into natural production areas below Priest Rapids Dam.

The Bonneville Hatchery should continue to provide bright fall chinook releases into the natural production areas of the mid- Columbia as part of the John Day Dam mitigation program. Programs that began in 1994 include fish for the Hanford K-Ponds and Ringold hatcheries until such time as broodstock programs are developed at those locations. Broodstock should continue to be acquired from the existing mid-Columbia bright fall chinook programs.

The Ringold hatchery facilities should be modified to ensure that this program is compatible with other rearing programs including the ongoing spring chinook and steelhead programs. Broodstock collection facilities should also be developed and integrated with the other bright fall chinook adult collection programs.

The Hanford K-Ponds are located on the Hanford Nuclear Reservation adjacent to the fall chinook natural production areas. With pumping and discharge permit modifications, these ponds have the capability to rear up to 5,000,000 fall chinook and could assist in the rearing programs. In 1994, 500,000 bright fall chinook were reared and released at the facility. Releases in the natural production areas will help increase the natural spawning component of the run. Releases should continue and be increased as broodstock becomes available. Broodstock collection should continue to be at the existing programs and if monitoring finds it to be necessary additional facilities be constructed near the release site.

b) Steelhead

Ringold Trout Pond is located on the Columbia River upstream of the Tri-cities area. It was constructed in 1961 as part of the Mitchell Act program. It was designed to rear and release 180,000 steelhead smolts. All the fish are released on-site to provide sport fishing opportunities for the Tri-cities area. Currently, broodstock is acquired by trapping adults at the adjacent salmon facility. Adults are held at Chelan hatchery where spawning and incubation occurs. Early rearing occurs at the Washington Department of Fish and Wildlife's Columbia Basin Hatchery. In late summer, the fish are transferred to the Ringold pond for final rearing and are released from the pond the following spring. Broodstock for the program originated from the Skamania Hatchery.

Broodstock acquisition and rearing programs should be changed to work in combination with proposed trapping facilities in the mid-Columbia tributaries. Final rearing and/or acclimation facilities should be constructed in the natural production areas including the tributaries such as Crab Creek.

Wells Trout Hatchery should continue to be operated as described in the Okanogan and Methow basin tribal recovery plans.

Chelan Hatchery should continue to be operated as described in the Entiat and Wenatchee basin tribal recovery plans.

East Bank Hatchery should continue to be operated as described in the Entiat and Wenatchee tribal recovery plans.

Turtle Rock Rearing Pond should continue to be operated as described in the Entiat and Wenatchee basin tribal recovery plans.

(4) A program to restore lamprey to the tributaries should be developed by the relevant fishery managers. This program should be under the overall leadership of the tribes.

Table 3 shows the tribal recommended actions needed to restore the fish resources of the Mid-Columbia Mainstem.

Table 1

Mid-Columbia River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Fall Chinook	6,740[1]	40,000
Steelhead	NA	NE
Lamprey	NA	NE

[1]1988-1992 redd counts. Number rounded to nearest tenth.

NA — Information not available
NE — None established

Table 2

Problems Impacting the Mid-Columbia River Fish Resources

	Mainstem	Tributaries
Passage Facilities		•
Irrigation Diversions	•	
Inadequate Production Compensation	•	

Table 3

Recommended Actions for the Mid-Columbia River System

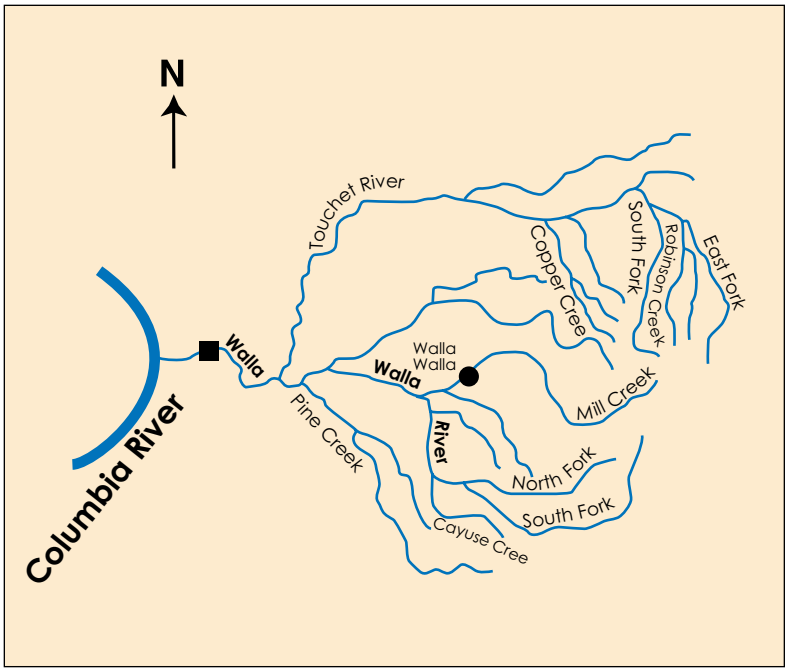
Problem	Recommended Action
Passage Facilities	(1) Construct passage facilities
Irrigation Diversions	(2) Provide instream flows, restore riparian areas
Inadequate Production Compensation	
Fall chinook, Steelhead Spring chinook, Coho	(3) Implement new broodstock programs, release programs, and production programs
Lamprey	(4) Develop and implement programs

WALLA WALLA RIVER

Prepared by the Confederated Tribes of the Umatilla Indian Reservation

Introduction

The Walla Walla River originates in the Blue Mountains of northeast Oregon. It generally flows west and north and enters the Columbia River at river mile 315 near Wallula, Washington. It drains 1,758 square miles. Elevations range from over 6,000 feet in the Blue Mountains to 270 feet at the mouth. The main tributaries are the North Fork, South Fork, Touchet rivers, and Couse, Birch, Mill, Pine, Dry, Yellow-hawk, and Cottonwood creeks (CTUIR, et. al., 1990).



Fish Population Status/Goals

Currently steelhead are the only anadromous salmonid that spawn in the Walla Walla River system. Natural production of steelhead in the Walla River occurs throughout the system. Historically, spring chinook, coho and chum also utilized the river system. Natural production of spring chinook occurred in the middle and upper mainstem and its major tributaries. Because spring chinook were eliminated from the system in the early 1900s, prior to the collection of detailed records, accurate data on the extent of the natural production is lacking. Information on chum and coho spawning locations and numbers is also lacking.

The subbasin planners recommended objective for spring chinook return is 5,000 adults of which 2,000 would spawn naturally and 2,500 would be for harvest. The summer steelhead objective is for a return of 11,000 of which 3,000 would be naturally produced and 7,680 would be for harvest. Objectives for chum and coho were not established by the subbasin planners.

Problems Impacting Fish Resources

Although problems associated with gravel mining, diking, forest and grazing practices exist, the most significant habitat impacts in the Walla Walla system, as noted in the subbasin plan, are associated with the extensive network of irrigation diversions (Ibid). Numerous passage problems for both adults and juveniles exist throughout the basin. The plan recommends that the passage problems be corrected (Ibid).

In addition to the habitat problems, the Walla Walla basin has received little or no mitigation for the losses incurred. The steelhead program in Washington is more directed at providing harvest opportunities than at restoring natural spawning populations.

Ongoing Actions In The Walla Walla River System

Mostly planning with little implementation is occurring in the basin. This is particularly the case with passage problems. As part of the Lower Snake River Compensation program, a steelhead acclima-

tion and release program exists in the Touchet River, Mill Creek and the mainstem Walla Walla River. The fish are reared at the Lyons Ferry Hatchery located near the mouth of the Palouse River. Hatchery production of spring chinook, coho and chum in the Walla Walla River does not exist. Rearing and release programs for the stocks have not been planned under any of the past mitigation programs, such as the Mitchell Act or Lower Snake River Compensation Plan.

The Confederated Tribes of the Umatilla Indian Reservation have proposed the restoration of spring chinook, coho and chum for the Walla Walla River system. The tribe is currently developing a spring chinook program under Northeast Oregon Hatchery Plan. A spring chinook rearing/adult holding and spawning facility site has been identified on the South fork of the Walla Walla River.

Recommended Actions for the Walla Walla River System

Habitat Enhancement Actions for Walla Walla

I. Administrative

A. Laws and Codes, Enforcement & Revision

- State of Oregon (OR)/Environmental Protection Agency complete Total Maximum Daily Load for stream temperatures, sediment, other pollutants (Clear Water Act)
- Enforce OR fish screening statutes
- Upgrade OR Forest Practices Act to be consistent with Upper Grande Ronde (UGR) Anadromous Fish Habitat Plan
- Upgrade Forest Service Land and Resource Management Plans consistent with UGR Plan to be in compliance with National Forest Management Act
- Revise mining laws to be consistent with production of high quality water and fish habitat

II. Instream Flow & Passage

A. Downstream Flow Enhancement

- Purchase, exchange, lease or seasonally rent water rights for selected fish habitat during critical low flow period
- Continue evaluation and feasibility of headwater storage in North Fork Walla Walla River for purpose of enhancing instream flows

B. Passage Needs

- Construct new juvenile screens and smolt traps at the Little Walla Walla diversion (Walla Walla River in Oregon) and Hofer diversions (Touchet River in Washington) to allow safe smolt passage during high flows and to allow trapping & hauling of smolts during low flow periods
- Construct new or upgrade ladders for improved fish passage at the following irrigation dams: Hofer & Maiden dams (Touchet River) Burlingame, Nursery Bridge, Little Walla Walla dams (Walla Walla River)
- Remove or partially remove Marie Dorian Dam for improved fish passage

III. Watershed Management

A. Water Quality Needs

- Increase shade cover to reduce stream temperatures (increased downstream extent of temperatures <60°F)
- Reduce sediment from agricultural practices and unimproved roads
- Reduce nitrate, phosphates, bacteria and other contaminants related to agricultural practices

PRIORITIES: Mid to lower mainstem Walla Walla & Touchet Rivers, lower North Fork Walla Walla River

B. Riparian Restoration Needs

- Implement UGR Plan on State, Federal and Tribal lands
- Implement Best Management Practices, including stream buffers to benefit fish on private lands
- Acquire, lease or implement management agreement to restore natural floodplain habitat and function

PRIORITIES: Mid to lower mainstem Walla Walla & Touchet Rivers, lower North Fork Walla Walla River

C. Range Management

- Revise and implement Best Management Practices to be consistent with UGR Plan Standards & Guidelines (S&Gs)

•Restrict/remove livestock in substandard areas
•Acquire, lease, develop projects in priority areas (see above)

D. Forest Management

•Upgrade, monitor, enforce Forest Practices Act consistent with UGR Plan S&Gs on private lands
•Implement UGR Plan S&Gs on State, Federal, Tribal lands
•Identify and implement active restoration projects
•Institute or continue protection of "good" habitat areas such as upper South & North Forks Walla Walla River, upper Mill Creek watershed

E. Mining Impact Reduction Needs

•Mitigate for gravel mining impacts in mainstem Walla Walla River

Artificial Production Actions for Walla Walla Subbasin

1. Begin a spring chinook reestablishment program of 600,000 yearling smolts using Carson stock spring chinook to take place in both the South Fork Walla Walla and Touchet rivers. This program was identified in the Northeast Oregon Hatchery Plan (NEOH).
   a. Further expand proposed South Fork Walla Walla hatchery facility to accommodate this production requirement.
   b. Releases into the South Fork Walla Walla River would occur directly from the facility. Develop juvenile acclimation/release facilities in the Touchet River drainage above Dayton.
   c. Develop adult capture facilities in the Walla Walla subbasin to support future broodstock collection. Adults to be held and spawned at the South Fork Walla Walla hatchery facility.
2. Begin a natural brood summer steelhead program of 100,000 yearling smolts into the South Fork Walla Walla River. This program was also identified in the NEOH.
   a. Releases would occur directly from the South Fork Walla Walla hatchery facility.
3. Phase out use of non-native stocks in the existing Washington state summer steelhead program. Replace with natural brood as available through the NEOH program identified in item 2 above.
4. These production actions should proceed concurrently with passage improvement projects identified in the habitat recommendations section.
5. Evaluate coho and chum current production potential in the subbasin for re-establishment of species.
6. Discontinue all catchable trout programs in areas where they may affect anadromous salmonid restoration activities.
7. A program to restore lamprey populations utilizing either transplantation or artificial propagation should be developed under the overall leadership of the affected tribes.
8. Monitor and evaluate all artificial production actions. Use adaptive management to determine whether program changes (i.e., release number, size, time, location, and/or life history) are needed in order to meet restoration objectives.

Table 1
Walla Walla River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	0	5,000
Steelhead	1,090-1,817[1]	11,000
Coho	0	NE
Chum	0	NE
Lamprey	NA	NE

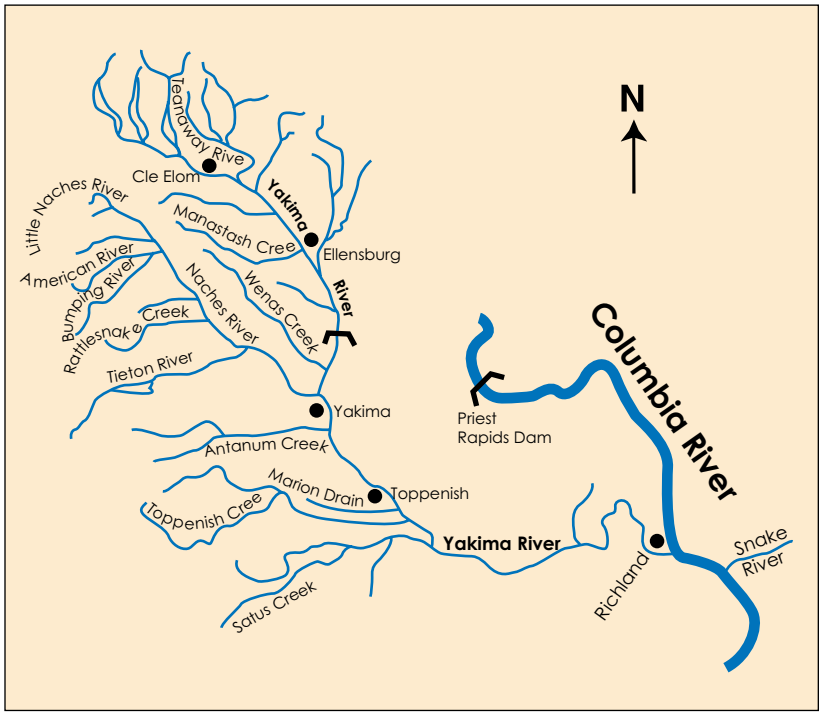
[1]Run years 1977-78 to 1983-84. From (CTUIR, et.al., 1990).
NA — Information not available
NE — None established

YAKIMA RIVER

Prepared by the Yakama Indian Nation

Introduction

The Yakima River originates in the Cascade Mountains at Lake Keechelus at an elevation of 6,900 feet. It is 214 miles long and encompasses an area of 6,155 square miles. The river flows in a southeasterly direction entering the Columbia River at river mile (RM) 335 near Richland, Washington (YIN, et. al., 1990). The major tributaries of the Yakima include the Naches, American, Bumping, Tieton, Little Naches, Cle Elum and Teanaway rivers. Major creeks include Status, Toppenish, Rattlesnake and Nile.



Fish Population Status/Goals

Three stocks of naturally reproducing spring chinook have been identified in the Yakima River. Natural production of one stock of spring chinook (Upper Yakima stock) occurs in the upper Yakima mainstem and the Cle Elum River. A second distinct stock (Naches stock) occurs in the Bumping River, Little Naches River, mainstem Naches River and Rattlesnake Creek. The third stock exists in the American River.

Two stocks of fall chinook occur in the Yakima River. The natural spawning areas for the lower mainstem stock of fall chinook occur in the lower Yakima River principally below Wapato. A second stock exists in Marion Drain.

Summer chinook in the Yakima River system historically occurred in the lower Naches River and mainstem Yakima above Prosser to the mouth of the Naches. Summer chinook are currently listed as an extirpated species of salmon in the Yakima River.

Natural spawning runs of steelhead exist throughout the Yakima River system including all of the major sub-drainage and tributary streams. Current electrophoretic data indicates there may be as many as four stocks of steelhead in the system. These stocks would include naturally reproducing populations located in the Satus Creek, Toppenish Creek, Naches River, and Yakima River subbasins. The largest wild runs are currently found in the two lower river tributaries, Satus and Toppenish creeks.

Coho are also currently listed as extirpated in the Yakima River. Historically, coho spawning occurred throughout the upper mainstem and tributaries of the Yakima River system.

Sockeye are also listed as extirpated in the Yakima system. They historically existed in all of the naturally existing lakes in the headwaters of the system.

The original set of goals and objectives for species of salmon in the Yakima River were listed in the subbasin plan. The objectives for spring chinook

have been modified through recent modeling efforts for the Yakima/ Klickitat Fisheries Project (YKFP). The subbasin plan objectives will be listed for all species and the more recent YKFP objectives will also be cited where available.

The subbasin planners recommended objective for spring chinook is 26,303 escapement to the subbasin with a terminal harvest of 15,519 and a spawning escapement of 9,706. The more recent YKFP natural production objectives for all Yakima River spring chinook stocks under the first phase of the YKFP (with only upper Yakima supplementation facilities operating) would include a total return to Yakima of about 11,000 adults: about 9,000 upper Yakima spring chinook, 1,100 Naches, and 700 American River spring chinook. Objectives for natural spawning would include 2,000 spring chinook in the upper Yakima; 640 spring chinook in the Naches; and 390 spring chinook to the American. Harvest objectives would include a Yakima River catch of about 6,000 fish over all spring chinook stocks (5,400 from the upper Yakima, 300 from the Naches, and 200 from the American River stocks), and a total harvest to all fisheries (Yakima River, Columbia River, and ocean) of about 8,800 fish.

Steelhead escapement objective is 29,704 with 16,040 for harvest and 12,298 for spawning escapement. For fall chinook the planners recommended a return objective of 8,410 with a harvest of 4,709 and a spawning escapement of 4,351. The summer chinook objective is 11,956 with a harvest of 7,413 and a spawning escapement of 3,640. The coho objective is 5,025 with a harvest of 2,161. A natural spawning component was not determined. An objective for sockeye was not established. Table 1 shows the fish populations status and goals.

Problems Impacting Fish Resources

Habitat problems identified in the subbasin plan include agricultural practices, grazing, irrigation and fluctuations in stream flows. The need to screen many of the tributary diversions remains (Ibid). Loss of riparian area to residential and recreational home development, channelization and road construction continue to be serious problems throughout the subbasin. In addition to the habitat problems, the compensation programs in the subbasin have been limited or non-existent. Planning for production programs has been occurring since the adoption of the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program resulting in little or no implementation. Table 2 shows the problems impacting the fish resources of the Yakima River system.

Ongoing Actions In The Yakima River System

Pursuant to the Columbia River Basin Fish and Wildlife Program adopted by the NPPC in 1982, a program of constructing new fish passage facilities (fish ladders and fish screens) has been implemented at diversion dams and canals in the Yakima Basin. To date, fish ladders and screens have been constructed at the following major dams and canals: Horn Rapids, Prosser, Sunnyside, Wapato, Roza, and Easton. In addition, fish ladders and screens have been constructed at a number of medium-sized diversion dams and canals, including Toppenish-Satus, Cowiche, Wapatox, Ellensburg Town, and Westside.

Construction of fish ladders and screens at over 60 smaller diversions is in progress, pursuant to the 1987 revised Columbia River Basin Fish and Wildlife Program (Phase II). These should be completed by the end of the decade.

There are two ongoing enhancement programs for fall chinook and coho salmon in the Yakima River. The fall chinook program includes the production and release into the Yakima of 1.7 million smolts from the Little White Salmon National Hatchery. This project is one component of the John Day mitigation program. Adults for the Little White Salmon Hatchery rearing program are currently trapped at the hatchery. Prior to 1994 the smolts were transported and directly released into the Yakima River. The Yakama Indian Nation, with funds provided under the Mitchell Act program, has developed acclimation facilities in the vicinity of Prosser Dam for final rearing and release of these fall chinook smolts.

The *US vs. Oregon* mandated coho program provides 700,000 early run coho for release to the Yakima River. These coho are produced at the Cascade Hatchery located near Bonneville Dam on the Oregon shore. This program is part of a larger effort to release coho in upper Columbia tributaries rather than in the lower Columbia. In 1994, these coho were also acclimated as part of the Yakama Indian Nation program to improve their post release survival.

Steelhead releases have occurred in the Yakima Basin over the past decade as a combined effort of the Washington Department of Fish and Wildlife and the local Trout Unlimited/Steelhead club. Originally these steelhead were imported as presmolts from out of basin hatcheries. The fish were generally of Skamania stock.

In recent years, local broodstock was acquired from the adult trapping facility located at Prosser Dam. The hatchery production of the local summer run steelhead occurred at the Yakima and Naches Hatcheries. This program has been reduced in recent years from 200,000 to 30,000 smolts. Over the last several years these smolts were used as experimental fish in the species interaction studies conducted on the Teanaway River. The last releases of steelhead in the Yakima occurred in 1994.

Recommended Actions For The Yakima River System

(1) Thermal pollution in the lower Yakima River is a serious problem. Tempera-tures often exceed the lethal threshold for salmonids during the smolt outmigration period, causing both immediate and delayed mortality. Thermal pollution is caused primarily by the diversion of nearly the entire flow of the river for irrigation upstream of Sunnyside Dam, irrigation return flows with elevated temperatures entering the river, downstream of Sunnyside Dam, and the removal of riparian vegetation.

Decreasing the thermal pollution in the lower Yakima River will require a broad program of increasing instream flows below Sunnyside Dam, reduction of return flows entering the Yakima River below Sunnyside Dam, and the restoration of riparian vegetation along the river. Such a program will require the involvement and cooperation of the state and federal resource agencies, irrigation districts, and landowners.

