JOHN DAY RIVER SUBBASIN
Salmon and Steelhead Production Plan

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Columbia Basin System Planning

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Special recognition also goes to the individual writers from the various fish and wildlife agencies and Indian tribes who have spent countless hours writing and rewriting the plans.

The System Planning Group also wants to acknowledge Duane Anderson of the Northwest Power Planning Council's staff for his assistance and expertise in computer modeling. Eric Lowrance and Leroy Sanchez from the Bonneville Power Administration also deserve recognition for developing the useful salmon and steelhead distribution maps, which appear in many of the subbasin plans.

Last, but not least, the System Planning Group recognizes the members of the System Planning Oversight Committee and the Columbia Basin Fish and Wildlife Authority's Liaison Group for their guidance and assistance over the past several months.

INTRODUCTION

The Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program calls for long-term planning for salmon and steelhead production. In 1987, the council directed the region's fish and wildlife agencies, and Indian tribes to develop a systemwide plan consisting of 31 integrated subbasin plans for major river drainages in the Columbia Basin. The main goal of this planning process was to develop options or strategies for doubling salmon and steelhead production in the Columbia River. The strategies in the subbasin plans were to follow seven policies listed in the council's Columbia River Basin Fish and Wildlife Program (Appendix A), as well as several guidelines or policies developed by the basin's fisheries agencies and tribes.

This plan is one of the 31 subbasin plans that comprise the system planning effort. All 31 subbasin plans have been developed under the auspices of the Columbia Basin Fish and Wildlife Authority, with formal public input, and involvement from technical groups representative of the various management entities in each subbasin. The basin's agencies and tribes have used these subbasin plans to develop the Integrated System Plan, submitted to the Power Planning Council in late 1990. The system plan will guide the adoption of future salmon and steelhead enhancement projects under the Northwest Power Planning Council's Columbia Basin Fish and Wildlife Program.

In addition to providing the basis for salmon and steelhead production strategies in the system plan, the subbasin plans attempt to document current and potential production. The plans also summarize the agencies' and tribes' management goals and objectives; document current management efforts; identify problems and opportunities associated with increasing salmon and steelhead numbers; and present preferred and alternative management strategies.

The subbasin plans are dynamic plans. The agencies and tribes have designed the management strategies to produce information that will allow managers to adapt strategies in the future, ensuring that basic resource and management objectives are best addressed. Furthermore, the Northwest Power Planning Council has called for a long-term monitoring and evaluation program to ensure projects or strategies implemented through the system planning process are methodically reviewed and updated.

It is important to note that nothing in this plan shall be construed as altering, limiting, or affecting the jurisdiction, authority, rights or responsibilities of the United States, individual states, or Indian tribes with respect to fish, wildlife, land and water management.

This plan was developed by the Oregon Department of Fish and Wildlife (ODFW), the Confederated Tribes of the Umatilla Reservation (CTUIR), and the Confederated Tribes of the Warm Springs Reservation of Oregon (Warm Springs Tribe) with the help of three committees formed at the subbasin level. The primary goal of the three-committee structure was to provide an opportunity for input during the preparation of the subbasin plan by other parties. The following is a brief description of the representation on, and function of, each of these committees for the John Day Subbasin Plan.

Public Advisory Committee: Representation includes non-treaty user groups and interested members of the community at large. The committee, using information supplied by the Technical Committee, established a range of objectives and provided input on potential options. This group provided valuable guidance to the Oregon Department of Fish and Wildlife.

Technical Committee: This group was composed of fishery agencies (state and federal), tribal, land and water management entities, and utility representatives. The technical committee compiled background material, supplied information from which objectives were established and described, and assessed options to attain objectives

Fish Management Committee: This group was composed of state and tribal fisheries biologists to select the range of objectives and options.

Members of the Public Advisory Committee and their affiliations are:

Tom Partin, Malheur Lumber
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Members of the Fish Management Committee are Mark Fritsch, representing the Warm Springs Tribe; Don Sampson, representing the Umatilla Tribe, and Errol Claire and Brad Smith, representing the Oregon Department of Fish and Wildlife. The core of individuals assembling the plan are as follows.