(2) Construction of large storage reservoirs in the upper drainage has drastically altered the natural hydrograph of the Yakima River. As a consequence, necessary flows are often not optimal to provide rearing habitat or flushing flows for smolt outmigration. Therefore, flows need to be revised for summer and winter rearing habitat, as well as flushing flows for smolts during the outmigration period.

(3) Much of the riparian vegetation in the Yakima Basin has been removed. This has resulted in drastic reduction in the recruitment of large woody debris to the streams. Large woody debris (living and dead large trees) should be retained in the riparian zone, and where necessary, large woody debris should be placed in the streams to provide urgently needed rearing habitat.

(4) Residential and shoreline development in the floodplain, agricultural development, road construction, and diking have resulted in the loss of side channels, reduction of floodplain function, channelization, and habitat simplification. Riparian and floodplain activities should be restricted by strict application of appropriate state and federal regulations (Growth Management Act, Shoreline Management Act). In addition, side channels should be reconnected to the river, overflow channels breached where appropriate, and riparian vegetation should be restored.

(5) Overgrazing in riparian areas and wet meadows, construction of recreational and residential homes, and the drainage from forest roads continues to cause sedimentation problems in streams, elevated water temperatures, and reduced instream flows. These impacts are especially noticeable on many tributary streams. Grazing in riparian areas and wet meadows should be properly managed, forest road management plans should be developed and implemented, and home construction in riparian areas should be regulated in a manner to prevent impacts to fisheries habitat.

(6) Virtually all of the fish passage problems on the mainstem Yakima and Naches River have been corrected. However, even after the construction of the Phase II fish passage facilities referred to above, a number of fish passage problems will remain on the tributaries. These should be immediately incorporated into the existing Phase II effort, and the entire Phase II effort should be accelerated.

(7) In addition to the serious thermal pollution problems referred to, irrigation return flows also contain heavy silt loads and high concentrations of agricultural pesticides. An aggressive water conservation program needs to be implemented in order to reduce silt loads entering the Yakima River, particularly below Sunnyside Dam. Water conservation will help reduce the introduction of agricultural chemicals into the Yakima River, as well as help reduce water temperatures.

(8) Water diversions for the generation of electrical energy occurs at Wapatox, Roza, and Prosser diversion dams. These diversions create low instream flows at three critical reaches in the Yakima River Basin. To solve these low instream flow problems, diversion of water for power production should be subordinated in order to provide proper instream flows.

(9a) Spring chinook

The Yakima/Klickitat Fisheries Project is the main production program measure planned for the Yakima River system as part of the NPPC Fish and Wildlife Program. The project managers, the Washington Department of Fish and Wildlife and the Yakama Indian Nation (as lead agency) have proposed to supplement all of the stocks of anadromous salmonids in the Yakima system. The program will be phased in over a number of years. The Environmental Impact Statement for the first phase will be released in 1995. The first phase will include the upper Yakima spring chinook stock (850,000 smolts) and the 700,000 coho smolts from the *US vs. OREGON* program that is currently operating in the Yakima. The other stocks will be implemented on a priority basis in subsequent phases of the program.

The spring chinook portion of the program calls for the construction of a main facility in the Yakima Basin near Cle Elum.

There will also be satellite final rearing and/or acclimation facilities in the spring chinook natural production areas. Broodstock acquisition will occur at a recently constructed adult trap at Roza Dam.

b) Fall chinook

The Yakima/Klickitat Fisheries Project is being designed to produce 2,600,000 juvenile fall chinook. Half of these juveniles will be of the lower mainstem stock and half of the Marion Drain stock. Broodstock will be trapped from returning adults in the lower Yakima (Horn Rapids Dam) and at facilities on Marion Drain. For the lower river stock there will be six final rearing and/or acclimation facilities near Horn Rapids Dam. Three final rearing and/or acclimation facilities will be developed in the Marion Drain and three acclimation facilities near Wapato for the Marion Drain stock.

c) Summer chinook

The Yakima/Klickitat Fisheries Project is being designed to rear 200,000 summer chinook smolts for release into the lower Naches River. Since there are currently no summer chinook left in the Yakima River system, the program will utilize the Wenatchee River summer chinook to provide broodstock to start the run. Once reestablished, the broodstock will be acquired from locally adapted adults returning to the Yakima system.

d) Coho

The Yakima/Klickitat Fisheries Project is being designed to produce 2,000,000 early run coho for release into the Yakima River system. Acclimation and release facilities should be developed. Broodstock acquisition could utilize the adult trapping facilities being developed for the other stocks.

e) Sockeye

In an attempt to restore sockeye to the Yakima River system, the National Marine Fisheries Service completed a study in 1992 designed to determine the feasibility of passing sockeye

above Cle Elum Dam. No adult or juvenile fish passage facilities were constructed on any of the Yakima storage reservoir dams when they were constructed in the early 1900's. A final study report is due out soon. If successful, the program will be expanded and production facilities developed as part of the YKPP. Broodstock for the research has come from trapping at Tumwater Dam on the Wenatchee River. The study should be evaluated and if determined feasible, a full scale sockeye restoration program should be implemented.

f) Steelhead

The Yakima/Klickitat Fisheries Project is currently being designed to rear and release 400,000 steelhead smolts. The broodstock will be acquired from natural spawning populations and releases will occur in the natural production areas using 12 acclimation ponds in the Naches Basin and Toppenish Creek and potentially 15 acclimation ponds above Roza Dam. The final stream to be supplemented will be Satus Creek.

The Naches Hatchery is located on the Naches River near the confluence with the Yakima River. It is a Washington Department of Fish and Wildlife facility. Currently, Naches Hatchery is in poor condition and needs major renovation. The Naches steelhead program has reared approximately 100,000 fish to fingerling size for transfer to the Nelson Springs Raceway for final rearing and release. During recent years, the program was funded by the Bonneville Power Administration and operated by the Washington Depart-ment of Fish and Wildlife. The Nelson Springs Raceway is operated by the Yakima Chapter of Trout Unlimited. Broodstock for the program was trapped by the Yakama Indian Nation at Prosser Dam. Currently, this program rears 33,000 fish per year for use in research above Roza Dam. The research is expected to continue until 1995. At that time, a determination for supplementation of steelhead above Roza Dam will be made.

The Yakima Hatchery is located in the Yakima Basin near the Yakima Airport. The Yakima steelhead program was very similar to the Naches Hatchery program. Like the Naches Hatchery, the Yakima Hatchery is also in very poor condition and the water supply inadequate. The Yakima program consisted of rearing 100,000 smolts for release into the Naches River. Broodstock was also acquired from trapping at Prosser Dam. The Yakima steelhead rearing program has now been terminated. The Naches Hatchery steelhead program, with the exception of the research described above, has also been terminated.

(10) A program to restore lamprey should be developed by the relevant fishery managers. This program should be under the overall leadership of the tribes.

Table 3 shows the tribal recommended actions needed to restore the fish resources of the Yakima River system.

Table 1

Yakima River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	4,270[1]	26,300[2]
Summer Chinook	0	12,000[2]
Fall Chinook	450[3]	4,700[2]
Steelhead	2,150[4]	29,700[2]
Coho	NA	5,000[2]
Lamprey	NA	NE

[1] Based on 1986-1990 redd counts. Assumes 2.5 fish per redd. Number rounded to nearest ten.
[2] Rounded to nearest hundred.
[3] Based on 1984-1988 redd counts. Assumes 7 fish per redd. Number rounded to nearest ten.
[4] Based on years 1985-1989 (YIN, et.al., 1990). Rounded to nearest ten.
NA — Information not available
NE — None established

Table 2

Problems Impacting the Klickitat River Fish Resources

	Basinwide	Upper Yakima	Lower Yakima	Tributaries
Thermal Pollution			•	
Unnatural Hydrograph			•	•
Lack of Large Woody Debris	•			
Riparian Degradation	•			
Sedimentation	•			
Passage Barriers				•
Inadequate Production Compensation	•			

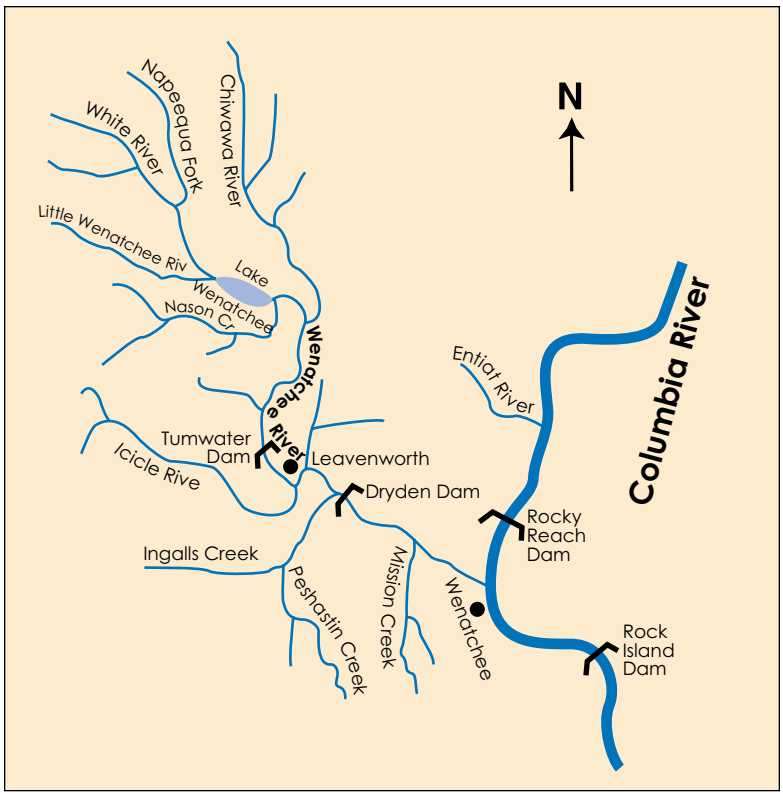
Table 3

Recommended Actions for the Yakima River System

Problem	Recommended Action
Thermal Pollution	(1) Restore riparian areas
Unnatural Hydrograph	(2) Provide smolt flushing flows, summer and winter rearing flows through storage releases
Limited Large Woody Debris	(3) Retain woody debris
Riparian Degradation	(4) Restore riparian vegetation
Sedimentation	(5) Eliminate or restrict logging, grazing, riparian development
Passage Barriers	(6) Construct passage facilities on tributary irrigation diversions
Water Quality	(7) Water conservation program to reduce silt and pesticides
Water Diversions	(8) Provide for instream flows
Inadequate Production Compensation	
Spring Chinook, Fall Chinook Summer Chinook, Coho Steelhead	(9) Implement new broodstock programs, release programs, production programs
Lamprey	(10)Develop and implement programs

WENATCHEE RIVER

Prepared by the Yakama Indian Nation



Introduction

The Wenatchee watershed drains a portion of the east Cascade Mountains in north central Washington within Chelan County. The watershed encompasses approximately 1,327 square miles, with 230 miles of major streams and rivers. The watershed originates in high mountainous regions of the Cascade Crest, with numerous tributaries draining sub-alpine regions within the Alpine Lakes and Glaciers Peak Wilderness areas. The Little Wenatchee and White rivers flow into Lake Wenatchee, the source of the Wenatchee River. From the lake outlet the river descends rapidly through Tumwater Canyon, dropping into a lower gradient section in the region of Leavenworth, where Icicle Creek joins the mainstem. Other tributaries include Peshastin Creek, Chiwawa River and Nason Creek (WDF et al. 1990).

Fish Population Status/Goals

Natural spawning runs of spring chinook occur in the Chiwawa, White, and Little Wenatchee rivers, and Peshastin, Nason, and Icicle creeks. The main natural production area for summer chinook in the mid-Columbia tributaries is the Wenatchee River mainstem. Like the rest of the runs in the mid-Columbia tributaries, the Wenatchee run was reestablished by the translocation of upper Columbia runs during the Grand Coulee Dam mitigation period. Natural spawning of sockeye occurs in the Wenatchee River system above Lake Wenatchee in the White River, Napeequa River (a tributary of the White River) and the Little Wenatchee River. Natural spawning of steelhead occurs throughout the Wenatchee River system. A large natural spawning run of coho historically occurred in the mid-Columbia River tributaries including the Wenatchee River. That population is believed to be functionally extirpated.

The subbasin planners' recommended objective for spring chinook is 21,000 adults of which 12,000 are natural stock and 9,000 hatchery; summer chinook objective is 10,000 adult natural fish; sockeye objective is 35,000 adult natural fish; summer steelhead objective is 12,218 adults of which 4,718 are natural fish and 7,500 hatchery fish for harvest. Objectives have not been established for fall chinook or coho. Table 1 shows the fish population status and goals.

Problems Impacting Fish Resources

Existing habitat conditions in the Wenatchee system varies widely. Problems have been noted with inadequate irrigation diversion screens and low flows later in the season (WDF, et. al., 1990). Some prob-

lems at the mainstem Dryden diversion still causes entrainment of adults and juveniles. Riparian areas in the mid and lower watershed have been significantly damaged. Losses are likely to continue given Chelan County's non-compliance with the Growth Management Act requirements and the County's general indifference to environmental issues. The subbasin is under intense recreational and residential development pressure.

Forest practices impacts range from low (Chiwawa River) to extreme (Mission Creek) but should decrease over time in much of the subbasin if the requirements of the Clinton Forest Plan are followed. The U.S. Forest Service is the major timber land owner in the watershed but the state Department of Natural Resources and a large timber company own a substantial portion of commercial timber land as well. The fate of watersheds with significant non-federal ownership is less certain.

Irrigation withdrawals significantly reduce habitat quality on the mainstem and render several tributaries, notably Peshastin Creek, nearly unusable for anadromous fish. Icicle Creek is over-appropriated such that summer water temperatures approach lethal levels.

Highway construction and attendant channel realignment, bank hardening, and loss of riparian vegetation have severely limited rearing habitat downstream of Lake Wenatchee.

Maintenance of existing habitat must be a high priority. The subbasin plan recommends the identification of diversions with improper screening and the repair and replacement of those screens as necessary (Ibid).

Limited compensation programs for some stocks is occurring in the basin; while other compensation, such as for coho and lamprey, is non- existent. Restoration of natural spawning fish is limited to only a few stocks and is also limited in overall numbers of fish. Until all programs are modified to restore the runs to the rivers and streams, the natural spawning populations will not recover. Table 2 shows problems impacting the fish resources of the Wenatchee River system.

Ongoing Actions In The Wenatchee River System

Some habitat improvements including fish ladders and screens have been constructed in the Wenatchee River system. Instream flow studies have been conducted on the mainstem, Nason Creek, and the Chiwawa River but flows identified by the study have not been adopted. Minimum flows have been established for the mainstem but not for tributaries. However, minimum flows are not adequate to realize the spawning potential of the existing habitat.

Watershed analysis is being conducted on Nason Creek, which should lead to better management of federal and private timber lands in that watershed.

A large group of concerned citizens and irrigators has formed to seek mutually beneficial solutions to environmental and agriculture problems. This group has to date focused on problem definition and education, but is currently trying to find funds to develop better water management strategies for the subbasin.

Hatchery production of spring chinook occurs at Leavenworth National Fish Hatchery (NFH) and Eastbank Hatchery. An adult trap has been constructed in the Chiwawa River. Eastbank Hatchery is assisting in restoring the natural run in the Chiwawa River. The program includes trapping broodstock from the Chiwawa River and releasing the smolts back into the river.

The Leavenworth NFH was constructed as part of the Grand Coulee Dam mitigation. It is located on Icicle Creek near Leavenworth, Washington. It was built during the late 1930s and early 1940s and modernized in the mid-1970s. It is designed to rear approximately 3,000,000 spring chinook smolts.

Currently, the program entails the trapping, rearing and releasing of spring chinook at the hatchery. The original program at the Leavenworth Hatchery began with fish being trapped at Rock Island Dam. Like the other Grand Coulee programs, the intent was to use the hatchery to assist in translocating the runs destined for above Grand Coulee Dam to the mid-Columbia tributaries. Also, like the other pro-

grams, eggs from other sources such as Carson, Cowlitz, Eagle Creek, Little White and Marion Forks hatcheries have been used at Leavenworth over the years. Leavenworth Hatchery is the primary back-up station for the Entiat and Winthrop hatcheries. Recently the Yakama Indian Nation and the state have developed terminal spring chinook fisheries in Icicle Creek.

Hatchery production of summer chinook takes place at the Eastbank Hatchery. Releases occur in the Wenatchee River just below Dryden Dam. The Eastbank Hatchery program began by trapping adults at Dryden and Tumwater dams on the Wenatchee River and transporting them to the Eastbank Hatchery for holding until spawning.

Hatchery production of sockeye occurs at the Eastbank Hatchery. Through the Federal Energy Regulatory Commission (FERC) intervention process, the Chelan County Public Utility District (PUD) is developing the sockeye program. Chelan PUD is using net pens for rearing in Lake Wenatchee. Broodstock for the program comes from trapping in the Wenatchee River at Tumwater Dam.

Following the construction of Grand Coulee Dam, there was an extensive hatchery supplementation program for reintroducing sockeye to Lake Wenatchee. The original program principally used stock trapped at Rock Island Dam that were destined for the Arrow Lakes region of British Columbia. The program was terminated in the 1950's primarily because the commercial fisheries in the lower Columbia below Bonneville Dam were unable to harvest enough fish to show a favorable benefit/cost ratio. During this period, lower river sockeye fisheries were restricted because of the impact on the summer chinook run. Not until the tribes became involved in the mid-Columbia FERC interventions was sockeye considered a priority species for restoration.

Hatchery production of steelhead takes place at Eastbank Hatchery, Chelan Hatchery, and Leavenworth Hatchery. Summer run steelhead are reared in these facilities. Broodstock has been acquired from numerous sources over the years including from traps at Priest Rapids and Wells dams, and from the use of the Skamania stock from the Skamania Trout Hatchery and Ringold Trout Pond.

Following the construction of Grand Coulee Dam, coho were released in the Wenatchee River. This coho program was discontinued in the 1960's and replaced with the lower Columbia River coho program in the area below Bonneville Dam. The Rocky Reach Hatchery (Turtle Rock Rearing Pond) coho program was terminated in 1992.

Recommended Actions For The Wenatchee River System

(1) No new permits for off-stream consumptive water use should be issued. New IFIM-based (Instream Flow Incremental Methodology) instream flow protection levels should be adopted for the mainstem and tributaries. Additional stream gauges should be placed in tributaries to better regulate interruptible water rights. The exemption from permitting extended to wells which use less than 5,000 gallons per day should be removed. Regional Water Planning should be conducted, and the state water code must be rigorously enforced.

(2) Chelan County must adopt and enforce an adequate Critical Areas Ordinance pursuant to the Growth Management Act.

(3) The Washington Forest Practices Act should be amended to include scientifically credible Riparian Management Zone requirements.

(4) The Dryden screens should be improved if still causing loss of juveniles and the entrainment of adults.

(5) To improve holding/resting and juvenile rearing habitat, provide in-channel habitat features (rock structures) in river reaches where the channel has been confined and the banks hardened. Re-open side channels cut-off by highway and railroad construction.

(6) Purchase undeveloped riparian areas in the White River, Nason Creek, and Chiwawa River drainages.

(7) Eliminate or severely restrict ground disturbing

activities that do not meet proposed fine sediment standards, such as road construction, logging and grazing .

(8) Purchase or lease water rights and fund improvements in irrigation efficiency.

(9a) Spring chinook

The existing Leavenworth Hatchery program should be changed by acquiring broodstock from the Wenatchee River natural production areas. Trapping in the Wenatchee River system should occur at Tumwater Dam or an appropriate tributary if stock identification data indicates significant genotypic or phenotypic differences among the various populations above Tumwater Dam. In recognition of the terminal fisheries in Icicle Creek and lack of adult capture/acclimation facilities in the upper tributaries, the program should be phased in over a period of time. This will enable the relevant fishery managers an opportunity to establish fisheries in the mainstem and tributaries above Tumwater Dam as well as construction of adequate release facilities in the White and Little Wenatchee rivers and Nason Creek. As the program is implemented, it will be necessary to modify the holding facilities at Leavenworth Hatchery to keep individual stocks separate.

Release programs should utilize final rearing and/or acclimation facilities in natural production areas. These should include Nason Creek, White River, and the Little Wenatchee River. Additional facilities should be constructed in the other natural production areas as necessary. The Chiwawa program will continue as part of the Rock Island Dam Settlement Agreement.

The Eastbank Hatchery was constructed in 1989 as part of the Rock Island Dam Settlement Agreement and is operated by the Washington Department of Fish and Wildlife. The program has the capacity to rear 672,000 smolts. The main hatchery is located just east of Rocky Reach Dam. A satellite facility for adult trapping and final rearing and release is located on the Chiwawa River. Broodstock for the program is acquired from the Chiwawa River. The main hatchery was constructed without a ladder or adult trapping capabilities to ensure that the program does not simply create another hatchery run. Broodstock for the program originally came from snagging adults off the natural spawning grounds in the Chiwawa River when a floating picket weir was ineffective. Monitoring and annual modifications are continuing at the Chiwawa trapping facility.

This program should be integrated with the Leavenworth Hatchery program to assist the natural spawning populations of the Wenatchee River system.

b) Summer chinook

The Eastbank Hatchery summer chinook program is designed to rear 1,816,000 yearling smolts, of which 840,000 are to be released into the Wenatchee River. Current releases occur in the natural production area. This program should continue.

c) Sockeye

The Chelan County PUD's Rock Island Dam Settlement Agreement calls for the rearing and release of 250,000 sockeye at 25 fish/pound into Lake Wenatchee. Broodstock are trapped at Dryden Dam or Tumwater Dam with adult holding, incubation, and early rearing in the Eastbank Hatchery. Due to the failure of the Dryden Dam trap, it is necessary to utilize the Tumwater Dam trap to acquire broodstock. Once feeding begins, fish are transferred to net pens in Lake Wenatchee where they are reared to 25 fish/pound and then released in late fall. The Chelan County PUD program should continue.

d) Steelhead

The Chelan Hatchery was constructed as part of Chelan County PUD's mitigation for Rocky Reach Dam. It is located on the Columbia River near the town of Chelan Falls. The facility rears 195,000 smolts for release into the Entiat and Wenatchee rivers. Prior to the Eastbank Hatchery coming on line, the facility also provided incubation and early rearing for 200,000 steelhead for the Turtle Rock Rearing Pond. The facility is funded by the Chelan County PUD and operated by the Washington Department of Fish and Wildlife. Broodstock for the program is acquired by bringing in eggs or adults from other facilities. Wells Dam pro-

vides most of the eggs for the current program. Eggs for the Turtle Rock program were provided from the Skamania Hatchery and, most recently, the Ringold Trout Pond.

Operation of the Chelan Hatchery should be integrated with operation of Eastbank Hatchery. Broodstock acquisition, final rearing and/or acclimation facilities should be developed in the Wenatchee River system. Additional releases should occur in the natural production area.

Eastbank Hatchery steelhead program is designed to rear 200,000 steelhead. Releases occur in the Entiat and Wenatchee River. The Eastbank program should continue to assist the natural spawning population in the Wenatchee River and its tributaries. Broodstock for the program should be acquired from the natural spawning populations and the use of other stocks terminated. Adult trapping and final rearing and/or acclimation facilities should be constructed and integrated with the other programs.

From the early 1950s to the mid 1970s, Leavenworth Hatchery reared resident trout in addition to salmon. The resident trout program was terminated in the mid 1970's when the hatchery was modernized and reprogrammed for spring chinook production. At the same time, Leavenworth began rearing 100,000 steelhead annually as compensation for the termination of the resident trout programs. Broodstock was acquired from the Washington Department of Fish and Wildlife's program at Wells Dam. Currently, the steelhead are reared to smolt size and released at the hatchery. If available, broodstock are also acquired at the hatchery. This program should be integrated with the recommended Eastbank and Chelan hatchery programs.

e) Coho

Opportunities for reintroducing coho into the Wenatchee River must come from reprogramming existing hatcheries. Willard National Fish Hatchery in the Bonneville Pool offers immediate opportunities. Currently, Willard NFH rears and releases early run coho which is the preferred stock for the Wenatchee River. As its name implies, the early run stock enters the Columbia earlier than the late run stock. Using the early run stock will allow coho to reach the up-river habitat while still in good condition. Willard National Fish Hatchery has the capability of rearing 2,500,000 early run coho smolts. The smolts are currently released at the Little White Salmon Hatchery at the mouth of the river. The program should be modified to release up to 500,000 coho into the natural production areas of the Wenatchee River. Future broodstock needs would be met by trapping in the natural production areas once the runs have been reestablished. Adult trapping facilities used for the summer chinook program can be used to acquire the broodstock. Final rearing and/or acclimation facilities should be constructed in the natural production areas.

(10) A program to restore lamprey should be developed by the relevant fishery managers. The overall restoration of lamprey should be under the leadership of the tribes.

Table 3 shows the tribal recommended actions needed to restore the fish resources to the Wenatchee River system.

Table 1

Wenatchee River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	1,280[1]	21,000
Summer Chinook	6,900[1]	10,000
Steelhead	6,410[2]	12,218
Sockeye	NA	35,000
Coho	NA	NE
Fall Chinook	NA	NE
Lamprey	NA	NE

[1] Based on 1989-1993 redd counts. Assumes 2.5 fish per redd. Number rounded to nearest tenth.

[2] Based on years 1983-1987. Includes both hatchery and natural runs. Rounded to nearest tenth.

NA — Information not available

NE — None established

Table 2

Problems Impacting the Wenatchee River Fish Resources

	Basinwide	Upper Wenatchee	Lower Yakima	Tributaries
Low Flows			•	•
Reduced Low Velocity Habitat			•	•
Lost Riparion Area	•			
Irrigation Diversions			•	•
Channelization			•	•
Loss of Side Habitat			•	•
Degraded Water Quality			•	•
Inadequate Production Compensation	•			

Table 3

Recommended Actions for the Yakima River System

Problem	Recommended Action
Low Flows	(1) Adopt instream flows, cease over-appropriations, conduct regional water planning
Reduced Low Velocity Habitat	(2) Restore shoreline habitat, utilize Canadian-style bank stabilization
Riparian Degradation	(3) Restore riparian vegetation, adopt and enforce appropriate riparian protection regulations
Irrigation Diversions	(4) Improve passage facilities, enforce design criteria
Loss of Side Habitat	(5) Restore channel configurations, adopt instream flows
Degraded Water Quality	(6) Reduce sedimentation, increase instream flows
Inadequate Production Compensation	
Spring Chinook, Sockeye Summer Chinook, Coho Steelhead	(7) Implement new broodstock programs, release programs, production programs
Lamprey	(8) Develop and implement programs

ENTIAT RIVER

Prepared by the Yakama Indian Nation

Introduction

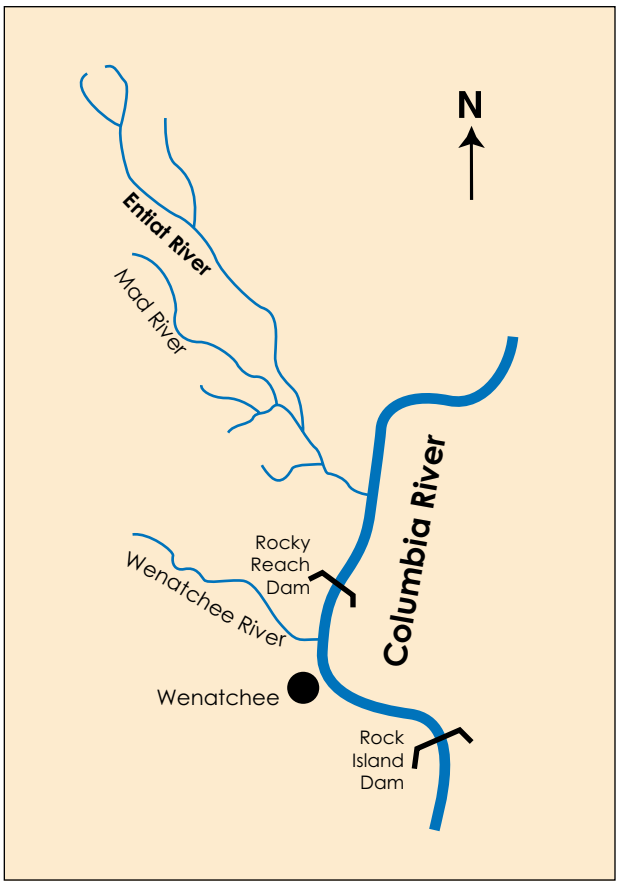
The Entiat River Basin is located in north central Washington, within Chelan County. The Entiat River originates at an elevation of over 9,000 feet in the Cascade Mountains. From its headwaters, the Entiat River flows southeasterly for approximately 42 miles before entering the Columbia River at river mile (RM) 483.7. Two major tributaries drain into the Entiat River, the North Fork Entiat and the Mad River, which enters into the Entiat at RM 10.5. Total drainage area of the subbasin is 419 square miles. (WDF et al. 1990).

Fish Population Status/Goals

A natural spawning run of spring chinook exists in the upper mainstem. A remnant natural spawning run of summer chinook exists in the Entiat River from the mouth to at least River Mile 28. Fall chinook may also now be spawning in the river. Straying from Turtle Rock releases may be occurring. There is little information available on the condition of the natural run of steelhead in the Entiat River. Natural production occurs in the mainstem Entiat and some of its major tributaries. Sockeye have also been reported spawning in the river near Brief. The origin of those fish has not been determined, but they are probably strays from the Wenatchee and/or Okanogan river systems.

A large natural spawning run of coho historically occurred in the mid-Columbia River tributaries. Natural spawning runs were recorded in the Okanogan, Methow, Entiat and Wenatchee. Currently, there is no attempt to count redds or determine if a small run still exists in the Entiat or any of the other tributaries.

The subbasin planners' recommended objective for summer steelhead is 4,471, of which 1,471 are natural and 3,000 are hatchery fish for harvest. The recommended spring chinook return is for a two-level approach for harvest. The first is for a run of 200-500 for harvest and the second objective for a run of 500-1,000 fish for harvest. The planners did not provide any numerical natural spawning objectives for spring chinook, coho, or fall chinook. Table 1 shows the fish population status and goals.



Problems Impacting Fish Resources

The habitat in the Entiat system has been affected by a host of land and water management activities. The Entiat River subbasin plan, completed under the Northwest Power Planning Council Fish and Wildlife Program, identified a few of these including irrigation diversions and associated low flows, inadequate fish screens as well as riparian vegetation removal. Additionally, the subbasin has been significantly affected by forest practices, bank hardening, and residential shoreline development.

Much of the subbasin was burned by major forest fires over the past 25 years. The Dinkleman Fire, 1988, burned approximately 50,000 acres and led to a major landslide that filled the lower four miles of the river with sediment. The Tyee Fire of 1994 burned much of the riparian areas within the watershed. In the aftermath of these fires, mass failures and rehabilitation activities will likely produce substantial sediment delivery to the streams. The fires have resulted from both natural and anthropogenic sources, but in all cases, forest management (notably roads) has significantly amplified the impact of fire to fish habitat. Absent fire, forest roads would be the most significant source of fine sediment, and they are in the un-burned portions of the watershed.

The steep topography of the subbasin largely limits residential development to floodplain and alluvial fan features. Accordingly, development has significantly affected fish habitat quality. Pressure to develop the remaining suitable building sites is extreme. Chelan County is more than two years behind schedule relative to the requirements of the Growth Management Act, and has proposed inadequate shoreline and wetland protection measures, the consequences of additional development will likely be severe.

The Entiat River is not as heavily appropriated as other Columbia subbasins, but the impact of water withdrawals is significant particularly during the late summer. New water rights are being issued subject to minimum instream flows. From August through the end of the irrigation season in most years instream flows are below minimums. Unfortunately, the Department of Ecology does not have adequate enforcement staff to ensure that interruptible diversions cease when low-flow thresholds are reached. Further, an Instream Flow Incremental Methodology (IFIM) study conducted in 1992 showed that the adopted flows are much lower than necessary to maintain habitat productivity.

Much of the riparian habitat within the subbasin has been altered, mostly by orchard owners who believe that riparian vegetation serves as alternative housing for orchard pests. Significant additional riparian vegetation has been removed or diminished by road construction, timber harvest, and fire damage in riparian areas.

Problems associated with irrigation diversions and screens, low flows, and modification of riparian areas also occur in the Entiat River system. All irrigation diversion structures should be inventoried and evaluated. New and improved fish screening systems should be installed (Ibid).

In addition to the habitat problems, past and present mitigation programs were not developed to return the fish to the natural environment. In some instances, species that have been lost or seriously diminished have not been restored either to the basin or the habitat. Table 2 shows the problems impacting the Entiat River system.

Ongoing Actions In The Entiat River System

Planning for habitat improvement projects has taken place, but implementation has not. A watershed coalition of local landowners and interested individuals was formed in 1993. They have intimated an interest in improving land and water management to improve conditions for fish but have yet to develop a substantive approach for doing so. The U.S. Forest Service (USFS) requirements under the Clinton Forest Plan should lead to better management of their ownership in the subbasin. Mitigation programs include those established as part of the Grand Coulee mitigation program and the Chelan County Public Utility District (PUD) mitigation for their mainstem dams.

Hatchery production of spring chinook in the Entiat River exists at the Entiat National Fish Hatchery (NFH). The Entiat Hatchery is operated as a satellite facility for Leavenworth complex. In addition to the hatchery, a spawning channel has been constructed on the upper end of the Entiat River natural production area.

Hatchery production of steelhead for release into the Entiat River exists at Eastbank Hatchery and Chelan Hatchery. Summer run steelhead are reared in these facilities. Broodstock has been acquired from numerous sources over the years including trapping at Priest Rapids and Wells dams and the

use of the Skamania stock from the Skamania Trout Hatchery.

There currently are no releases of summer chinook or coho into the Entiat River.

Recommended Actions For The Entiat River System

(1) The DOE should stop issuing consumptive water rights, and replace the inadequate existing instream flow flows with more appropriate IFIM-based flows.

(2) Cease road construction and begin to close roads and return system to more natural condition. Systems roads that cannot be closed should be retro-fitted with crossing structures that can withstand the increased peak flows that invariably follow fires.

(3) Loss of the riparian vegetation throughout the system must be stopped and a program of riparian restoration implemented. Chelan County must adopt and enforce an adequate Critical Areas Ordinance pursuant to the Growth Management Act.

(4) Issuances of hydraulic permits by the state for channel control has led to bank hardening. The issuances of hydraulic permits should be strictly controlled to ensure there is no additional loss of the riparian vegetation.

(5) Logging and grazing in the watershed have created degraded water quality due to sediment entering the system. A USFS report indicates that fine sediment levels exceed forest plan standards in the middle/lower reaches of the watershed. This condition will be exacerbated by the 1994 Tyee Fire. Watershed activities such as logging and grazing which continue to cause sedimentation should be eliminated or severely restricted until the system recovers.

(6) Conduct Regional Water Planning to improve water management to the betterment of fish habitat. After Regional Planning is completed create a water conservation trust fund to pay for conservation improvements that will return saved water to instream flows.

(7) Reconnect the river to blocked side channels and/or create new side channels to improve rearing habitat conditions.

(8a) Spring chinook
Entiat NFH was constructed as part of the Grand Coulee Dam mitigation. The facility reared approximately 800,000 smolts before switching to well water. Capacity has been reduced by roughly one half, and the hatchery now releases about 400,000 subyearlings and 400,000 yearling smolts. Broodstock acquisition occurs by trapping at the hatchery or egg transfers from Leavenworth NFH. Current releases occur at the hatchery. The Entiat Hatchery should begin a program to acquire broodstock from the existing natural run. Final rearing and/or acclimation facilities should be provided in the natural production areas. The spawning channel located in the upper end of the natural production area should be examined for possible modification to a semi-natural rearing pond for summer rearing and late fall release.

b) Summer chinook
The Eastbank Hatchery program for summer chinook should be changed to provide release of some of the existing production into the Entiat River natural production area. Final rearing and/or acclimation facilities should be constructed.

c) Steelhead
The Chelan Hatchery steelhead program for the Entiat River should be integrated with operation of Eastbank Hatchery. Releases should be acclimated and adult trapping facilities developed. These may be integrated with the other release and adult capture programs.

d) Coho
Eastbank Hatchery is designed to rear 200,000 steelhead for releases in the Entiat and Wenatchee River. The Eastbank program should continue to assist the natural spawning

populations in the Entiat River and its tributaries and be integrated with the Chelan Hatchery program.

The Turtle Rock Rearing Pond produced 500,000 coho smolts for release at the facility until 1992. With the termination of the steelhead program at Turtle Rock, coho production may be possible providing the disease problems are corrected. Evaluate the use of the facility for rearing coho with the release to occur in the Entiat River natural production areas.

Willard National Fish Hatchery has the capability of rearing 2,500,000 early run coho smolts. The smolts are currently released at the Little White Salmon Hatchery at the mouth of the river. The program should be modified to begin a release program of up to 500,000 coho into the natural production areas of the Entiat River.

Since there are no adult trapping programs in the Entiat River for summer chinook, coho or steelhead, the existing adult traps on the Wenatchee River will be used to trap broodstock for the Entiat River. Once restored, broodstock for the Entiat River would be acquired from the restored runs.

(9) A program to restore lamprey should be developed by the relevant fishery managers. The overall restoration to the Columbia River lamprey should be under the leadership of the tribes.

Table 3 shows the tribal recommended actions needed to restore the fish resources of the Entiat River System

Table 1

Entiat River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	190[1]	200-500[2] 500-1,000[2]
Summer Chinook	NA	NE
Steelhead	NA	3,000[2] 1,471[3]
Coho	NA	NE
Fall Chinook	NA	NE
Lamprey	NA	NE

[1] Based on 1986-1990 redd counts. Assumes 2.5 fish per redd. Number rounded to nearest tenth.
[2] Harvest goal only. Natural production goal not established for spring chinook.
[3] Natural production goal.
NA — Information not available
NE — None established

Table 2

Problems Impacting the Entiat River Fish Resources

	Basinwide	Upper Entiat	Lower Entiat	Tributaries
Irrigation Diversions	•			
Roads	•			
Riparian Degradation	•			
Bank Hardening	•			
Degraded Water Quality	•			
Inadequate Production Compensation	•			
Recent Fire History	•			

Table 3

Recommended Actions for the Entiat River System

Problem	Recommended Action
Irrigation Diversions	(1) Implement conservation programs, cease over-appropriations, provide adequate instream flows
Road Construction	(2) Stop road construction
Riparian Degradation	(3) Restore riparian vegetation
Bank Hardening	(4) Stop issuances of hydraulic permits
Poor Water Quality	(5) Eliminate or severely reduce logging, grazing
Degraded Water Quality	(6) Reduce sedimentation, increase instream flows
Inadequate Production Compensation	
Spring Chinook, Steelhead Summer Chinook, Coho	(7) Implement new broodstock programs, release programs, production programs
Lamprey	(8) Develop and implement programs

METHOW RIVER

Prepared by the Yakama Indian Nation

Introduction

The Methow River is located in north central Washington with its source on the eastern slopes of the Cascade Mountains, and flows southeasterly to enter the Columbia River at river mile (RM) 524 near the town of Pateros. The Methow subbasin encompasses about 1,800 square miles. The Methow and Okanogan subbasins represent the upper limit of anadromous salmonid distribution in the Columbia River Basin. The Methow River enters the Columbia between Wells and Chief Joseph dams (WDF et al. 1992).

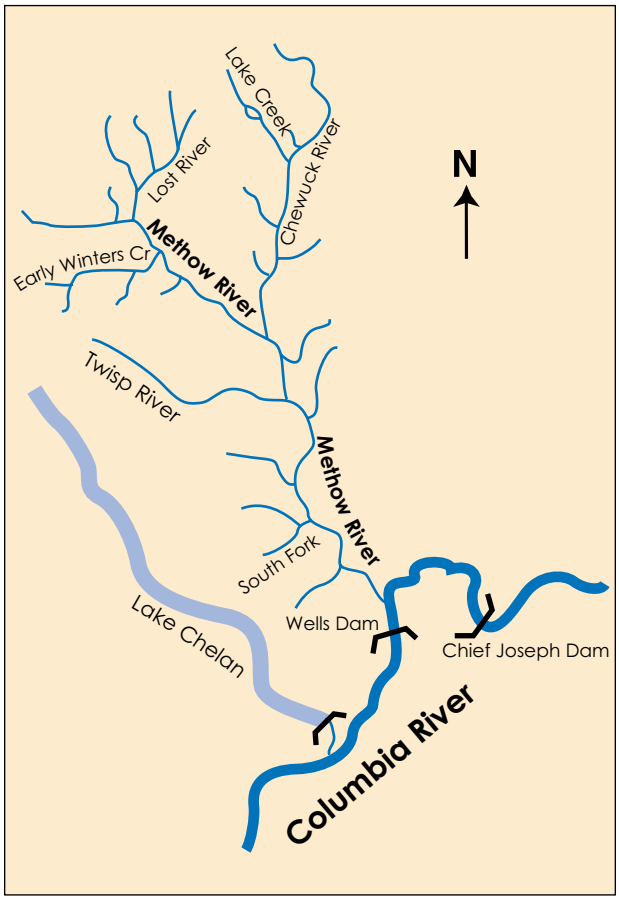
Fish Population Status/Goals

Spring chinook spawn naturally in the Twisp, Chewuck, and upper Methow rivers and some minor tributaries. A natural run of summer chinook exists in the mainstem from Winthrop downstream to the mouth of the river. Steelhead natural production occurs throughout the basin. A minor population of coho may still spawn in the system.

The National Marine Fisheries Service is presently considering the mid-Columbia (Methow, Okanogan, Entiat, and Wenatchee rivers) summer chinook as a candidate for protection under the Endangered Species Act.

The subbasin planners did not provide natural production objectives for the various stocks. Rather they recommended harvest return objectives of 2,000 spring chinook, 3,000 summer chinook and 10,000 hatchery reared steelhead. They did not provide harvest or natural production objectives for coho.

Table 1 lists fish population status and goals.



Problems Impacting Fish Resources

Habitat quality has been significantly reduced by a range of activities including forest practices, flood control, mining, dredging, grazing and shoreline development. The most significant impact, however, is probably irrigated agriculture. Flows in all mainstem reaches downstream of Winthrop and the lower reaches of all major tributaries are significantly reduced by irrigation withdrawals. Further, during the late summer, most of the Methow's minor tributaries are completely diverted for irrigation. Minimum instream flows were established in 1977 for several mainstem reaches and for a few larger tributaries. Unfortunately, the adopted flows did not reflect actual fish habitat requirements but instead represented but a portion of the hydrograph that remained after more than eighty years of appropriation. A subsequent Instream Flow Incremental

Methodology (IFIM) study revealed that the adopted flows are generally less than 50% of optimal flows for salmonids, and are frequently less than 20% of optimal.

The impacts of such diversions include reduced habitat area, juvenile stranding, adult passage barriers, redd de-watering, elevated water temperatures, and increased vulnerability to predation. Additionally, many of the irrigation diversions are poorly screened or not screened at all.

Most of the irrigation systems in the subbasin are terribly inefficient by modern standards. The largest system in the valley, the Methow Valley Irrigation District, diverts approximately thirty acre feet of water for every acre of land served. The Skyline Ditch, which diverts water from the Chewuch River, a large Methow River tributary, diverts more than 50 acre feet per acre served. Ironically, on-farm efficiencies were recently judged by the U.S. Bureau of Reclamation to be fair to good. Poor delivery systems are responsible for most the inefficiencies of Methow subbasin irrigation systems. Commonly, water is delivered via simple earth canals cut into porous glacial till.

Flood control efforts have not been as extensive in the sub- basin as they have been elsewhere primarily because the river south of the Carlton is deeply incised. However, several side channels in the vicinity of the town of Twisp have been disconnected from the river by flood control projects. Additionally, gravel and large wood were dredged from the mainstem and Chewuck rivers following the 1948 and 1972 floods in an effort to increase channel capacity. Persistent effects of that action include loss of habitat complexity and low in-channel wood volume. There are no flood control dams in the subbasin.