Richard Rieber, ODFW, lead writer
Errol Claire, ODFW
Brad Smith, ODFW
Ray Temple, ODFW
Mark Fritsch, Warm Springs Tribe
Don Sampson, Umatilla Tribe

PART I. DESCRIPTION OF SUBBASIN

Location and General Environment

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 (Fig. 1). The basin includes a major part of Gilliam, Grant, and Wheeler counties; and portions of Crook, Harney, Jefferson, Morrow, Sherman, Umatilla, Union, and Wasco counties. The basin 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 upper basin is one of Oregon's most physiographically diverse regions comprised of mountains, rugged hills, plateaus cut by streams, alluvial basins and valleys. Soils are equally diverse and support a number of vegetation types. Coniferous forests and meadows are prevalent above 4,000 feet. Below 4,000 feet, the plant community includes grasses, sagebrush, and juniper trees, except on north-facing slopes where higher moisture levels support vigorous perennial grasses.

The lower basin is a plateau of nearly level to rolling Columbia River basalt deeply dissected by the John Day River and tributaries. The lower basin's vegetation was essentially a bunchgrass climax community with some timber at higher elevations, but the introduction of livestock grazing and farming altered its character (OWRD 1986).

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 (EPA Reach 17070101-004-00). The upper mainstem down to Picture Gorge near Dayville constitutes the Upper John Day Valley. Picture Gorge extends about 20 miles along the mainstem to Kimberly and creates a natural divide between the upper and lower basin. 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 System.

The largest tributary in the John Day Basin is the North Fork, which enters the mainstem at Kimberly (RM 185) and extends upstream 117 miles to its headwaters in the Blue Mountains at elevations near 8,000 feet.

The Middle Fork John Day River originates just south of the North Fork and flows roughly parallel to it for 75 miles until they merge at RM 32, about 31 miles above Kimberly.

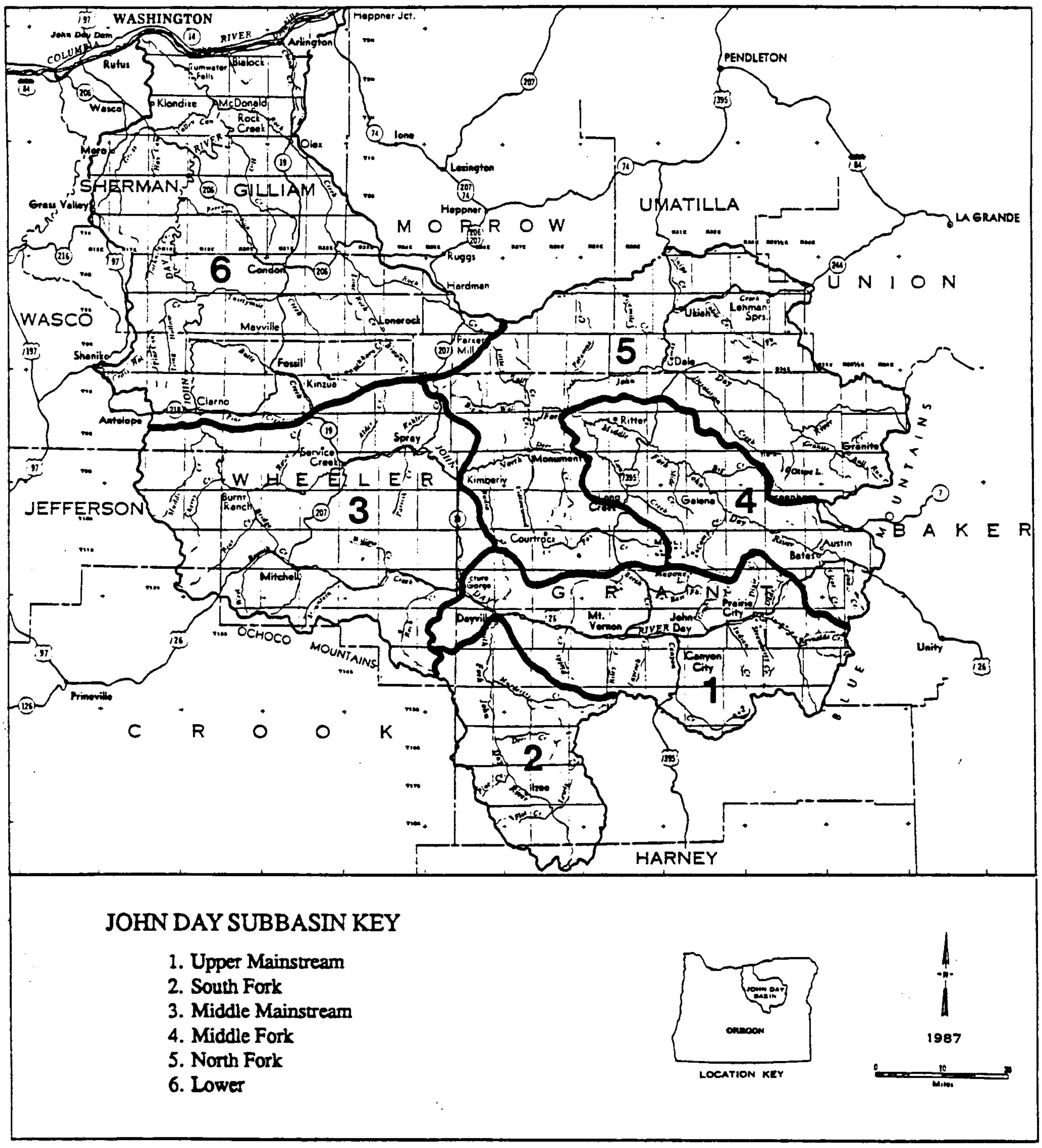


Figure 1. John Day River Basin and subbasin divisions (OWRD 1986).

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. A 15-foot waterfall followed by a torrential cascading stream segment through large boulders blocks upstream migration of steelhead near RM 30. Consequently, steelhead cannot access an estimated 81 stream miles of potential spawning and rearing habitat in the upper South Fork drainage. On June 17, 1988, however, the Oregon Fish and Wildlife Commission approved the Izee Falls Fish Passage Plan, which will ultimately increase summer steelhead access to the headwaters of the South Fork.

Other major mainstem tributaries include Rock Creek (RM 22) and Canyon Creek (RM 248).

The climate of the John Day Basin is semiarid characterized by low winter and high summer temperatures, low average annual precipitation, and dry summers. Most precipitation occurs between late fall and spring. Summertime temperatures reflect hot days and cool nights. Precipitation is low over the whole plateau with much of the moisture falling on the Coast Range and Cascade Mountains before reaching the lower John Day Basin.

The Blue Mountains exhibit a great range of climates because of the diversity of the region. Low elevation areas are generally warmer and receive less precipitation than higher elevations. Table 1 provides average precipitation values for selected locations in the basin.

Precipitation increases with elevation. Mean annual precipitation is 9 inches at Arlington and exceeds 40 inches in the mountains. A majority of the precipitation in the mountains falls as snow. Seventy percent of annual precipitation occurs in the cooler months of November through May, mostly as snow. Less than 10 percent falls as rain during the summer growing season in July and August.

John Day Basin daily temperatures range from well below zero at Ukiah and Austin in the winter to over 100 degrees Fahrenheit at Arlington in the summer. Mean annual temperatures vary inversely with elevation and range between 41 F at Austin and 54 F at Arlington.

Table 1. Average precipitation (in inches) at selected sites (OWRD 1986).

Site	Elevation	Years	Precipitation
Arlington	285	74	9.07
Moro	1838	75	11.28
Monument	1995	22	13.42
Mitchell	2645	46	11.36
Dayville	2400	77	11.41
Antelope	2680	61	12.60
Condon	2880	80	12.70
John Day	3063	30	10.33
Ukiah	3355	60	17.60
Long Creek	3720	29	15.65
Austin	4213	64	20.40

Land cover in the John Day Basin is predominantly forest and rangelands, with a small amount of cropland. Grass, shrub, and juniper communities predominate in the valleys, but give way to ponderosa pine, lodgepole pine, Douglas fir, and white fir communities at higher elevations. Much of the agricultural land in the basin is found on the plateaus of Gilliam and Sherman counties. Irrigation is used to a greater extent in the upper subbasin to grow alfalfa, meadow hay, and fruit crops. Table 2 lists land cover classifications by county in acres.

The introduction of livestock into the basin and the suppression of wildfires has changed the species composition of the original grasslands. Less desirable grass species have increased in many areas of the basin, particularly on spring and fall range and in big game wintering areas. Increasing juniper density and size, usually attributed to reduced fire frequency, climatic changes, and heavy grazing, apparently reduces understory plant cover and productivity, with forage grasses being most severely reduced. Oregon State University (1986) studies also suggest that erosion is significant in areas associated with juniper and that juniper control programs could improve the basin's water resources.

Recreation and tourism also are important to the basin's economy. The John Day Fossil Beds National Monument, the Strawberry Mountain, Black Canyon, and North Fork John Day

Table 2. Land cover classification by county (in thousand acres) (OWRD 1986).