Along the mainstem, development encroachment into the shoreline has been similarly mitigated relative to other subbasins by the river's deep incision. Natural topography, highway construction, and other development (agricultural, residential, and municipal) along the few sites below the confluence of the Methow and Chewuck rivers, which historically supported riparian vegetation have conspired to limit habitat productivity in this reach. Residential, commercial, and agricultural development, and dispersed camping have significantly affected many tributary shoreline areas. Grazing impacts are generally low to moderate subbasin wide but are locally severe (particularly on tributaries) on mostly private lands.

The U.S. Forest Service (USFS) is the major forest land owner in the subbasin. Much of the federal land is protected by inclusion in the wilderness system, but most of the anadromous fish habitat is within the portion available for timber harvest. Many forest roads, particularly those in the Chewuck drainage, are in poor condition. Riparian vegetation is in generally good shape along the mainstems within the forest and varies from excellent to poor in tributary watersheds. The Washington State Department of Natural Resources and several private interests own the remainder of the commercial forest ground in the subbasin.

Ongoing Actions In The Methow River System

The recently completed *Draft Methow River Basin Plan* (January, 1994) developed cooperatively by state, tribal, and local governments, and environmental, fishing, recreation, business, and agricultural interests calls for an end to the further diminution of instream flows. The group convened to resolve the water allocation impasse that has existed in the basin for the past 17 years. The plan recommends that any new out-of-stream uses be satisfied by savings from existing uses and that 90% or more of saved water be returned to the stream to benefit aquatic resources. The group also suggested a number of approaches for implementing conservation.

Hatchery production of spring chinook occurs at Winthrop National Fish Hatchery (NFH) and the Methow Valley Spring Chinook Hatchery. Adult traps have been constructed on the Twisp and Chewuck rivers. Releases occur from acclimation facilities at all three of the sites. Broodstock holding occurs at the Methow and Winthrop hatcheries.

Winthrop NFH is located in the upper Methow near the town of Winthrop, Washington. As part of the

Grand Coulee Dam mitigation, it was constructed in the early 1940's by the Bureau of Reclamation and is operated by the U.S. Fish and Wildlife Service. Since its construction, the facility has been modernized (most recently in the mid-1970s) and currently has the capacity to rear approximately 1,000,000 spring chinook to smolt size. The hatchery also serves as a trapping location for spring chinook. A proposal to expand the Winthrop Hatchery to assist in the restoration of spring chinook into the Similkameen River above Enloe Dam was originally put forth in the 1973 Oroville-Tonasket Project Report. But due to continuing political problems since that time, the project has not been implemented.

The Methow Valley Spring Chinook Hatchery was constructed as part of the Wells Dam Settlement Agreement. The facility is designed to rear and release 738,000 smolts. The main facility is operated in conjunction with two satellite final rearing/acclimation facilities on the Twisp and Chewuck rivers. Adult traps have been constructed on these rivers to acquire broodstock for the rearing program.

Hatchery production of summer chinook takes place at Wells Hatchery and the Eastbank Hatchery. Broodstock for the Wells Dam program is acquired from trapping at Wells Dam. The facility was designed and constructed to rear 4,400,000 summer chinook to subyearling smolt size. The program was modified in 1984 to require the release of 400,000 fish into the natural production area of the Methow River. Currently, releases from Wells Hatchery occur at the hatchery. Only one release has been made from the facility into the Methow River.

The Eastbank Hatchery summer chinook program for the Methow River was started by trapping adults at Wells Dam and Wells Hatchery for release in the Methow River. The hatchery is designed to rear 1,816,000 yearling smolts, of which 400,000 are released into the Methow River. The Methow River releases are the responsibility of the Chelan County Public Utility District (PUD) and are coordinated with the Douglas County PUD's Wells Dam program.

Releases from Rock Island Hatchery occur in the Methow River near Twisp. The run at Wells Hatchery was developed by trapping adults at Wells Dam. The Rock Island Hatchery program began by trapping adults and hatchery volunteers at Wells Dam and at Wells Hatchery and then transporting them to the Rock Island Hatchery for holding until spawning.

The Wells Hatchery steelhead program for the Methow River system originated from adult trapping facility at Priest Rapids Dam. Broodstock collection was moved to the Wells Dam ladder in the early 1980s. This allows naturally spawned and hatchery returns destined for the streams above Wells Dam to be used as broodstock on an annual basis.

Although the existing broodstock collection provides for the use of some naturally spawning stocks, it does not provide for separation of the stocks above Wells Dam.

Currently there are no releases of coho into the Methow River system.

Recommended Actions For The Methow River System

(1) Irrigation diversions in combination with natural low flow occurrences and channel realignment in the basin create dewatering problems and upstream passage problems and significantly reduce available habitat. Instream flows will be significantly improved by implementing the recommendations of the *Draft Methow Basin Plan*. The Department of Ecology, in concert with the U. S. Forest Service on its lands, should enforce the state water code to stop illegal diversions. A relatively modest funding program ($2-3 million per year for 10 years) for water conservation projects would swiftly and significantly improve in-basin productivity for all anadromous stocks.

(2) Spring chinook rearing and over-wintering habitat could be significantly increased by reconnecting cut-off side channels and oxbows and by creating new off-channel habitats such as percolation channels. In the upper-Methow and Lost rivers, flows often disappear in late summer apparently as a result of natural phenomena. Percolation channels designed to take advantage of this circumstance would provide ideal year-round rearing environments.

(3) Riparian degradation throughout the basin should be stopped. Incentives for private landowner cooperation in programs to restore the riparian vegetation should be implemented. Programs for public education, development of riparian easements and enforcement of regulations should also be implemented.

(4) To ensure adequate large woody debris recruitment over time, Okanogan County must enforce its "Critical Areas" ordinance under the Growth Management Act and incorporate appropriate language into its Flood Management Plan. Washington State Forest Practices Act must be changed to require scientifically credible riparian buffer widths, and the U.S. Forest Service must adhere to the riparian reserve prescriptions in the Clinton Forest Plan. Additionally, the U.S.Forest Service should explore the possibility of adding large wood (whole tree scatter planting) to wood-deficient streams and stream reaches.

(5a) Spring chinook

Broodstock for the Winthrop rearing program should be changed to acquire broodstock from the Methow River system natural spawning population. Due to the depressed run, broodstock acquisition will by necessity be done over an extended period of time. This program should be implemented in a coordinated manner with the Methow Valley Spring Chinook program. The need for a new adult trap to be constructed in the natural production area of the Lost River should be evaluated. Release facilities, some of which are already developed as features of the PUD settlement agreements, are needed in natural production areas. Adult traps and release facilities exist on the Chewuck and Twisp rivers. Adult holding capabilities at Winthrop Hatchery must be modified to ensure proper separation of adults.

b) Summer chinook

Summer chinook adult traps and final rearing and/or acclimation facilities should be constructed in natural production areas. Adult holding capabilities at Wells Hatchery should be modified to ensure separation of adults.

c) Steelhead

Steelhead adult traps and release facilities should be constructed in natural production areas. Many of these facilities could be used in conjunction with the current spring and summer chinook programs of the Methow River basin. Adult holding capabilities at Wells Trout Hatchery may need modification to ensure separation of the adults.

d) Coho

The Winthrop National Fish Hatchery has previously been used to rear coho for release into the Methow River system. The program was highly successful, but was terminated when the decision by the fishery agencies was to move the coho program to the lower Columbia River hatcheries. Until the Turtle Rock facility is modified, and the spring chinook program is fully on line, it may be possible to utilize part of the production capability at Winthrop to rear coho for release in the Methow River.

The Rocky Reach Hatchery coho program produced 500,000 late run coho for release at the facility until 1992. Because of disease problems, adult production from this station was essentially non-existent. Providing a quality smolt can be reared at Turtle Rock, the facility could be modified to rear 500,000 coho smolts for release into the Methow River. Final rearing and/or acclimation facilities should be developed on the Methow River. Adult trapping facilities can utilize the existing trapping facilities at Wells Dam and those developed for summer chinook.

e) Fall chinook

The Rocky Reach Hatchery fall chinook program currently rears 500,000 smolts for release at the facility. Incubation and early rearing occurs at the Rocky Reach Hatchery facility located on the east bank of the Columbia River immediately below Rocky Reach Dam. Fish are then transferred to the Turtle Rock Rearing Pond facility, above the dam, where they are reared and released into the Columbia River.

The practice of releasing fish at the rearing pond has resulted in an increase in straying of fall chinook to other locations in the mid-Columbia. Adult fall chinook have also been

trapped at Wells Dam. As noted earlier fall chinook have only been recorded spawning in the Methow River. These fish are in all probability the result of straying past Priest Rapids Dam and past the rearing program at Wells Hatchery. This program should be terminated and a program of rearing summer chinook or coho reevaluated.

If the fall chinook is not terminated, broodstock should be acquired from Priest Rapids. Releases should occur below Priest Rapids Dam using final rearing and/or acclimation facilities in the natural production area.

(6) A program to restore lamprey should be developed by the relevant fishery managers. This program should be under the overall leadership of the tribes.

Table 3 shows the tribal recommended actions needed to restore the fish resources of the Methow River system.

Table 1

Methow River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	620[1]	2,000[2]
Summer Chinook	510[3]	3,000[2]
Steelhead	13,100[4]	10,000[2]
Coho	NA	NE
Fall Chinook	NA	NE
Lamprey	NA	NE

[1] Based on 1989-1993 redd counts. Assumes 2.5 fish per redd. Number rounded to nearest tenth.
[2] Harvest goal only. Natural production goal not established.
[3] Based on 1989-1993 redd counts. Assumes 2.5 fish per redd. Number rounded to nearest tenth.
[4] Based on years 1982-1986 from Wells Dam counts. Rounded to nearest tenth.
NA — Information not available
NE — None established

Table 2

Problems Impacting the Methow River Fish Resources

	Basinwide	Upper Methow	Lower Methow	Tributaries
Migration Barrier		•		
Irrigation Diversions	•			
Riparian Degradation	•			
Lack of Large Woody Debris	•			
Inadequate Production Compensation	•			

Table 3

Recommended Actions for the Methow River System

Problem	Recommended Action
Migration Barriers	(1) Construct passage facilities
Irrigation Diversions	(2) Line facilities, change to pump system, implement conservation programs, cease over-appropriation, implement plan
Riparian Degradation	(3) Restore riparian vegetation
Limited Large Woody Debris	(4) Retain woody debris
Inadequate Production Compensation	
Spring chinook, Steelhead Summer chinook, Coho	(5) Implement new broodstock programs, release programs, production programs
Lamprey	(6) Develop and implement programs

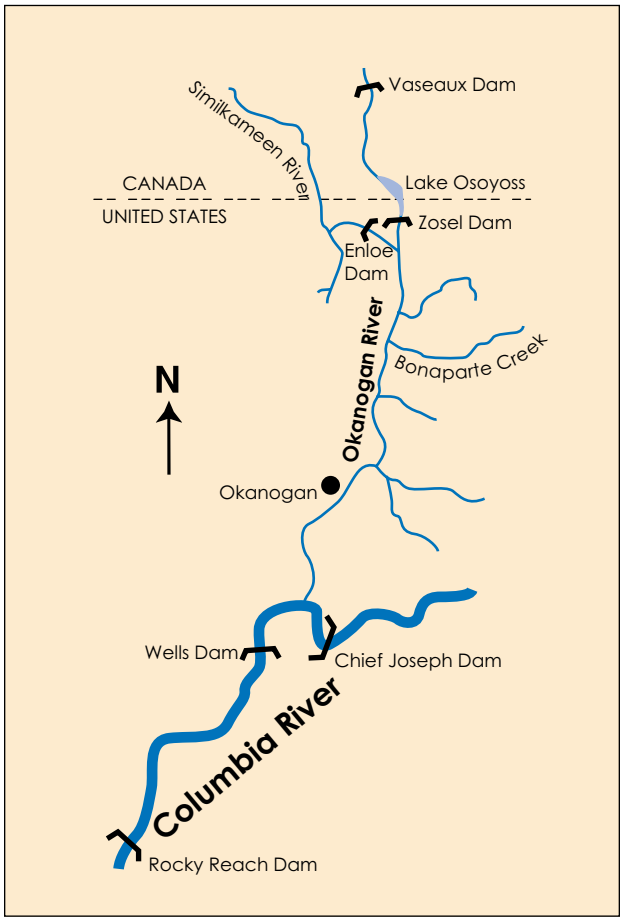
OKANOGAN RIVER

Prepared by the Yakama Indian Nation

Introduction

The Okanogan subbasin represents the upper limit of anadromous salmonids in the Columbia River Basin and enters the Columbia between Wells and Chief Joseph dams. The Okanogan subbasin straddles British Columbia and Washington, begins near Armstrong, British Columbia, and flows south through a chain of lakes. The first and largest of these is Lake Okanogan, followed by Lakes Skaha, Vaseaux and Osoyoos. The U.S. -Canadian border divides Lake Osoyoos into two, nearly equal parts. From Lake Osoyoos, the Okanogan River flows about 80 miles south where it enters the Columbia River near Brewster at river mile (RM) 533 (WDF et al. 1992).

The Similkameen River enters the Okanogan River from the northwest approximately 75 miles above the mouth. It is the main tributary to the Okanogan. The subbasin encompasses approximately 8,200 square miles.



Fish Population Status/Goals

A natural spawning run of summer chinook exists in the mainstem and the Similkameen River. Natural spawning of sockeye occurs in the Okanogan River (downstream of Vaseaux Dam) above Lake Osoyoos as well as a limited amount of lake spawning. Coho have been occasionally observed spawning in the mainstem. Steelhead natural production occurs throughout the basin. Spring chinook are believed to be extinct in the Okanogan subbasin.

The subbasin planners did not provide for specific run sizes to the Okanogan River. Their objective was to provide returns for harvest rather than natural production. Their recommended harvest objectives were 1,000 spring chinook, 2,000 summer chinook, 15,000 sockeye, and 10,000 hatchery reared steelhead. Table 1 shows the fish population status and goals.

Problems Impacting Fish Resources

Land and water resource management have significantly reduced habitat quality and quantity for all salmonid species and life stages. The Okanogan River mainstem suffers from extreme summer temperature, fine sediment, and low flow problems. These problems are further exacerbated by ubiquitous bank erosion and the attendant increase in channel width-to-depth ratio. Agricultural activities, including uncontrolled grazing, water diversions, and riparian vegetation removal, are the principal causes of the basin's habitat problems.

Tributary habitats have also been significantly affected by agriculture and additionally by forest practices and anthropogenic barriers. Salmon

Creek, as the name implies, once supported a spring chinook population, but is now entirely diverted into an irrigation delivery system. Enloe Dam blocks access to more than 95% of the anadromous habitat in the Similkameen River, the Okanogan's largest tributary. Additional thermal and or structural barriers exist on most tributaries within the subbasin.

Sockeye habitat in the Okanogan has been affected by loss of the riparian vegetation and channelization for flood control. There are additional problems, most notably dam blockage of the upper reaches of the Okanogan system. Correction of these passage problems could ultimately provide for full utilization of the spawning and rearing habitat. Low flows and high temperatures also affect sockeye migration in the Okanogan River during late summer and early fall. Sockeye rearing habitat in the system occurs in Lake Osoyoos. Water quality in Lake Osoyoos, the principal rearing area for Okanogan sockeye, may be a significant factor limiting smolt production. Warm summer water confines rearing juveniles to a relatively small portion of the lake's deeper upper basin. Instream flows are also a significant problem for sockeye. Flows in the Canadian portion of the subbasin are dropped approximately by half at the end of the irrigation season, resulting is redd exposure and occasionally total desiccation. Spring flows have also been inadequate to flush sockeye smolts from the system, leaving them vulnerable to predation by the river's considerable big mouth minnow population.

The Oroville-Tonasket Irrigation District has proposed a dam on Palmer Lake which would increase water temperatures in the Similka-meen River. Any temperature increase in this heavily stressed system could spell disaster.

Compensation programs for some stocks have been lacking and those that are being developed have either been to small or in some instances have not been implemented with the objective of restoring the natural runs. Table 2 shows the problems impacting the fish resources of the Okanogan River system.

Ongoing Actions In The Okanogan River System

Some measures have been implemented in the Okanogan River system as part of compensation programs for the mid-Columbia Public Utility District (PUD) projects. Previous mitigation attempts such as the mitigation for Grand Coulee Dam, were minor. Plan for correcting habitat problems have been completed, but little has been done to carry out the plans.

Hatchery production of summer chinook for the Okanogan River takes place at Wells Hatchery and the East Bank Hatchery. Broodstock for the programs is acquired from trapping at Wells Dam. Currently, releases from East Bank Hatchery occur in the Similkameen River near Oroville. The East Bank Hatchery program began by trapping adults at Wells Dam and transporting them to the East Bank Hatchery for holding until spawning.

Hatchery production of steelhead in the Okanogan River takes place at Wells Trout Hatchery. Releases occur in mainstem and the Similkameen River. The adult trap used to acquire broodstock for summer chinook at Wells Dam is also used for steelhead.

Sockeye production has been experimental as part of the Douglas County PUD Wells Dam settlement. The early rearing program is being developed on the lower Okanogan at Cashmere Springs by the Colville Tribe. The fish are then transported, placed in net pens and released in Lake Osoyoos.

Currently, there are no releases of coho or fall chinook into the Okanogan River system.
An advisory group of state, tribal, and federal fish managers, the Department of Ecology, and interested local irrigators has met with Canadian authorities in each of the past two years to recommend flow management operation schedules for the basin. The group meets each spring to decide how the limited available, unappropriated flow can be configured for fish.

The subbasin is closed to further water appropriation during the irrigation season.

Recommended Actions For The Okanogan River System

(1) The United States/Canada Boundary Waters Treaty should be amended to include flow agreements which better protect anadromous fish. Within the United States, the water code must be rigorously enforced, and opportunities to acquire water rights for instream flows for the mainstem and all tributaries should be aggressively pursued.

(2) Passage should be provided at Enloe Dam (dam removal is the best option) to the lakes located above Lake Osoyoos, Salmon Creek and the natural falls on Omak Creek. Due to the large sediment load, barriers have developed in the mainstem. The riparian area should be restored and bio-engineered erosion control measures implemented. Such approaches will reduce width-to-depth ratio and make limited water more useable as fish habitat.

(3) Grazing and agricultural practices should be improved to prevent sedimentation of spawning and rearing habitat. Funding to develop additional Coordinated Resource Management Programs which feature riparian protection/recovery should be made available.

(4) Okanogan County must strictly enforce its Critical Areas Ordinance and further ensure that all remaining riparian areas are protected.

(5) Lumber mill effluent on Omak Creek should be treated before being released into the system. Standards of the Clean Water Act or state standards should be investigated and enforced.

(6) Wetland and riparian restoration projects should be implemented on all tributaries and on the mainstem.

(7) The Washington Forest Practices Act should be amended to include scientifically credible Riparian Management Zone prescriptions.

(8a) Summer chinook

Wells Hatchery is located on the west bank of the Columbia River below Wells Dam. It is part of Douglas County PUD's mitigation for Wells Dam and is operated by Washington Department of Fish and Wildlife. The facility was designed and constructed to rear 4,400,000 summer chinook to subyearling smolt size. The program was modified in 1984 to require the release of 400,000 fish into the natural production area of the Methow River. Releases have also been proposed for the Okanogan River. An adult trap and final rearing and/or acclimation facility should be constructed in natural production area of the mainstem. Adult holding capabilities at Wells Hatchery should be modified to ensure separation of adults.

The Eastbank Hatchery program for the Okanogan River was started by trapping adults at Wells Dam for release in the Similkameen River. The hatchery is designed to rear 1,816,000 yearling smolts, of which 576,000 are released into the Similkameen River. The Okanogan River releases are the responsibility of the Chelan County PUD and should be coordinated with the Douglas County PUD's Wells Dam program to ensure compatibility.

b) Steelhead

Wells Trout Hatchery is located on the west bank of the Columbia River immediately below Wells Dam. It was constructed in 1967 as mitigation for Wells Dam. The facility was improved in the mid 1980s by the Bureau of Reclamation as part of the Oroville-Tonasket Project and currently has the capacity to rear 450,000 smolts. Current funding for the operation is provided by Douglas County. The facility is operated by the Washington Department of Fish and Wildlife. Currently, the facility rears summer run steelhead some of which are released into the Okanogan and Similkameen rivers. Broodstock for the program originated mainly from adults trapped at Priest Rapids Dam. Broodstock collection was moved to the Wells Dam ladder in the early 1980s. This allows naturally spawned and hatchery returns destined for the streams above Wells Dam to be used as broodstock on an annual basis.

Although the existing broodstock collection provides for the use of some naturally spawning stocks, it does not provide for separation of the stocks above Wells Dam. To ensure the program is more responsive to the natural runs, new adult traps and final rearing and/or acclimation facilities should be constructed in natural production areas. Many of these facilities could be used in conjunction with the summer chinook program.

Adult holding capabilities at Wells Trout Hatchery may need modification to ensure separation of the adults.

c) Sockeye
Douglas County PUD's Wells Dam Settlement Agreement calls for the rearing and release of 200,000 sockeye at 25 fish/pound into Lake Osoyoos. Broodstock is acquired at the Wells Dam trap, with incubation occurring at Cashmere Springs located on the lower Okanogan River. The program is funded by the PUD and operated by the Colville Tribe. Fish are put in net pens for partial rearing released as pre-smolts to complete their final rearing in the lake environment. Providing the program is successful, it will be increased to 375,000 at 25 fish/pound for release into Lake Osoyoos.

d) Coho
Turtle Rock hatchery water supply should be improved so that it can begin a coho release program for the Okanogan River. The facility could be modified to rear 500,000 coho smolts in place of the existing fall chinook program. Final rearing and/or acclimation and release facilities should be developed on the Okanogan River. Adult trapping facilities can utilize the existing trapping facilities at Wells Dam and those developed for summer chinook once the runs have been reestablished. It must be stressed that this program can only be achieved if the disease problems at Turtle Rock facility are corrected.

e) Fall chinook
Rocky Reach Hatchery (Turtle Rock Rearing Pond) currently rears and releases 500,000 subyearling fall chinook at Turtle Rock. Incubation and early rearing occurs at the Rocky Reach Hatchery facility located on the east bank of the Columbia River immediately below Rocky Reach Dam.

The practice of releasing fish at the rearing pond has resulted in an increase in the straying of fall chinook to other mid-Columbia locations. Adult fall chinook have also been trapped at Wells Dam. Sporadic spawning of fall chinook has been documented in the Okanogan River. These fish are in all probability the result of straying past Priest Rapids Dam, the past rearing program at Wells Hatchery and most recently the rearing and release of bright fall chinook at Turtle Rock. This program should be terminated and the facilities reevaluated for rearing summer chinook or coho.

Adult trapping facilities should be developed for all of the stocks including summer chinook and steelhead. Since there is only one stock of sockeye located above Wells Dam, the adult trapping at the dam should continue.

Additional final rearing and/or acclimation facilities should be developed for all species throughout the natural production areas. The facilities could consist of ponds, raceways, net pens or other such structures.

(9) A program to restore lamprey should be developed by the relevant fishery managers. This program should be under the overall leadership of the tribes.

Table 3 shows the tribal recommended actions needed to restore the fish resources of the Okanogan River system.

Table 1

Okanogan River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Summer Chinook	860[1]	2,000[2]
Sockeye	47,300[3]	15,000[2]
Steelhead	1,750[4]	10,000[2]
Spring Chinook	0	1,000[2]
Coho	NA	NE
Fall Chinook	NA	0
Lamprey	NA	NE

[1] Based on 1986-1990 redd counts. Assumes 2.5 fish per redd. Number rounded to nearest ten.
[2] Harvest goal only. Natural production goal not established.
[3] Based on Wells Dam counts 1983-87.
[4] Based on years 1984-88.
NA — Information not available
NE — None established

Table 2

Problems Impacting the Okanogan River Fish Resources

	Basinwide	Upper Okanogan	Lower Okanogan	Tributaries
Thermal Barrier		•	•	•
Passage Barriers		•	•	•
Sedimentation	•			
Low Stream Flows	•			
Poor Water Quality	•			
Inadequate Production Compensation	•			

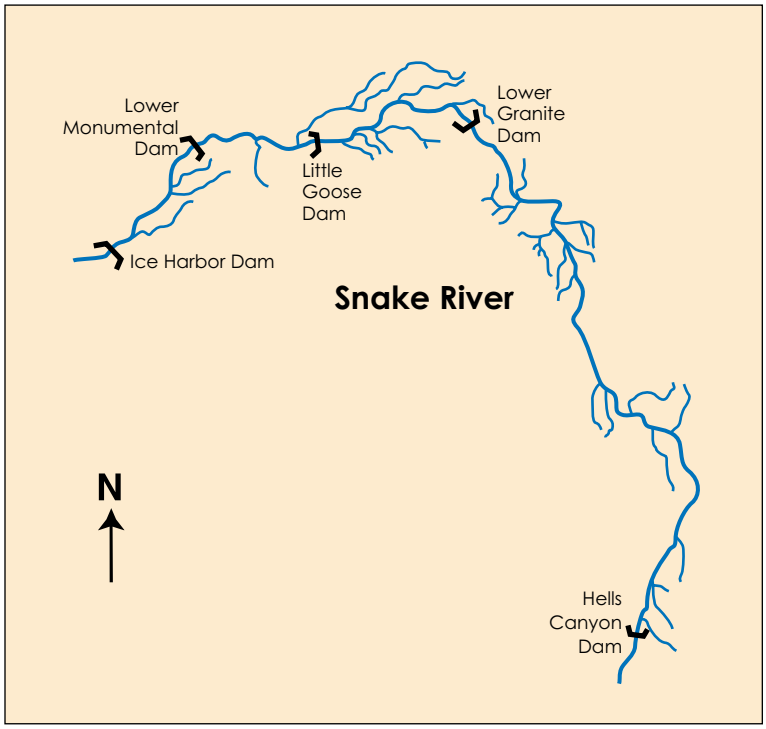
Table 3

Recommended Actions for the Okanogan River System

Problem	Recommended Action
Thermal Barrier	(1) Secure instream flows, renegotiate boundary water treaty, restore riparian vegetation
Passage Barrier	(2) Provide passage
Sedimentation	(3) Eliminate or reduce grazing, provide gravel flushing flows
Low Stream Flows	(4) Provide instream flows, cease over-appropriations
Poor Water Quality	(5) Enforce Clean Water Act, process effluent
Inadequate Production Compensation	
Spring chinook, Steelhead Summer chinook, Coho	(6) Implement new broodstock programs, release programs, production programs
Lamprey	(7) Develop and implement programs

SNAKE RIVER MAINSTEM

Prepared by the Columbia River Inter-Tribal Fish Commission, the Nez Perce Tribe and the Confederated Tribes of the Umatilla Indian Reservation



Introduction

The Snake River mainstem is that section of the river from Hells Canyon Dam downstream to the Columbia River. This section of the river generally flows northward forming the border of Idaho and Oregon and Washington until it turns westward at Lewiston, Idaho. The Snake River Basin is the largest drainage system that enters the Columbia River. The drainage area for the basin is approximately 34,100 square miles (WDF, Et al., 1990). The principal tributaries in this section of the river, which are described individually in these subbasin plans include the Salmon, Clearwater, Imnaha, Grande Ronde, and Tucannon rivers. In addition to these major rivers, minor tributaries, such as Asotin Creek, enter the Snake River.

Fish Populations Status/Goals

Currently natural spawning of fall chinook in the Snake River occurs mainly in the mainstem below Hells Canyon Dam. Small populations also appear to spawn below the lower Snake River mainstem dams. Inundation of habitat by dam construction has significantly affected fall chinook spawning in the mainstem Snake.

Natural production of spring chinook occurs in Asotin Creek. Natural production of steelhead occurs in the mainstem and other minor tributaries such as Asotin Creek.

The recommended goal for mainstem Snake River fall chinook is 18,300. Numerical objectives were not developed for spring chinook or steelhead. Table 1 shows the populations, status and goals.

Problems Impacting Fish Resources

The major habitat needs in this section of the river continue to be passage at mainstem dams and flows below the Hells Canyon Dam. An existing Federal Energy Regulatory Commis-sion (FERC) settlement between the Idaho Power Company (IPC) and fishery agencies requires IPC to provide flows for downstream migration should the fishery agencies require IPC to release fall chinook (FERC Settlement Agreement, 1980). This part of the settlement agreement has not been implemented.

Also found in this section of the river are large irrigation pumps. These pumps, when not properly screened, attract downstream migrants out of the mainstem and into the irrigation systems where they are lost.

Compensation programs for the losses incurred by the construction of the mainstem dams have been limited, improperly placed or non-existent.

Ongoing Actions In The Snake River Mainstem

A study recently determined the extent of the mortality associated with irrigation pumps and recommended corrective actions that should be taken.

Hatchery production of spring chinook for the mainstem Snake River occurs at Rapid River Hatchery. In 1994, spring chinook were also released below Hells Canyon Dam from Lookingglass Hatchery. An adult trap has also been constructed below Hells Canyon Dam to acquire broodstock. Direct stream releases occur at the adult trap. Since these fish are part of the Rapid River stock, the National Marine Fisheries Service (NMFS) does not consider them as listed Snake River spring chinook even though these Rapid River fish represent the only major stock currently being reared that originated from the Snake River system.

The Northeast Oregon Hatchery is currently being planned as a measure in the Northwest Power Planning Council (NPPC) Fish and Wildlife Program. It is expected that the facilities) will provide some fish for release in Snake River tributaries in Northeast Oregon and Southwest Washington.

Hatchery production of fall chinook in the mainstem Snake River takes place at Lyons Ferry Hatchery. Adult trapping currently occurs at Lyons Ferry Hatchery and Lower Granite Dam. Releases from the facility currently occur at the hatchery. Previous releases also occurred below Ice Harbor Dam with broodstock expected to return and be trapped at the hatchery or Ice Harbor Dam adult trap. NMFS has not included these fish in the listing of Snake River fall chinook, although beginning in 1996 they will allow the use of Lyons Ferry stock to supplement natural production above Lower Granite Dam.

Oxbow Hatchery is an Idaho Power Company facility that is currently used to hold steelhead and spring chinook. Although the facility is on-line, it currently does not produce fall chinook.

The Nez Perce Hatchery being studied under the NPPC Fish and Wildlife Program may include a fall chinook component. Currently, the Nez Perce Hatchery program is being designed to consist of a central incubation, rearing and release facility. Broodstock will be acquired from trapping at Lower Granite Dam.

Hatchery production of steelhead for the mainstem Snake River takes place at Lyons Ferry Hatchery. In addition and as noted in the individual basin recovery plans, final rearing ponds have been constructed in the Tucannon and Grande Ronde river systems. Two final rearing ponds have also been constructed outside the Snake basin in the Walla Walla River system. Broodstock is expected to return mainly to the hatchery.

Releases of full-term reared smolts occur at the hatchery and ponds. Past broodstock has included eggs from Wells and Skamania stocks.

Recommended Actions For The Snake River Mainstem

Artificial Production Actions for Mainstem Snake Subbasin

1. Begin a fall chinook supplementation program using Lyons Ferry stock. For the interim, produce yearlings (up to 900,000) and subyearlings (after full yearling production is met).

   a. Reduce releases at Lyons Ferry Hatchery to a level which (on average) will result in adult rack returns adequate to meet no more than broodstock needs. Outplant remaining juveniles above Lower Granite Dam.

   b. Maintain adult capture capabilities at Lower Granite Dam to capture broodstock as necessary.

   c. Develop adult capture and juvenile acclimation/release facilities in the Asotin Creek and Pittsburg Landing areas on the Snake River and selected tributaries to support future broodstock collection and smolt outplanting activities. Until final facilities are developed, direct stream releases should occur immediately.

2. Any returning adults not required to meet the above two objectives should be released above Lower Granite Dam into the natural production area.

3. Continue the summer steelhead program at Lyons Ferry Hatchery using Lyons Ferry stock.

4. Begin a natural broodstock summer steelhead program in Asotin Creek. The program should be phased in with releases occurring as production becomes available.

5. Develop adult capture and juvenile acclimation/release facilities in Asotin Creek to support future broodstock collection and smolt outplanting activities. Until final facilities are developed, direct stream releases should occur.

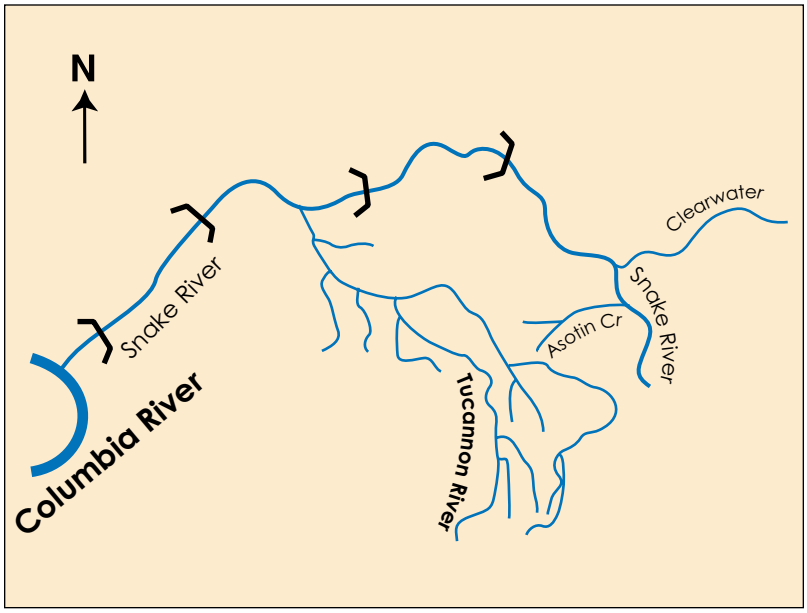
6. Discontinue all catchable trout programs in areas where they may affect anadromous salmonid restoration activities.

7. A program to restore lamprey populations utilizing either transplantation or artificial propagation should be developed under the overall leadership of the affected tribes.

8. Monitor and evaluate all artificial production actions. Use adaptive management to determine whether program changes (i.e., release number, size, time, location, and/or life history) are needed in order to meet restoration objectives.

TUCANNON RIVER

Prepared by the Confederated Tribes of the Umatilla Indian Reservation and the Nez Perce Tribe



Introduction

The Tucannon River originates in the Blue Mountains of the Umatilla National Forest at an elevation of 6,387 feet. It drains approximately 550 square miles flows north for 50 miles through Washington state and enters the Snake River near Starbuck, Washington at 500 feet elevation (WDF, et. al., 1990). The principal tributary is Pataha Creek.

Fish Population Status/Goals

Natural production of spring chinook occurs in the Tucannon River. Recent returns have averaged about 400 adults per year, until 1994 when only about 100 fish returned. Natural production of fall chinook in the Tucannon River has been observed at small levels since the construction of Lyons Ferry Hatchery. These fish are believed to be strays from the hatchery release program. The National Marine Fisheries Service (NMFS) has listed the spring and fall chinook as threatened under the Endangered Species Act. Natural production of group A steelhead occurs in the Tucannon River.

The tribes recommended adult return goals are 3,000 for spring chinook and 2,000 for fall chinook. The recommended objective for summer steelhead is 2,200 fish with a natural escapement of 1,500 and a harvest of 700 fish. Table 1 shows the fish populations, status and goals.

Problems Impacting Fish Resources

Problems in the basin include those related to both habitat and production. Habitat problems noted by the subbasin planners include high temperatures, irrigation, sedimentation, loss of riparian vegetation and passage (Ibid). Inadequate production programs and failure to mitigate for lost species also occur in the Tucannon River system.

Ongoing Actions In The Tucannon River System

Hatchery production of spring chinook for the Tucannon River occurs at Lyons Ferry Hatchery. An adult trap and release facility are located on the Tucannon River at the existing Tucannon Hatchery.

Hatchery production of fall chinook takes place at Lyons Ferry Hatchery. It is believed that some of the returns have strayed to the Tucannon River.

Hatchery production for steelhead in the Tucannon River takes place at Lyons Ferry Hatchery. Broodstock sources for steelhead released into the Tucannon River have included Skamania, Wells, Priest Rapids and Lyons Ferry Hatchery. In addition to the hatchery, a final rearing and release pond has been constructed in the Tucannon River. Releases of full-term reared smolts occurs at the pond.

Broodstock is acquired from the returns to Lyons Ferry Hatchery. When broodstock does not arrive,

eggs are exchanged between stations. As noted, Wells, Priest Rapids and Skamania stocks have been used in the Tucannon River.

Some measures have been implemented to correct habitat problems.

Recommended Actions For The Tucannon River System

Habitat Enhancement Actions for Tucannon

I. Administrative

A. Laws and Codes, Enforcement & Revision

- State of Oregon (OR)/Environmental Protection Agency complete Total Maximum Daily Load for stream temperatures, sediment, other pollutants (Clear Water Act)
- Enforce Oregon fish screening statutes
- Upgrade Oregon Forest Practices Act to be consistent with Upper Grande Ronde (UGR) Anadromous Fish Habitat Plan
- Upgrade Forest Service Land and Resource Management Plans consistent with UGR Plan to be in compliance with National Forest Management
- Revise mining laws to be consistent with production of high quality water and fish habitat

II. Instream Flow & Passage

A. Instream Flow Enhancement

- Purchase, exchange, lease or seasonally rent water rights for selected fish habitat during critical low flow periods
- Implement more efficient irrigation methods and water conservation practices benefitting landowners and instream flows

III. Watershed Management

A. Water Quality Needs

- Increase shade cover to reduce stream temperatures (increased downstream extent of temperatures <60°F)
- Reduce sediment from agricultural practices and unimproved roads
- Reduce nitrate, phosphates, bacteria and other contaminants related to agricultural practices
- Manage ponds and lakes that are located in close proximity to the mainstem Tucannon in a manner that will minimize contribution of elevated water temperatures

PRIORITIES: Mainstem Tucannon River, Pataha Creek

B. Riparian Restoration Needs

- Implement UGR Plan on state, federal and tribal lands
- Implement Best Management Practices (BMPs), including stream buffers to benefit fish on private lands
- Acquire, lease or implement management agreement to restore natural floodplain habitat and function
- De-emphasize recreational use along upper mainstem Tucannon River by relocating existing use

PRIORITIES: Mainstem Tucannon River, Pataha Creek

C. Range Management

- Revise and implement BMPs to be consistent with UGR Plan Standards & Guidelines (S&Gs)
- Restrict/remove livestock in substandard areas
- Acquire, lease, develop projects in priority areas (see above)

D. Forest Management

- Upgrade, monitor, enforce Forest Practices Act consistent with UGR Plan S&Gs on private lands
- Implement UGR Plan Standards & Guidelines on state, federal, tribal lands
- Identify and implement active restoration projects
- Institute or continue protection of "good" habitat areas such as upper Tucannon drainage within wilderness area and upper mainstem Tucannon River below wilderness area

E. Mining Impact Reduction Needs
No current problems

Artificial Production Actions for Tucannon Subbasin

1. Maintain the Tucannon stock spring chinook program of 132,000 yearling smolts.

    a. Use no more than 50% of the returning adults for program broodstock requirements. Release all other returning adults upstream into the primary natural production area.

    b. Change release location to a site upstream of the hatchery weir to encourage more escapement above the weir into the best spawning/rearing habitat area. Immediately develop acclimation facilities in the primary natural production area. In the interim, acclimate and release spring chinook from the Curl Lake acclimation pond.

2. Discontinue use of non-native stocks in the existing summer steelhead program. Develop a new broodstock population from natural Tucannon returns.

    a. Reduce program to 120,000 yearling smolts.

    b. Continue the existing steelhead release program from Curl Lake in a manner which would not interfere with spring chinook acclimation.

3. Begin acclimation/release program of 500,000 subyearling fall chinook. Lyons Ferry stock should be used as the founder population for this program.

    a. Develop adult capture and juvenile acclimation/release facilities in the Starbuck Dam area to support future broodstock collection and smolt outplanting activities. Until final facilities are developed, direct stream releases should occur.

4. Evaluate historical status of coho populations and current production potential in the subbasin for reestablishment of species.

5. Discontinue all catchable trout programs in areas where they may affect anadromous salmonid restoration activities.

6. A program to restore lamprey populations utilizing either transplantation or artificial propagation should be developed under the overall leadership of the affected tribes.

7. Monitor and evaluate all artificial production actions. Use adaptive management to determine whether program changes (i.e., release number, size, time, location, and/or life history) are needed in order to meet restoration objectives.

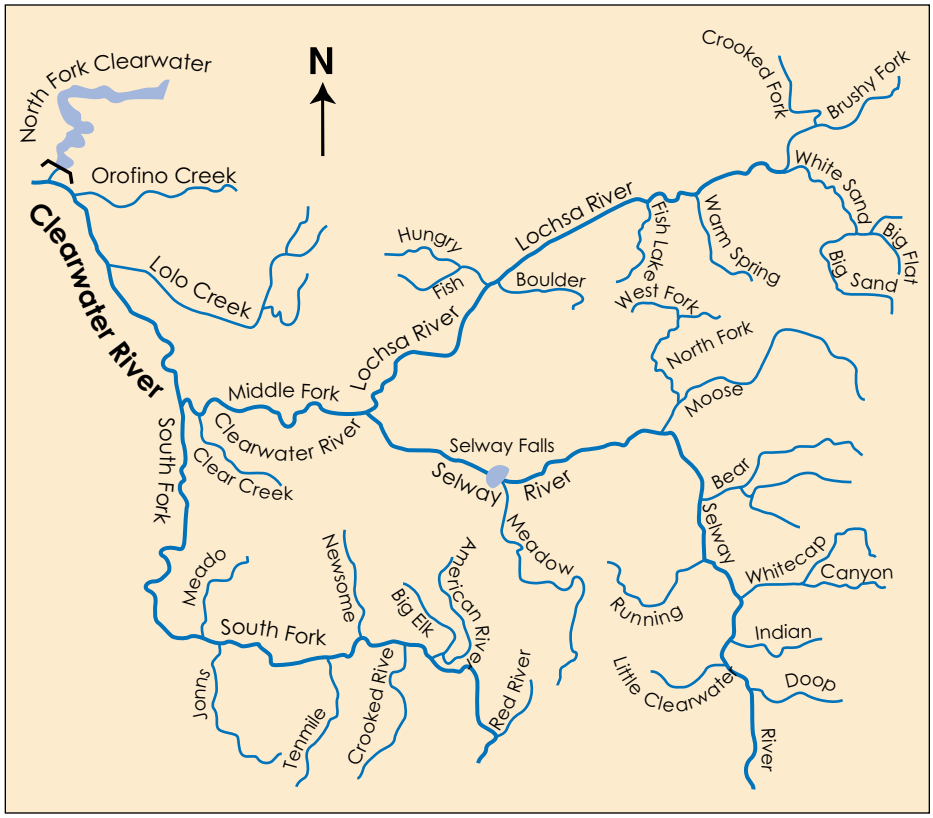
Table 1
Tucannon River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	400	3,000
Steelhead	NA	2,200
Fall Chinook	NA	2,000
Lamprey	NA	NE

NA — Information not available
NE — None established

CLEARWATER RIVER

Prepared by the Nez Perce Tribe



Introduction

The Clearwater River is located in north central Idaho and drains approximately 9,645 square miles. The subbasin extends from the Washington and Idaho border in the west to the eastern headwaters along the west slope of the Bitterroot Moun-tains along the border of Idaho and Montana. It elevations range from 9,000 feet at the headwaters to 700 feet at the mouth where it enters the Snake River at Lewiston, Idaho. The main tributaries include the Locsha, Selway, South Fork and North Fork rivers (NPT, et al., 1990). Other tributaries include the Red River, Lolo, Orofino, Newsome, Brushy Fork and Lapwai creeks.

Fish Populations Status/Goals

Natural spawning runs of spring chinook in the Clearwater River system were severely impacted by Lewiston Dam. Its removal in 1972 opened up major habitat which has led to re-establishment of natural spawning in all of the major subdrainage and tributary streams. These actions demonstrate the ability of fish runs to be re-established with dam removal and supplementation. The streams include Newsome, Meadow, and Johns creeks and the Crooked, American, and Red rivers in the South Fork drainage; Crooked Fork, Brushy Fork, Boulder Creek, and White Sands Creek in the Lochsa drainage; Selway River and Bear, Meadow, Running, Whitecap and Moose creeks in the Selway drainage; and Lolo Creek and Eldorado Creek in the Lolo Creek drainage. These natural runs have not been listed under the Endangered Species Act.

A remnant natural spawning run of summer chinook may exist in the Clearwater River system as a result of past hatchery releases. Existence of natural spawning summer chinook should be confirmed.

A natural spawning run of fall chinook occurs in the Clearwater River. These fish have been designated as endangered by the (NMFS).

Historical information regarding locations of natural spawning runs of coho in the Clearwater River system is not recorded. Attempts to restore coho runs in the South Fork and its tributaries occurred in the 1960s using egg incubation channels and fry plants. The Integrated System Plan recognized

Orofino Creek as having potential for reintroduction of coho through supplementation. Nez Perce tribal members have also noted that coho were found in such streams as Fish Creek and Clear Creek.

Natural spawning runs of both group A and group B steelhead exist in the Clearwater River system. Group A are found in the lower river tributaries. Natural spawning in the Clearwater system occurs in all of the major subdrainage and tributary streams. These include: Newsome, Meadow, and Johns creeks and the Crooked, American, and Red rivers in the South Fork drainage; Crooked Fork, Brushy Fork, Boulder Creek, and White Sands Creek in the Lochsa drainage; the Selway River and Bear, Meadow, Running, Whitecap, and Moose creeks in the Selway drainage; and Lolo Creek and Eldorado Creek in the Lolo Creek drainage.

The subbasin planners recommended a long- term objective of 60,000 spring chinook to the basin with a natural spawning component of 10,000 fish and a harvest component of 45,000 fish. The recommended long-term minimum objective for summer chinook is 50,000 fish. The long-term objective run size for fall chinook is 50,000 fish. The recommended objective for coho is 14,000 fish. The recommended long-term objective for B-run steelhead is 91,000 fish with a natural spawning component of 12,000 fish and a harvestable component of 74,000 fish. For the A-run component the objective is for 2,000 fish with an escapement of 1,000 and harvest of 1,000. Table 1 shows the fish populations, status and goals.

Problems Impacting Fish Resources

Existing habitat condition in the Clearwater system varies widely. Problems noted in the subbasin plan include logging, road building, grazing, mining, barriers and others (Ibid). The subbasin planners noted specific major habitat constraints in 45 spring chinook streams and 63 steelhead streams (Ibid). These constraints include sedimentation, low flows, water quality (temperatures), migration barriers, rearing and spawning habitat, riparian degradation and channel/bank instability (Ibid). Habitat programs are not coordinated on a watershed basis thus limiting their effectiveness to restore the habitat.

Compensation programs for the Clearwater River system have been limited or non-existent. Programs have not been developed and/or implemented with the objective of restoring the natural spawning populations. Off-station release programs for the most part occur to provide fisheries rather than to increase the natural spawning runs. Tribal production planning has been occurring since 1982 with little or no program implementation even though the programs are intended to increase the natural populations. As terminal fisheries and production programs develop on hatchery returns, the ability to modify the release to the habitat becomes more difficult. Releases of fall chinook and coho do not occur in the subbasin at this time. In 1993, returns of fall chinook to the Dworshak Hatchery were destroyed rather than used to help restore natural spawning populations. Table 2 shows the problems impacting the Clearwater River system.

Ongoing Actions In The Clearwater River System

Some habitat improvements have occurred in the basin under the Northwest Power Planning Council's (NPPC)Fish and Wildlife Program. These include improvements on Meadow Creek, Crooked River, and Red River in the South Fork; Brushy Fork and White Sands Creek in the Lochsa; and Lolo Creek and Eldorado Creek in the Lolo Creek drainage.

Hatchery production of spring chinook in the Clearwater River occurs at several major hatcheries and rearing ponds. Hatcheries constructed include Dworshak, Kooskia, and Clearwater Anadromous Hatchery. In addition to the major hatcheries, rearing ponds have been constructed at Red River, Powell, and Crooked River. Facilities being studied under the Fish and Wildlife Program include the Nez Perce Tribal Hatchery. Adult traps have been constructed at the hatcheries and rearing ponds.

Releases occur at the hatcheries or adult traps, with broodstock expected to return and be trapped at those locations. When broodstock does not arrive, eggs are acquired from other stations. Over the years, Carson, Leavenworth, Little White Salmon, and Cowlitz hatcheries have been used to provide

broodstock. The primary back-up station in recent years has been the Rapid River Hatchery.

To begin a program of tributary releases and to begin restoring natural production, the Nez Perce Tribe has utilized the Sweetwater Springs incubation and early rearing facility to rear and release spring chinook into Meadow Creek a tributary of the Selway. The program began by utilizing Rapid River broodstock. The fish are released as Time Released Fed Fry (TRFF) utilizing a helicopter to distribute the fish throughout the stream. The spring chinook reared in the Clearwater River system have not been designated by the NMFS under the Endangered Species Act.

Hatchery production of steelhead in the Clearwater River takes place at Dworshak Hatchery and the Clearwater Anadromous Hatchery. Releases of full-term reared smolts at Dworshak Hatchery occur mainly at the hatchery. Broodstock is expected to return and be trapped at the hatchery. The Clearwater Anadromous Hatchery releases occur throughout the Clearwater system. The broodstock for the program is trapped at Dworshak Hatchery.

Recommended Actions For The Clearwater River System

(1) Logging, road building and the loss of the riparian vegetation has created high cobble embededness. To eliminate or reverse this problem, those practices should be stopped or severely restricted until the streams can recover.

(2) The loss of the riparian area is occurring throughout the watershed. Practices such as mining, logging and development in the riparian area must be halted and the riparian vegetation be allowed to recover.

(3) Sedimentation due to logging is occurring throughout the watershed. In addition, mining and road building also continue to create sedimentation problems. The watershed must be left to recover by eliminating or severely restricting these practices. Riparian restoration must be carried out.

(4) High water temperatures like the other problems are mainly due to logging, road building and grazing. Establish-ment, adoption and enforcement of standards under the Clean Water Act are necessary. As noted, eliminating or severely restricting logging, grazing and road building are needed.

(5) In lower river tributaries where agricultural diversions exists, high water temperatures and low stream flows are a problem. The adoption and enforcement of instream flows are needed.

(6) Land use practices in highly erodible streams such as Deadman and Canyon creeks must be controlled and limited to ensure that little to no erosion occurs.

(7) Practices such as logging which removes large woody debris from the riparian areas must be terminated. Large woody debris must be maintained to help ensure the stream integrity.

(8a) Spring chinook

The Dworshak Hatchery spring chinook program is part of the Lower Snake River Compensation Plan. Dworshak Hatchery is located on the North Fork of the Clearwater River approximately one mile below Dworshak Dam. It has been constructed to rear 1,200,000. Although the program calls for off-station releases, most of the smolts have been released at the hatchery site to ensure broodstock needs are met. The release of fingerlings excess to program needs have occurred off-station. Additionally, smolts have been released at the Powell Adult Trap site. Fingerlings are also provided to Red River Pond, Crooked River Pond and Powell Pond. Returns will be used as broodstock in the Clearwater Anadromous Hatchery program.

Development of the Dworshak run has utilized numerous hatchery runs including Carson, Leavenworth, Little White Salmon and Rapid River. The Dworshak program is very representative of the Clearwater River spring chinook programs in that a variety of spring chinook runs have been used to develop the program. Currently, there are adult trapping facili-

ties on the upper Lochsa at the Powell Adult Trap and the upper South Fork at the Red River and Crooked River adult traps.

Clearwater Anadromous Hatchery was constructed as part of the Lower Snake River Compensation Plan. It has been designed to rear and release 1,369,500 spring chinook smolts. Additionally, the facility will provide 1,050,000 fry for rearing and release at three satellite facilities in tributaries of the Clearwater. The facility should provide the fry for the satellite rearing facilities. In conjunction with other rearing programs, the smolts should be released to the natural production areas of the Clearwater River system. Broodstock acquisition should use, to the extent possible, the currently constructed traps. Construction of additional traps will be necessary in other natural production areas. Final rearing and/or acclimation facilities should be constructed in the natural production areas.

Red River Rearing Pond was originally constructed in the early 1970s. It was incorporated as a program of the Pacific Northwest Regional Commission, composed of the governors of Washington, Oregon, and Idaho. The Red River Program is unique in that it rears spring chinook under semi-natural rearing conditions. The fish are introduced into the pond in early summer as fed fry and allowed to leave the pond in late fall as fingerlings to over-winter in the natural environment of the Clearwater River system. Most of the fish have been acquired from Rapid River Hatchery.

Recently, the facility has been upgraded and adult trapping capabilities installed as part of the Lower Snake River Compensation Plan. Broodstock is now taken from the returning adults. The program should continue and the unique nature of the past rearing and release program maintained. The program had been very successful in returning adults. A significant increase in the natural spawning population had been demonstrated. In recent years the program has taken too many adults. The tribal recommended broodstock trapping protocol that does not adversely affect the natural production is needed.

Crooked River Pond, located on the South Fork, and Powell Pond, located on the upper Lochsa, are operated in a manner similar to Red River. As with Red River, a broodstock trapping protocol is needed at the facilities. All three are considered part of the Clear-water Anadromous Hatchery program.

Kooskia Hatchery is a federally constructed enhancement hatchery constructed on the Nez Perce Indian Reservation and is capable of rearing 800,000 spring or summer chinook smolts. It is located near the mouth of Clear Creek, a tributary of the Middle Fork. Over the years, the hatchery has used numerous upriver broodstocks for its program. Like the other programs in the Clearwater system, its current primary backup station is Rapid River Hatchery. In recent years the hatchery has been operated in conjunction with Dworshak Hatchery. Releases have been mainly at the hatchery.

Releases from this facility should include off-station releases in tributaries of the Clearwater. Although the Clearwater system has had numerous releases of non-indigenous stocks, the primary option for broodstock acquisition should be trapping at release sites. Secondary programs could include any of the other trapping facilities on the Clearwater system. Releases should be done utilizing final rearing and/or acclimation facilities. Because of the wilderness designation, construction of facilities for releases into Selway River, even temporary ones, may not be allowed. In such a case, direct stream releases should occur. Helicopter releases may be necessary.

The Nez Perce Tribal Hatchery has been planned under the NPPC Fish and Wildlife Program since 1982. The spring chinook program has been designed to consist of a central incubation and early rearing facility. Fish will then be moved to eleven tributary facilities. Fish will be reared at the tributary satellite

facilities during the summer months and will be released in late fall to over-winter in the natural environment. Once reestablished and adult trapping facilities constructed, broodstock will be acquired in tributaries where fish will be released.

(b) Summer chinook

Kooskia Hatchery is capable of rearing 800,000 spring or summer chinook smolts. Although it is currently rearing spring chinook, future rearing at this facility may be converted to summer chinook to begin a program for that stock in the Clearwater River basin. Broodstock for the program would originally be acquired from the South Fork Salmon River. Releases would all be off-station in tributaries of the Selway. Future broodstock could be acquired by trapping at Selway Falls if feasible.

The Clearwater Anadromous Hatchery should provide 400,000 smolts to assist in the restoration of summer chinook in the Clearwater River system.

Besides the facilities currently on-line, additional facilities proposed under the Integrated System Plan would provide up to an additional 500,000 summer chinook smolts for the Selway River.

c) Fall chinook

Lyons Ferry Hatchery, which is located in Lower Monumental Pool, was designed to rear 9,100,000 fall chinook smolts for release into the Snake River. Broodstock for the program has been developed by trapping adults at the hatchery and Ice Harbor Dam. Smolts are released in the Snake River at the hatchery. Past releases have also occurred below Ice Harbor Dam. Trapping broodstock at the hatchery and Ice Harbor Dam should be terminated and a trapping program begun at Lower Granite Dam. Releases at the hatchery and below Ice Harbor Dam should be terminated and all releases should occur above Lower Granite Dam in natural production areas. Up to one-half of the production should be considered for release annually into the Clearwater River.

The Nez Perce Hatchery being studied under the Fish and Wildlife Program may include a fall chinook component. Currently, the Nez Perce Hatchery program is being designed to consist of a central incubation, rearing, and release facility. Broodstock will be acquired from trapping at Lower Granite Dam.

d) Coho

The Sandy River Hatchery is part of the Mitchell Act program. It is located on the Sandy River near the town of Sandy, Oregon. It currently rears 1 million early run coho for release at the hatchery. To begin a program in the Clearwater River system, current operations would be modified by releasing smolts into Orofino Creek and Fish Creek. Final rearing and/or acclimation and release facilities should be developed on Orofino Creek.

e) Steelhead

The Dworshak Hatchery steelhead program is mitigation for the construction of Dworshak Dam on the North Fork of the Clearwater. Dworshak Hatchery is located on the North Fork of the Clearwater River approximately one mile below Dworshak Dam. It rears 1,300,000 to 2,500,000 group B steelhead smolts. Most of the smolts are released at the hatchery site to ensure broodstock needs are met. Off-station releases of smolts are made mainly to provide harvest. The release of fry, fingerlings, and adults in excess to program needs have occurred off-station. In recent years Kooskia Hatchery, has been used as an early rearing station for Dworshak Hatchery.

Broodstock development has occurred by trapping fish from the North Fork. The broodstock has been manipulated over the years to provide for sport fishing needs. These stocks should no longer be used as a predominate source for release to the natural production areas. New broodstock acquisition programs should be undertaken to acquire broodstock from the tributaries of the Clearwater. This program should

be done in conjunction with the Clearwater Anadromous Hatchery.

Clearwater Anadromous Hatchery has been designed to rear and release 2,500,000 steelhead smolts. All the fish are to be released off-station to provide additional fishing opportunities and supplement natural production. Currently no broodstock source other than Dworshak Hatchery has been identified for the program.

Broodstock acquisition should be changed to work in combination with the spring chinook trapping facilities. Final rearing and/or acclimation facilities should be constructed in the natural production areas.

(9) A program to restore lamprey should be developed by the relevant fishery managers. This program should be under the overall leadership of the tribes.

Table 3 shows the tribal recommended actions needed to restore the fish resources of the Clearwater River system.

Table 1

Clearwater River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	270[1]	60,000
Summer Chinook	NA	50,000
Fall Chinook	NA	50,000
Steelhead	NA	91,100 B 2,000 A
Coho	NA	14,000
Lamprey	NA	NE

[1] Based on 1989-1993 redd counts. Assumes 2.5 fish per redd. Number rounded to nearest ten.
NA — Information not available
NE — None established

Table 2

Problems Impacting the Clearwater River Fish Resources

	Basinwide	South Fork Clearwater	Middle Fork Clearwater	Tributaries
High Cobble Embededness				•
Loss of Riparian Area	•			
Sedimentation	•			
High Water Temperatures		•	•	•
Poor Water Quality		•	•	
Irrigation Diversions				•
Severe Erosion				•
Lack of Large Woody Debris				•
Inadequate Production Compensation	•			

Table 3

Recommended Actions for the Clearwater River System

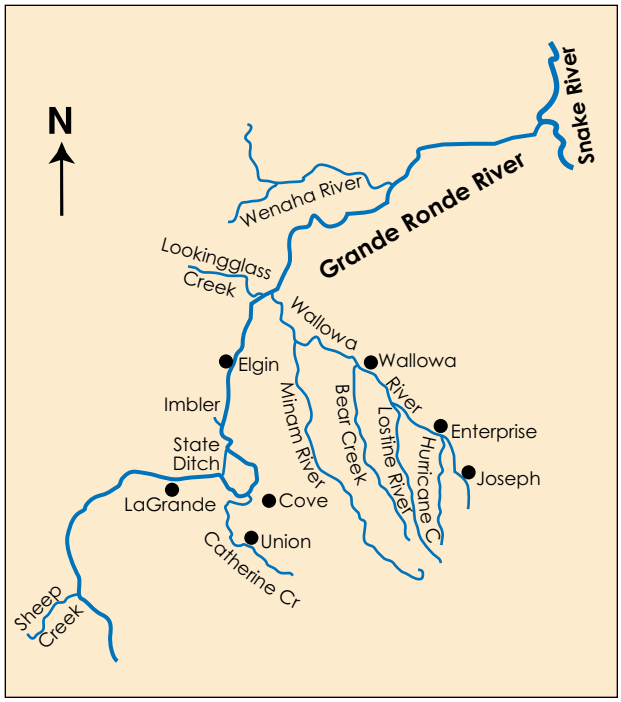
Problem	Recommended Action
High Cobble Embededness	(1) Eliminate or severely restrict logging, road building, restore riparian area
Loss of Riparian Area	(2) Restore riparian vegetation, reduce or eliminate mining
Sedimentation	(3) Eliminate or severely restrict loggng and grazing, restore riparian area
High Water Temperature	(4) Enforce Clean Water Act, reduce diversions, reduce or eliminate grazing, reduce roads
Irrigation Diversions	(5) Reduce diversions, provide instream flows
Severe Erosion	(6) Control land use in highly erodible areas
Limited Large Woody Debris	(7) Retain large woody debris
Inadequate Production Compensation	
Spring chinook, Steelhead Summer chinook, Coho	(5) Implement new broodstock programs, release programs, production programs
Lamprey	(6) Develop and implement programs

GRANDE RONDE RIVER

Prepared by Confederated Tribes of the Umatilla Indian Reservation and the Nez Perce Tribe

Introduction

The Grande Ronde River originates in the Blue Mountains of northeastern Oregon. It is bounded by the Blue Mountains to the west and northwest and the Wallowa Mountains in the southeast. It drains an area of approximately 3,950 square miles and flows 212 miles from its headwaters enters the Snake River in the Hells Canyon reach at river mile (RM) 168.7 (ODFW, et.al., 1990). Its principal tributaries are the Wenaha, Wallowa and Minam rivers, and Catherine and Lookingglass creeks. Smaller tributaries include Bear, Hurricane, Sheep and Indian creeks.



Fish Population Status/Goals

Natural spawning of spring chinook occurs in the Wenaha, Wallowa, Minam, Lostine, and upper Grande Ronde rivers, and Bear, Hurricane, Lookingglass, and Catherine creeks. The Washington Department of Fish and Wildlife has recently documented fall chinook natural spawning in the lower Grande Ronde River (WDF, 1993). Natural spawning of group A steelhead occurs throughout the Grande Ronde River system. Historically, sockeye spawning occurred in the tributaries of Wallowa Lake. Natural spawning runs of coho historically occurred in the Grande Ronde River system. Natural spawning runs were recorded in the Wenaha, Wallowa, Minam, and Lostine rivers and Catherine, Prairie, and Spring creeks.

The National Marine Fisheries Service (NMFS) has listed the natural component of the Grande Ronde spring chinook as part of the Snake River spring/summer chinook and has listed them as endangered under the Endangered Species Act. They have also listed the fall chinook as endangered.

The subbasin goals call for an annual return of 16,000 spring chinook with a natural escapement of 12,400 and a harvest of 4,000 fish. The recommended return of fall chinook is for 10,000 of which 2,500 would be for harvest. The recommended goal for summer steelhead is a 27,500 return of which 18,450 were for natural production and 9,050 for harvest. The recommended goal for sockeye is a return of 2,500 fish with a harvest of 625 fish. The recommended coho return is for 3,500 fish with a natural escapement of 1,000 and a harvest of 300. Table 1 shows the fish populations, status and goals.

Problems Impacting Fish Resources

Problems noted in the subbasin plan include those related to logging, road building, irrigation, grazing and stream channelization (Ibid). Some habitat improvement has occurred in Wallowa River and the upper Grande Ronde River. In addition to the habitat problems, the compensation programs for the basin are either inadequate or lacking. Many species are not being replaced, particularly not in the natural habitat.

Ongoing Actions In The Grande Ronde River System

Some measures have been implemented in the basin to correct habitat problems or partially mitigate losses. An extensive planning process has been completed in the basin leading to the development of the Upper Grande Ronde Plan. Implementation of the measures outlined in the plan has been lacking.

Hatchery production of spring chinook in the Grande Ronde River occurs at Lookingglass Hatchery. A new facility, Northeast Oregon Hatchery, has also been studied under the Northwest Power Planning Council (NPPC) Fish and Wildlife Program. Past releases from Lookingglass Hatchery have occurred throughout the basin. Since the listing of the natural run component and the failure to list the hatchery reared component, the NMFS has attempted to modify the release program from Lookingglass Hatchery. This has resulted in a decrease in the numbers released into the basin and a decrease in the run. The releases now occur at the hatchery with broodstock expected to return and be trapped at the hatchery. In addition, the state and federal fishery agencies propose to trap adults at Lower Granite Dam and prevent them from entering the Grande Ronde River. Over the years, Carson, Rapid River and Marion Forks hatcheries have been used to provide broodstock. The primary back-up station in recent years has been the Rapid River Hatchery.

Hatchery production of steelhead for the Grande Ronde River takes place at Irrigon Hatchery and Lyons Ferry Hatchery. In addition to the hatcheries, final rearing ponds have been constructed in the Grande Ronde River systems. Broodstock are acquired by trapping the fish at Wallowa Hatchery and adult traps. Broodstock used in the Grande Ronde system have included Pahsimeroi, Snake River, Wallowa, Wells, and Skamania.

Releases of full-term reared smolts occur at Wallowa Hatchery at the final rearing/acclimation facilities and through direct stream releases. When broodstock does not arrive, eggs are exchanged between stations.

Currently, there is no hatchery production of coho or fall chinook in the Grande Ronde River. Opportunities for reintroducing coho and increasing fall chinook production in the Grande Ronde come from reprogramming existing hatcheries.

Recommended Actions For The Grande Ronde River System

Habitat Enhancement Actions for Grande Ronde

I. Administrative

A. Laws and Codes, Enforcement & Revision

- State of Oregon (OR)/Environmental Protection Agency complete Total Maximum Daily Loads for stream temperatures, sediment, other pollutants (Clear Water Act)
- Enforce Oregon fish screening statutes
- Upgrade Oregon Forest Practices Act to be consistent with Upper Grande Ronde (UGR) Anadromous Fish Habitat Plan
- Upgrade Forest Service Land and Resource Management Plans consistent with UGR Plan to be in compliance with National Forest Management
- Revise mining laws to be consistent with production of high quality water and fish habitat

II. Instream Flow & Passage

A. Instream Flow Enhancement

- Purchase, exchange, lease or seasonally rent water rights for selected fish habitat during critical low flow periods
- Implement more efficient irrigation methods and water conservation practices benefitting landowners and instream flows
- Reinvestigate Prairie Creek pipeline project which would conserve irrigation water and make it available for enhancement of instream flows in the Wallowa River below Wallowa Lake

B. Passage Needs

- Ladder Wallowa Lake Dam to allow upstream passage for sockeye salmon

III. Watershed Management

A. Water Quality Needs

- Increase shade cover to reduce stream temperatures (increased downstream extent of temperatures <60°F)
- Reduce sediment from agricultural practices and unimproved roads
- Reduce nitrate, phosphates, bacteria and other contaminants related to agricultural practices

PRIORITIES: Upper Grande Ronde and tributaries, mainstem Grande Ronde River, Catherine Creek & tributaries, Joseph Creek & tributaries, Wallowa River & tributaries outside wilderness area

B. Riparian Restoration Needs

- Implement UGR Plan on state, federal and tribal lands
- Implement Best Management Practices, including stream buffers to benefit fish on private lands
- Acquire, lease or implement management agreement to restore natural floodplain habitat and function

PRIORITIES: Upper Grande Ronde & tributaries mainstem Grande Ronde River, Catherine Creek & tributaries, Joseph Creek & tributaries, Wallowa River & tributaries outside wilderness area

C. Range Management

- Revise and implement Best Manage-ment Practices to be consistent with UGR Plan Standards & Guidelines
- Restrict/remove livestock in substandard areas
- Acquire, lease, develop projects in priority areas (see above)

D. Forest Management

- Upgrade, monitor, enforce Forest Practices Act consistent with UGR Plan Standards & Guidelines private lands
- Implement UGR Plan Standards & Guidelines on State, Federal, Tribal lands
- Identify and implement active restoration projects
- Institute or continue protection of "good" habitat areas such as upper Grande Ronde River and tributaries above Vey Meadows (east Fork Grande Ronde, Lookout Cr., East Fork Sheep Cr., Chicken Cr. upper Limber Jim Cr. Weneha, Minam River, Upper Lostine, Bear, Hurricane, Five Points, Beaver and Lookingglass)

E. Mining Impact Reduction Needs

- Mitigate for impacts of mining tailings in the upper Grande Ronde system

Artificial Production Actions for Grande Ronde Subbasin

1. Continue the Rapid River stock spring chinook production program (at Lookingglass Hatchery) up to 900,000 yearling smolt level to provide for supplementation in Lookingglass Creek, Catherine Creek (CC) and the upper Grande Ronde River (UGRR). The Rapid River program would be reduced only when, or if, naturalized brood programs are developed or Imnaha program requirements increase.

   a. Release all Rapid River stock spring chinook smolts at Lookingglass Hatchery except for releases designated in 1 b.

   b. Supplement Catherine Creek and the upper Grande Ronde River with 250,000 Rapid River spring chinook smolts each. Adult not utilized for Lookingglass Hatchery brood and Lookingglass Creek outplanting should also be released into these habitats.

2. Develop adult capture and juvenile acclimation/release facilities in both CC and UGRR to support future broodstock collection and smolt outplanting activities. Until final facilities are

developed, direct stream releases should occur.

3. Continue to outplant adult Rapid River stock spring chinook in Lookingglass Creek at a level of 200 adults per year to re-establish a natural spawning population.

   a. Implement water treatment modifications to the Lookingglass Hatchery water intake system so that adult escapement in Lookingglass Creek above the hatchery can be increased to near production potential (about 500).

4. Adult spring chinook trapping and removal at Lower Granite Dam should be discontinued.

5. Immediately begin a Lostine River spring chinook captive broodstock program to provide up to 250,000 yearling smolts for supplementation of Wallowa River tributaries. Switch to conventional smolt supplementation programs using naturally produced broodstock when returns reach levels that would support adult broodstock collection.

   a. Develop adult capture and juvenile acclimation/release facilities in the Lostine River to support future broodstock collection and smolt outplanting activities. Until final facilities are developed, direct stream releases should occur.

   b. Modifications may be required at Lookingglass or another hatchery facility to implement the captive broodstock rearing programs.

   c. Modification of adult holding facilities at Lookingglass Hatchery may be necessary to keep stocks separate.

6. No hatchery supplementation of spring chinook should occur at this time in the Minam and Wenaha Rivers (pristine habitats located in wilderness areas) but population monitoring should continue for evaluation of future supplementation needs.

7. Utilize the Cottonwood Creek acclimation facility on the lower Grande Ronde River to acclimate and release fall chinook (from Lyons Ferry Hatchery). Continue the existing steelhead release program in a manner which would not interfere with the fall chinook acclimation program.

8. Discontinue use of non-native stocks in the existing summer steelhead programs. Develop new broodstock populations from Grande Ronde natural runs. Summer steelhead broodstock collection in the Grande Ronde system should occur in conjunction with spring chinook collections near natural productions areas. Release programs should utilize final rearing/acclimation facilities sited in natural production areas. Necessary facilities should be developed immediately. Until final facilities are developed, continue steelhead releases from existing facilities and/or direct stream releases.

9. Coho reprogramming of lower Columbia River hatcheries should occur to provide 2 million early run coho (Tanner Creek stock) for release into the Grande Ronde River system. Release programs should utilize several final rearing/acclimation facilities, including Big Canyon, located in natural production areas. Historical coho production areas in the Grande Ronde Basin include the Wallowa River and tributaries, Catherine Creek, and the upper Grande Ronde River. Spring chinook and steelhead acclimation facilities may also be utilized for coho. Broodstock should be acquired from existing early run returns of Tanner Creek stock coho to lower Columbia River facilities until such time as runs are reestablished in Snake River tributaries. At that time, broodstock collection would occur at Lower Grande Dam and/or at adult collection facilities located in natural production areas.

10. A program to reestablish sockeye salmon returning to Wallowa Lake should be initiated. Requirements for such a program have been already been investigated and are outlined by S.P. Cramer and Associates. Mid-Columbia sockeye stocks should be examined as potential founder populations for reestablishment in Wallowa Lake.

11. Discontinue all catchable trout programs in areas where they may affect anadromous salmonid restoration activities.

12. A program to restore lamprey populations utilizing either transplantation or artificial propagation should be developed under the overall leadership of the affected tribes.

13. Monitor and evaluate all artificial production actions. Use adaptive management to determine whether program changes (i.e., release number, size, time, location, and/or life history) are needed in order to meet restoration objectives.

Table 1

Grande Ronde River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	900[1]	16,000
Fall Chinook	NA	10,000
Steelhead	NA	27,500
Sockeye	0	2,500
Coho	0	3,500
Lamprey	NA	NE

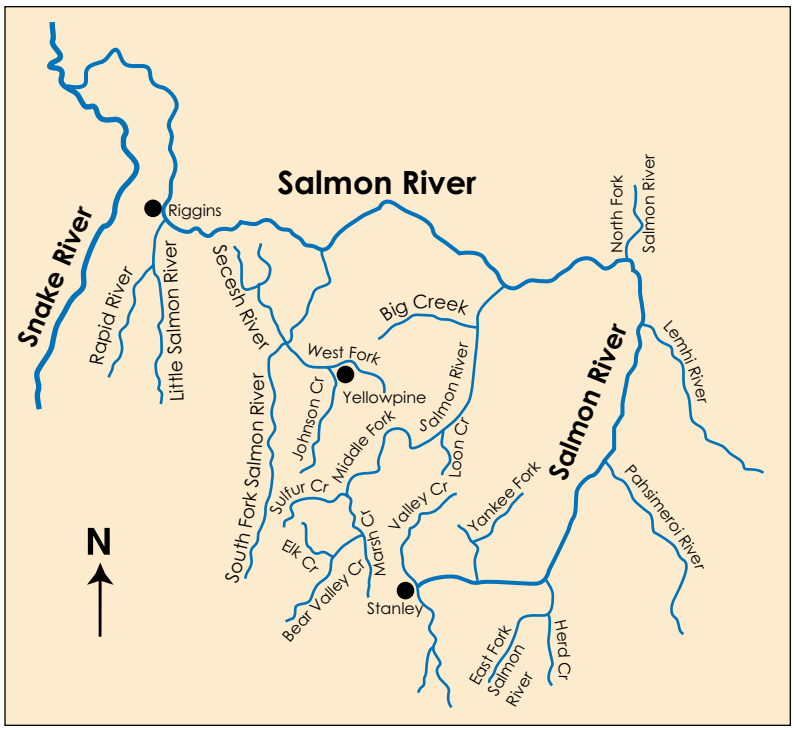
[1] Based on 1986-1990 redd counts. Assumes 2.5 fish per redd.
NA — Information not available
NE — None established

SALMON RIVER

Prepared by the Nez Perce Tribe

Introduction

The Salmon River originates in the Sawtooth Mountains of central Idaho near the 12,662 feet high Mount Borah. The river flows 410 miles north and west. After flowing west through the River of No Return Wilderness, it enters the Snake River in the Hells Canyon Reach. The Salmon River subbasin is the largest in the Columbia Rives system, excluding the Snake River and is just over 14,000 square miles. The major tributaries include the East Fork, Pahsimeroi, Lemhi, North Fork, Middle Fork, South Fork and Little Salmon rivers (IDFG, et. al., 1990). Many other tributaries flow into the Salmon River including Valley, Yankee Fork, Panther, Chamberlain, Slate and Allison creeks.



Fish Populations Status/Goals

Natural spawning of spring chinook in the upper Salmon River occurs in upper Valley Creek, upper Yankee Fork, Herd Creek, upper East Fork, Alturas Lake Creek, and the upper Salmon River. Spring chinook also spawn in the Lemhi River, North Fork of the Salmon River and the Middle Fork of the Salmon River in upper Big Creek, Sulfur, Elk, Marsh, and Bear Valley creeks and other mainstem Salmon River tributaries.

Natural spawning of summer chinook in the upper Salmon River occurs in lower Valley Creek, lower East Fork, and the mainstem Salmon River. Summer chinook also spawn in the Middle Fork of the Salmon River in lower Big Creek and Loon Creek. The South Fork of the Salmon and its tributaries Johnson Creek and Secesh River/Lake Creek are the principal summer chinook spawning areas in the lower Salmon River system.

The spring chinook and summer chinook have been designated by the National Marine Fisheries Service (NMFS) as endangered under the Endangered Species Act.

Natural spawning of sockeye occurred in the upper Salmon River in the Stanley lakes area. This area included Alturas, Petit, Yellow Belly, Redfish, and Stanley lakes. Due to a variety of factors such as irrigation, dams, harvest, poisoning and migration barriers to create resident sport fisheries, and lack of mitigation, the run has disappeared. Because much of the existing spawning and rearing habitat is in fair to good condition, the opportunity exists to restore fish to the natural habitat. Although most existing habitat is in fair to good condition, problems should be corrected to provide for full utilization of the habitat. The lakes historically used by sockeye in the upper Salmon River system included Stanley, Redfish, Yellowbelly, Petit and Alturas lakes.

Natural spawning of group A steelhead in the upper Salmon River is believed to occur in most of the drainage that is accessible to the run. Exact locations and size of spawning populations have not been fully documented. Examination of the Pahsimeroi Hatchery release records reveals that group A steelhead have been released into nearly every drainage from the mouth of the Middle Fork to the upper reaches of the Salmon River. Group B steelhead that were introduced from the Clearwater River have also been released in numerous tributaries in this section of the Salmon River system. Success of the past releases is not known. Most of the fish were released as fry. Smolt releases have occurred mainly at hatcheries and adult traps or in streams near population centers for sport fisheries.

In the lower Salmon River, natural spawning runs of steelhead exist throughout this section of the Salmon River from the mouth of the Middle Fork to the Snake River. Like the upper reaches, very little is known of the size and location of spawning populations. Hatchery releases have occurred in this area, but they have been less frequent than in the upper Salmon. With the exception of the Middle Fork of the Salmon and its tributaries, all other major drainages have received hatchery releases. Both group A and group B steelhead have been released in this section of the river.

During the subbasin planning process, numerical objectives were not developed for the various species. Table 1 shows the fish populations, status and goals.

Problems Impacting Fish Resources

Existing habitat condition in the Salmon system varies from pristine habitat to very badly damaged. Problems identified in the subbasin plan include among others, mining, grazing, irrigation, road building and logging. High sedimentation is clearly the biggest problem in the Salmon River subbasin due to the highly erodible terrain. Past studies clearly indicate that the degradation has contributed significantly to fish declines. Most streams out of wilderness are terribly degraded by sedimentation as indicated by the documented pool losses, which range from 30 to 70 percent.

Compensation programs for the Salmon River have been limited or non-existent. With the exception of steelhead, very few releases are made in the natural environment. Steelhead releases, for the most part, are intended to provide either for fisheries or the continuation of the hatchery programs. Because attempts were made to eliminate sockeye from the system very few remain. Rather than beginning an aggressive restoration program for sockeye, attempts are being made to develop a very questionable captive broodstock program.

Table 2 shows the problems impacting the Salmon River system.

Ongoing Actions In The Salmon River System

Streams that have received improvements through the Northwest Power Planning Council (NPPC) Fish and Wildlife Program include the Middle Fork tributaries, Valley Creek, Yankee Fork, and upper mainstem of the Salmon River. Feasibility studies on other needed improvements have been completed on a number of streams including Panther Creek, Lemhi River, Herd Creek and East Fork of the Salmon. The subbasin planners' recommended strategies for habitat include habitat enhancement, screening, and barrier removal (Ibid). Without significant changes in grazing and logging practices, it is unlikely the habitat measures alone will lead to recovery of the streams.

Hatchery production of spring chinook occurs at Sawtooth and Rapid River hatcheries. In addition to the major hatcheries, a rearing pond has been constructed on Yankee Fork and an adult trap has been constructed on the East Fork of the Salmon River. Releases mainly occur at the hatcheries or adult trap, with broodstock expected to return and be trapped at the hatchery or adult trap. Rapid River serves as the primary back-up station for egg distribution in the Snake River system. Sawtooth has been attempting to develop a run by trapping at the hatchery and the East Fork Trap. The NMFS has listed the Sawtooth Hatchery component as threatened but did not list the Rapid River component under the Endangered Species Act.

Currently, the Nez Perce Tribal Hatchery program is being designed to consist of a central incubation and early rearing facility. Broodstock will be acquired in tributaries where fish will be released including Slate Creek a tributary of the lower Salmon River. Fish will be reared at satellite facilities during the summer months and released in late fall to over-winter in the natural environment.

Hatchery production of summer chinook takes place at McCall and Pahsimeroi hatcheries. Facilities are being proposed under the Integrated System Plan (ISP) to produce an additional five million smolts. However, the ISP does not disclose what broodstock will be used to produce these additional smolts. One adult trap has been constructed in the South Fork of the Salmon. Adults are also trapped at Pahsimeroi Hatchery. The NMFS listed the McCall Hatchery run component, but did not list the Pahsimeroi Hatchery component of the summer chinook.

Releases from Pahsimeroi Hatchery occur at the hatchery. Releases from McCall Hatchery occur approximately one mile above the adult trap on the South Fork of the Salmon, with broodstock expected to return and be trapped at the hatchery or adult trap. The run at Pahsimeroi Hatchery was begun by acquiring eggs from the South Fork trapping program.

With the exception of the captive broodstock program at Eagle Hatchery, artificial production of sockeye does not exist. Past programs have been very limited and the last program attempted to use broodstock from British Columbia. No mitigation program was planned under the Lower Snake River Compensation Plan. Currently, the Nez Perce Tribe is proposing the construction of an artificial production program for the Snake including the Salmon River system. Details of this program such as size and location have not yet been determined. The NMFS has listed sockeye as endangered.

Hatchery production for steelhead takes place at several major hatcheries. Both group A and group B steelhead are reared in the facilities. The group A hatchery includes Niagara Springs. Both group A and group B are reared at Hagerman National Fish Hatchery and Magic Valley Hatchery. Releases of full-term reared smolts occur mainly at the hatcheries or adult traps, with broodstock expected to return and be trapped at the hatchery or adult trap. Adult traps used to acquire broodstock for spring and summer chinook are also used for steelhead. Additionally, releases are made near population centers to provide for sport fisheries.

Recommended Actions For The Salmon River System

(1) Barriers that have been constructed on the sockeye lakes should be removed. Culverts that have been improperly installed should be replaced. Natural migration barriers on streams should be removed or passage provided.

(2) Streams that have excess irrigation diversions must have instream flows adopted and enforced. Diversions should be reduced and the continual practices of over-appropriation of water stopped.

(3) The loss of the riparian area is occurring throughout the watershed. Logging, mining and grazing in the riparian area must be stopped and the riparian vegetation be allowed to recover.

(4) The removal of large woody debris from the riparian area should be terminated. Large woody debris is necessary to help ensure stream integrity.

(5) Sedimentation due to logging including road building, grazing, and mining is occurring throughout the watershed. These practices must be eliminated or severely restricted in highly erodible areas to allow the watershed to recover. Riparian restoration should also be carried out.

(6) Water quality problems such as high temperatures and chemical pollution are caused mainly by irrigation diversions and mining. Adoption and enforcement of water quality standards under the Clean Water Act are necessary. The elimination or severe restriction of mining and irrigation, particularly the over-appropriation of water, are needed.

(7a) Spring chinook

Sawtooth Hatchery is located in the upper Salmon River near the town of Stanley, Idaho. As part of the Lower Snake River Compensation Plan, it was constructed by the Corps of Engineers and is operated by Idaho Department Fish and Game. The facility was designed and constructed to rear 2,300,000 spring chinook to smolt size. It also serves as a trapping location for spring chinook. Steelhead for the Hagerman National Fish Hatchery and Magic Valley Hatchery are also trapped at Sawtooth Hatchery.

A satellite facility on the East Fork of the Salmon River is also operated in conjunction with Sawtooth Hatchery. It is used to trap spring chinook for Sawtooth Hatchery and also steelhead for the Hagerman and Magic Valley steelhead hatcheries. In addition, the East Fork site is used as a release location.

Besides releases at the hatchery and East Fork satellite, smolts have been released into the natural production areas of upper Yankee Fork and upper Valley Creek. The construction of rearing ponds on Yankee Fork have the capability of rearing 200,000 fingerlings for fall release.

Numerous options exist for acquiring broodstock for the Sawtooth rearing program. The first option would continue the current program of trapping and holding spring chinook at Sawtooth Hatchery, East Fork Trap, and at upper Yankee Fork, upper Valley Creek, and at other tributaries in the region. The stocks trapped at these locations are compatible with the current genetic make-up of the chinook stocks above the traps because fish from this stock have been captured and used since the hatchery was constructed in the mid-1980s. The second option, construction of new adult traps and final rearing and/or acclimation facilities, should be constructed in other natural production areas, including in natural production areas above Sawtooth Hatchery. These options are compatible with the Endangered Species Act listing of Snake River spring chinook.

To begin the program immediately, construct temporary adult traps in the tributaries (except on the East Fork). Adult holding capabilities at Sawtooth Hatchery must be modified to ensure separation of adults.

Release locations should be modified to ensure the natural runs are being assisted by the supplementation program. The use of the Yankee Fork Rearing Ponds should be incorporated in future release strategies for Sawtooth Hatchery. Additional release programs on the tributaries should be done using final rearing and/or acclimation facilities as described previously. The practice of marking all releases must be terminated. In all instances, the practice of removing any fins, other than the adipose for evaluation purposes, must be terminated.

Rapid River Hatchery was started by trapping adults at Hells Canyon Dam in 1964. The trapping was terminated after three years. The hatchery is designed to rear three million smolts. Broodstock acquisition occurs by trapping approximately one mile below the hatchery and below Hells Canyon Dam. Current releases occur at the hatchery and below Hells Canyon Dam. Fish for the Hells Canyon release should originate from the broodstock trapped below the dam.

This program should continue. In addition, the Rapid River stock should be designated as appropriate for use in restoration of naturally spawning Snake River spring chinook stocks. The program should also be incorporated in a tributary release program in concert with the proposed Nez Perce facility.

(b) Summer chinook

The Pahsimeroi Hatchery is located in the upper Salmon River near the town of Challis, Idaho. It is part of Idaho Power Company's mitigation for its Hells Canyon Dam complex and is operated by Idaho Department of Fish and Game. The facility was designed and constructed to rear 1,000,000 spring chinook to smolt size. However, following an initial program for spring chinook, it was converted to a summer chinook program in the late 1980s. It also serves as a trapping location for summer

chinook. Steelhead for the Niagara Springs Hatchery are also trapped at the site.
Adult traps and final rearing and/or facilities should be constructed in natural production areas, and the use of the South Fork Salmon River summer chinook should be terminated. This will ensure that the stock used in the facilities is appropriate for release into natural production areas. The facilities are needed in the natural production areas of the mainstem Salmon and lower East Fork. Adult holding capabilities at Pahsimeroi Hatchery should be modified to ensure separation of adults. Release locations should be modified to include the natural production areas of the Salmon River and the lower East Fork.

McCall Hatchery was started by trapping summer chinook adults at Lower Granite Dam in the late 1970s. Trapping continued for three years, until the trap was completed on the South Fork of the Salmon. Trapping was then terminated at Lower Granite Dam. The hatchery is designed to rear one million smolts. Current releases occur in the South Fork approximately one mile above the trap. A final rearing and/or acclimation facility should be constructed in the natural production area above the trap and the current direct stream release program phased out.

This recommended action should be expanded to begin additional releases in the natural habitat, including in Johnson Creek where adult trapping and smolt acclimation facilities will have to be constructed.

(c) Steelhead
Hagerman National Fish Hatchery is located in the Thousand Springs area near the town of Hagerman, Idaho. It is part of the Lower Snake River Compensation Plan. It was constructed by the Corps of Engineers and is operated by the U.S. Fish and Wildlife Service. The facility was designed and constructed to rear 2,400,000 steelhead to smolt size. Currently, the facility rears both group A and group B steelhead. The group A steelhead are primarily released at Pahsimeroi and Sawtooth hatcheries and the group B are primarily released at the East Fork Trap. Group A broodstock for the program originated from Hells Canyon trapping and group B from the Dworshak Hatchery. Group A steelhead for the Hagerman National Fish Hatchery are currently trapped at Pahsimeroi and Sawtooth hatcheries. Group B steelhead are acquired from either the East Fork Salmon River Trap or Dworshak Hatchery.

New adult traps and final rearing and/or acclimation facilities should be constructed in the natural production areas including the North Fork and Lemhi rivers. These facilities may be used in conjunction with the spring chinook program as that program is also expanded.

Adult holding capabilities at Sawtooth and Pahsimeroi hatcheries should be modified to ensure separation of the adults. Additional release programs on the tributaries should be implemented using final rearing and/or acclimation facilities.

The Magic Valley Hatchery was constructed as part of the Lower Snake River Compensation Plan. It is located in the Thousand Springs area near Filer, Idaho. It was designed to rear two million smolts. Currently, the program rears one million group A steelhead and one million group B steelhead. Group A steelhead are primarily released at Pahsimeroi and Sawtooth hatcheries and group B are released at the East Fork Trap. Broodstock acquisition is similar to that for the Hagerman National Fish Hatchery.

Operation of the Magic Valley Hatchery should be in conjunction with operation of Hagerman hatchery. Broodstock acquisition, final rearing and/or acclimation facilities would be compatible.

Niagara Springs Hatchery is part of Idaho Power Company's mitigation for the Hells Canyon Dam complex. It is located in the Thousand Springs area near Buhl, Idaho. It rears 1,600,000 group A steelhead. Releases occur primarily at Pahsimeroi Hatchery and below Hells Canyon Dam. Broodstock was originally acquired by trapping steelhead below Hells Canyon Dam and transferring them to the Pahsimeroi Hatchery for rearing and release. Pahsimeroi Hatchery continues to

be the primary trapping facility for upper Salmon River group A steelhead.

The Niagara program should be used to assist the natural spawning populations in the lower Salmon River tributaries. Adult trapping and final rearing and/or acclimation facilities should be constructed on the tributaries.

d) Sockeye

The current captive rearing program for sockeye occurs at the Eagle Hatchery near Eagle, Idaho. This program was developed following the listing of sockeye as endangered. The few fish that have returned to Redfish Lake have been trapped for this program. Out-migrants, including kokanee, have also been trapped at the Redfish Lake outlet. Because of this broodstock acquisition program, there is no evidence that the fish being reared are actually sockeye.

An additional sockeye program should be started for the Salmon River system's other historical sockeye lakes. This proposed new restoration program would not affect the existing captive broodstock project. Since the captive fish are marked by means of fin removal, the new program would not remove any fins so that the stocks could be differentiated. To start the program, broodstock should be acquired from the existing run of sockeye destined for mid-Columbia tributaries. Trapping can occur at the existing Tumwater Dam trap or the Wells Dam trap. Trapped adults can be held in the vicinity of these existing traps until spawned or they could be trucked to and held in the Idaho lakes until spawned.

The eggs could be used in reprogrammed public hatcheries or private hatcheries for rearing and release back into Petit, Stanley, Yellowbelly and Alturas lakes. The trapped adults could also be allowed to spawn naturally in existing spawning habitat above these lakes. The dams constructed at the outlets of sockeye lakes (in a successful past effort to eliminate the sockeye in favor of sport fishing stocks) should be removed or fish ladders installed to allow passage.

Juvenile release programs should be developed on each lake using final rearing and/or acclimation facilities. These facilities could consist of net pens which would allow the fish to adjust to natural lake conditions. If final rearing is to occur, net pens will be a necessary component of the artificial rearing facility. Until these facilities have been acquired it will be necessary to directly release the fish into the lakes. Lake water should be mixed with tanker water to minimize extreme temperature variations between the truck water and the lake.

The Nez Perce Tribe is currently examining the feasibility of a sockeye rearing facility. The size, location, broodstock requirements, and rearing and release locations have not yet been determined.

(8) A program to restore lamprey should be developed by the relevant fishery managers. This program should be under the overall leadership of the tribes.

Table 3 shows the tribal recommended actions needed to restore the fish resources of the Salmon River system.

Table 1

Salmon River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	900[1]	128,000
Summer Chinook	1,750[1]	60,200
Steelhead	NA	192,900
Sockeye	<10	44,500
Lamprey	NA	NE

[1] Based on 1989-1993 redd counts. Assumes 2.5 fish per redd. Number rounded to nearest ten.
NA — Information not available
NE — None established

Table 2

Problems Impacting the Salmon River Fish Resources

	Basinwide	Upper Salmon	Lower Salmon	Tributaries
Migration Barrier			•	
Irrigation Diversion		•		•
Riparian Degradation	•			
Lack of Large Woody Debris	•			
Sedimentation	•			
Poor Water Quality		•		•
Inadequate Production Compensation	•			

Table 3

Recommended Actions for the Salmon River System

Problem	Recommended Action
Migration Barriers	(1) Construct passage facilities
Irrigation Diversions	(2) Provide for instream flows. Stop over-appropriation
Riparian Degradation	(3) Restore riparian vegetation
Limited Large Woody Debris	(4) Retain woody debris
Sedimentation	(5) Eliminate or severely restrict grazing, logging, mining, road construction
Poor Water Quality	(6) Enforce Clean Water Act, rstrict mining, reduce irrigation diversion
Inadequate Production Compensation	
Spring chinook, Steelhead Summer chinook, Sockeye	(7) Implement new broodstock programs, release programs, production programs
Lamprey	(8) Develop and implement programs

IMNAHA RIVER

Prepared by the Nez Perce Tribe and the Confederated Tribes of the Umatilla Indian Reservation

Introduction

The Imnaha River originates in the Wallowa/Whitman National Forest in Northeast Oregon at an elevation of approximately 10,000 feet. It drains 980 square miles
and from its juncture of the North and South forks it flows northerly for 63.5 miles and enters the Snake River in the Hells Canyon reach at an elevation of 975 feet (NPT, et. al., 1990). Its principal tributary is Big Creek.

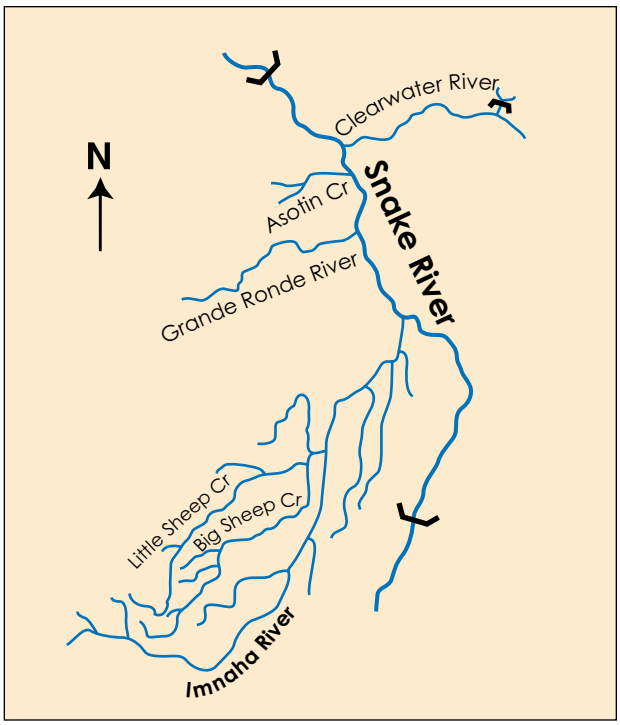
Fish Population Status/Goals

Spring chinook spawning occurs in the Imnaha River, Big Sheep Creek, and Lick Creek. Summer chinook spawning may occur in the Imnaha River. Fall chinook spawning occurs in the lower reaches of the Imnaha River which was verified by the Washington Department of Fish and Wildlife in 1992 (WDF, 1993). The chinook stocks in the Imnaha have been listed by the National Marine Fisheries Service (NMFS) as endangered. The NMFS also designated the spring chinook and summer chinook as one stock under their spring/summer chinook classification. Natural spawning of group A steelhead occurs throughout the Imnaha River system.

The goal for the spring chinook return to the basin is for 5,740 fish of which 3,800 are for natural production and 700 for harvest. The goal for fall chinook is for a return of 3,000 adults. The goal for steelhead is 4,315 of which 2,100 are for natural escapement and 2,000 for harvest (Ibid). Table 1 shows the fish populations, status and goals.

Problems Impacting Fish Resources

Problems noted in the subbasin plan include logging, road building, mining, farming and ranching practices (Ibid). These are not thought to be major



limiting factors on fish production. Habitat improvement has occurred in Big Sheep Creek. Table 2 shows the problems impacting the fish resources in the Imnaha River system.

Ongoing Actions In The Imnaha River System

Hatchery production of spring chinook for the Imnaha occurs at Lookingglass Hatchery which is located in the Grande Ronde River Basin. An adult trap and release facility has been constructed on the Imnaha River. Releases mainly occur at the adult trap and other locations by direct stream releases. Broodstock are trapped at the adult trap. Additional facilities being studied under the Northwest Power Planning Council (NPPC) Fish and Wildlife Program include Northeast Oregon Hatchery.

Hatchery production of steelhead for the Imnaha River reach of the basin takes place at the Irrigon Hatchery. A smolt release facility and adult trap have been constructed on Little Sheep Creek. The program rears group A steelhead.

Habitat projects to date have been ineffective in restoring the Imnaha River natural habitat. Habitat must be improved through a coordinated watershed approach.

Recommended Actions For The Imnaha River System

(1) The Wallowa Valley Improvement Canal Diversion diverts water from the Imnaha River system to the Grande Ronde River system. This practice should be terminated and instream flows provided.

(2) Logging and grazing throughout the basin should be eliminated or reduced significantly to reverse the sedimentation problem.

(3) The Forest Service salvage logging should be terminated to allow from the retention of large woody debris.

(4) Riparian destruction throughout the watershed should be stopped. Programs to restore the riparian vegetation should be implemented.

(5) Logging should be severely curtailed or eliminated.

(6) Stream channelization due to road construction should be eliminated. Where possible streams should be allowed to follow their natural course.

(7) Grazing should be severely curtailed or eliminated.

(8) Currently, the spring chinook program entails trapping and release of spring chinook in the mainstem Imnaha River facility with rearing at Lookingglass Hatchery.. The current program at Lookingglass Hatchery for the Imnaha River utilizes eggs from the Imnaha River.

Release programs should utilize final rearing and/or acclimation facilities in natural production areas. An additional facility should be constructed on Big Sheep Creek. Until the new facility is constructed, direct stream releases should occur.

The steelhead program calls for the trapping of broodstock in Little Sheep Creek. Releases occur at the trapping facility. This program should be expanded to acquire broodstock from streams throughout the system. Releases should also occur throughout the system through the use of final rearing and/or acclimation facilities.

The Northeast Oregon Hatchery is currently being planned as a measure in the NPPC Fish and Wildlife Program. It is expected that the facilities will provide fish for release in the Imnaha River system. The broodstock and smolt release facilities currently developed or recommended under the Lookingglass program could also be used for this program.

(9) Programs to restore fall chinook, coho and lamprey have not yet occurred. Development of restoration plans by the relevant fishery managers is recommended.

The tribally recommended action needed to restore Imnaha River fish resources is shown in Table 3.

Table 1

Imnaha River Fish Populations Status and Goals

Species	Current Population (5-year average)	Adult Return Goal
Spring Chinook	340[1]	5,740
Summer Chinook	NA	NE
Fall Chinook	NA	3,000
Steelhead	NA	4,315
Lamprey	NA	NE

[1] Based on 1984-1988 redd counts. Assumes 2.5 fish per redd.
NA — Information not available
NE — None established

Table 2

Problems Impacting the Imnaha River Fish Resources

	Basinwide	Upper Imnaha	Lower Imnaha	Sheep/Lick
Irrigation Diversion		•	•	
Sedimentation	•			
Limited Large Woody Debris	•			
Loss of Riparian Area			•	
Logging		•		•
Road Construction	•			
Grazing	•			
Inadequate Production Compensation		•		

Table 3

Recommended Actions for the Imnaha River System

Problem	Recommended Action
Irrigation Diversion	(1) Provide instream flows
Sedimentation	(2) Restrict logging, grazing
Limited Large Woody Debris	(3) Retain woody debris
Loss of Riparian Area	(4) Cease stram channelization, grazing, fencing
Logging	(5) Eliminate or reduce reduce logging
Road Construction	(6) Reduce road construction
Grazing	(7) Eliminate or reduce grazing
Inadequate Production Compensation	
Spring chinook, Steelhead	(8) Proper broodstock acquisition, release programs, additional production
Fall chinook, Coho, Lamprey	(9) Develop programs

ACRONYMS

BIA	Bureau of Indian Affairs
BCF	Bureau of Commercial Fisheries
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
CBFWA	Columbia Basin Fish and Wildlife Authority
CCT	Confederated Colville Tribes
CFF	Commission of Fish and Fisheries
COE	U.S. Army Corps of Engineers
CRITFC	Columbia River Inter-Tribal Fish Commission
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CTWSIR	Confederated Tribes of the Warm Springs Indian Reservation
DOE	Department of Energy
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ICFRU	Idaho Cooperative Fish and Wildlife Research Unit
IDFG	Idaho Department of Fish and Game
ISP	Integrated System Plan
MCPUD	Mid-Columbia Public Utilities District
NMFS	National Marine Fisheries Service
NPT	Nez Perce Tribe
ODFW	Oregon Department of Fish and Wildlife
PNL	Pacific Northwest Laboratories
PUD	Public Utilities District
SBT	Shoshone-Bannock Tribes of Fort Hall
USFWS	U.S. Fish and Wildlife Service
WDF	Washington Department of Fisheries
WDW	Washington Department of Fish and Wildlife
YIN	Yakama Indian Nation

GLOSSARY

anadromous fish: Fish, such as salmon and lamprey, that hatch in freshwater, migrate to the ocean, where they grow, and then return to freshwater as mature fish to spawn.

anthropogenic: Produced or caused by humans.

artificial propagation: Using a human-controlled system to spawn, incubate, hatch and/or raise fish.

basin: See **watershed**.

Best Management Practices (BMPs): An action or combination of actions that are the most effective and practical (including technological, economic, and institutional considerations) means of preventing or reducing non-specific sources of water pollution.

Bonneville Power Administration: Created in 1937, the agency markets and distributes power generated by the Federal Columbia River Hydroelectric System and provides funding for salmon recovery projects under the Northwest Power Act.

broodstock: Adult fish that produce the next generation of fish.

Clean Water Act: A federal statute with the primary goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. The act delegates the authority to develop and implement water quality standards to the U.S. Environmental Protection Agency (EPA). The EPA also acts to ensure that each state's water quality standards and pollution control programs are consistent with the act's purposes.

Columbia River Fish Management Plan (CRFMP): A consent decree approved by and entered as an order of the district court in *United States v. Oregon*, in which the parties to *United States v. Oregon* may exercise their sovereign power in a coordinated and systematic manner to protect and rebuild upper Columbia River fish runs and allocate their harvest between Indian and non-Indian fisheries.

Columbia River Inter-Tribal Fish Commission (CRITFC): A coordinating fisheries agency, founded in 1977 by the Nez Perce, Umatilla, Warm Springs, and Yakama tribes — the four Columbia River tribes that reserved fishing rights in 1855 treaties with the United States government. CRITFC, through its staff of biologists, policy analysts, law enforcement officers, and other specialists, strives to protect the tribes' fishing rights and works to restore the fish resources upon which tribal religion, culture and livelihood depend.

desiccation: The process of making dry or being dried.

downstream migration: The journey of young salmon or lamprey from streams and rivers to the ocean.

Endangered Species Act (ESA): A federal statute with a primary goal of protecting threatened and endangered species and the ecosystems on which they depend. Under the act, the U.S. Fish and Wildlife Service (USFWS) has the authority to designate species for protection and the responsibility to develop recovery plans. The National Marine Fisheries Service, under an agreement with the USFWS, administers the ESA for Pacific salmon.

escapement: The number of salmon surviving

to return to a specified point of measurement. Spawning escapement consists of those fish that survive to spawn.

fish ladder (also known as **fishway**): A series of ascending pools of water, constructed to enable salmon or other fish to swim upstream around or over a dam. Resembles a stairway.

fish screen: A meshlike structure placed across a water intake, pipe or passageway to divert fish from the intake.

flow: The rate at which water passes a given point on a stream or river; often expressed as cubic feet per second (cfs).

genetics: The study of heredity and variation in organisms of the same or related kinds.

genotypic: Pertaining to the genetic make-up of an organism.

habitat: The place where a plant or animal lives and grows.

hydrograph: A representation of water levels over time.

infectious hematapoietic necrosis (IHN): A virus that can kill salmonids including chinook, sockeye and steelhead; the most severe outbreaks occur when fish are young (i.e. fry or fingerlings).

instream flow incremental methodology (IFIM): Analytic tool to estimate quantity and quality of water in rivers and streams to determine whether and where fish habitat is available.

juvenile: Young fish, usually two years of age or less.

mainstem: The main channel of a river as opposed to tributary streams and smaller rivers that feed into it.

Mitchell Act: A federal statute passed in 1938 to mitigate for fishery damage caused by Bonneville Dam and subsequent federal water projects; and implemented by state and federal agencies primarily through hatchery programs which resulted in the taking of upper Columbia and Snake river salmon as brood-stock for downriver hatcheries.

mitigation: Actions taken to help compensate for damage, such as human-caused damage to fish and wildlife resources. Mitigation for fish losses often takes the form of hatchery production.

mortality: The death of fish from natural or human causes.

natural production: Fish that are raised and return to spawn in streams, either by natural spawning or by outplanting hatchery fish.

Northwest Power Act: The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (also known as the Regional Power Act), which authorized the Northwest Power Planning Council and called for the development of a Columbia Basin fish and wildlife mitigation program to be funded by the Bonneville Power Administration. See Northwest Power Planning Council.

Northwest Power Planning Council (NPPC): The NPPC, authorized by the Northwest Power Act, consists of eight members appointed by the governors of Idaho, Montana, Oregon and Washington. Under the federal act, NPPC is charged with the development of a fish and wildlife program to protect, mitigate, and restore Columbia Basin fish and wildlife (including related spawning grounds and habitat) harmed by hydroelectric dams.

outplanting: See **supplementation**.

passage: The movement of migratory fish through a river system.

phenotypic: Pertaining to the visible or otherwise measurable physical characteristics of an organism.

population: A group of organisms of a species living in a certain area.

rearing: The juvenile life stage of anadromous fish that is spent in freshwater rivers, streams, and lakes before migrating to the ocean.

recruit: A fish of sufficient size to be subject to harvest and/or a mature fish arriving at a spawning area.

redd: A spawning nest dug into gravel in a stream bed by an adult salmon.

riparian areas: The region adjacent to bodies of water, such as streams, springs, rivers, ponds, and lakes.

run: A population of fish of the same species consisting of one or more stocks migrating at a discrete time.

salmonid: A fish of the Salmonidae family, which includes salmon and trout.

sedimentation: The settling of silt or any matter in bodies of water.

smolt: A juvenile salmon migrating to the ocean and undergoing physiological changes (smoltification) to adapt its body from a freshwater to a saltwater environment.

spawner: A mature fish that produces eggs or sperm.

species: Basic category of biological classification. In sexually reproducing organisms, a group of interbreeding individuals not normally able to interbreed with other groups. Under the ESA, a species can be either a biological species, biological sub-species, or distinct population segment of a biological species.

stock: A group of fish that spawn together in a particular stream during a particular season that generally do not interbreed with any other group of their species that spawns at a different time.

straying: The tendency of some anadromous fish to return and spawn in streams other than those in which they were born.

subbasin: A designated watershed with a single entry river into either the Snake or Columbia River basin.

supplementation: The act of releasing young, artificially propagated fish into natural spawning and rearing habitat. As adults, these fish will return to spawn naturally in the stream where they were released rather than returning to the propagation facility. (Also called outplanting.)

total maximum daily load (TMDL): Under the Clean Water Act, the total amounts of different pollutants allowable for a particular watershed.

tributary: A stream of lower order than the stream or river it joins. For example, the Clearwater River is a tributary of the Snake River which is a tributary of the Columbia River.

United States v. Oregon: The federal court case that upheld the treaty fishing rights of the Columbia River treaty tribes in a 1969 deci-

sion. The case remains under the court's jurisdiction. In 1983 the court ordered tribes, states, and the federal government to develop a management plan which the court then approved in 1988. See **Columbia River Fish Management Plan**.

United States-Canada Salmon Treaty (also called the **Pacific Salmon Treaty**): Signed in 1985, the United States-Canada Pacific Salmon Interception Treaty limits each country's interception of the other's salmon to promote the ability of stocks to rebuild in both nations.

upstream migration: The return of adult salmon from the ocean to inriver areas where they were born and where they will spawn the next generation.

watershed: The drainage area contributing water, organic matter, dissolved nutrients and sediments to a river or lake. Used interchangeably with basin or subbasin.

Definitions are provided for additional clarification; they have no legal significance.

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