County	Irr. Agri.	Non-Irr. Agri.	Range	Forest	Urban	Water	Other	Total
Crook		<0.1	3.7	16.1				19.8
Gilliam	3.5	251.1	418.0	1.0	0.7	10.0	2.4	686.7
Grant	40.3	14.5	1072.4	1186.3	2.8	0.3	5.4	2321.9
Harney			8.5	9.5				17.9
Jefferson	0.2	0.6	103.6	10.1		<0.1		114.6
Morrow	2.9	16.7	82.0	149.1	0.1	0.1	<0.1	250.9
Sherman	0.4	165.9	123.7	12.4	0.4	0.6	1.3	304.6
Umatilla		0.8	112.1	197.9	0.1	<0.1	2.6	313.6
Union			2.1	3.0				5.1
Wasco	0.8	3.3	107.7		0.1	0.1	<0.1	112.0
Wheeler	12.0	24.8	735.7	254.9	0.4	0.3	7.4	1035.5

Water Resources

Water Use

The Oregon Water Resources John Day Basin Program, adopted May 24, 1962, and last modified December 2, 1985, establishes a program for the use and control of the water resources of the basin. Recognized beneficial water uses in the basin include domestic, municipal, livestock, irrigation, industrial, mining, power development, recreation, pollution abatement, wildlife and aquatic life uses (Table 3). Agricultural uses account for most of the water rights established since 1940. Agricultural uses other than irrigation are small and will not result in significant new water requirements.

Although on the average the John Day Basin annually discharges about 1.5 million acre-feet of water, only 4 percent of the flow takes place in the critical July through September period. This is the period of peak water requirements for irrigation. Water also is needed at this time for the support of juvenile anadromous and resident fish. Thus, some problems (low flow and high water temperature) do affect fish survival.

Irrigation water consumption estimates were developed based on the crop type, crop acreage, and locale. These conservative estimates are shown in Figure 2. Over the irrigation season, the crops grown in the basin require an estimated 102,000 acre-feet of water (OWRD 1986). This translates into about 280 cubic feet per second (cfs) from April through September.

Municipal and industrial consumption is far less at about 700 to 800 acre-feet per year (J. Rodgers, Grant County water master, pers. commun.). Total basin permitted diversions (1,100,000 acre-feet or 1,549 cfs) are 76 percent of the John Day Basin's annual discharge (1,475,000 acre-feet or 2,036 cfs) (OWRD 1986). However, actual consumption undoubtedly is less than that permitted. Table 4 provides current and future estimates of actual agricultural and municipal and industrial water use in the John Day Basin.

Estimates of per capita water use for domestic and municipal water use range from 100 gallons to 430 gallons per person per day. Based on an expected population growth of 2,000 persons during the next 15 years, the increased water requirement will be less than 1,000 acre-feet per year, or an average of 1.5 cfs (OWRD 1986). The small amount of industrial growth likely will be served by municipal water systems using well and/or ground water sources. Any new surface use will most likely be transfer of an older water right (J. Rodgers, Grant County water master, pers. commun.).

Table 3. Summary of existing water rights for the John Day Subbasin (in cfs) by beneficial use (OWRD 1986).

Use	Lower John Day	Middle Mainstem	Upper Mainstem	North Fork	Middle Fork	South Fork	Total1/
Agriculture			<0.1				<0.1
Commercial				3.7			3.7
Domestic (lawn/garden)	0.2	0.2	0.2	0.1	<0.1		0.7
Domestic	0.1	1.3	1.6	1.2	1.8	0.1	6.1
Fish life	0.1	0.7	12.8	2.0			15.6
Fire protection		<0.1	0.2		0.1		0.3
Industrial/ Manufacturing	0.8		7.3	2.1	2.2		12.4
Irrigation 2/	229.0	495.5	927.0	291.5	88.5	97.5	2,129.0
Livestock	4.0	0.6	0.9	1.7	0.8	0.3	8.3
Mining		30.8	40.5	202.2	49.5		323.0
Municipal	15.4	5.4	9.3	3.9	3.1	5.1	42.2
Power			13.9	25.0	0.8		39.7
Quasi- Municipal	2.5	2.8					5.3
Recreation	0.2		<0.1	2.0	<0.1		2.3
Storage 3/	(129)	(5,215)	(681)	(1,898)	(82)	(377)	(8,382)
Temp. control	3.3						3.3
Wildlife		<0.1	<0.1				<0.1
Other 4/	9.6	6.8	4.3	0.7			21.4
Total 1/	265.2	544.1	1,018.1	536.1	146.7	103.0	2,613.0 (1,549)

1/ Totals may not agree due to rounding.
2/ cfs allowed during 6-month irrigation season.
3/ Storage is in acre-feet. Storage rights allow no diversion. Use of stored waters requires a separate right under the specified use.
4/ Represents those rights with uncoded use in provisional database.

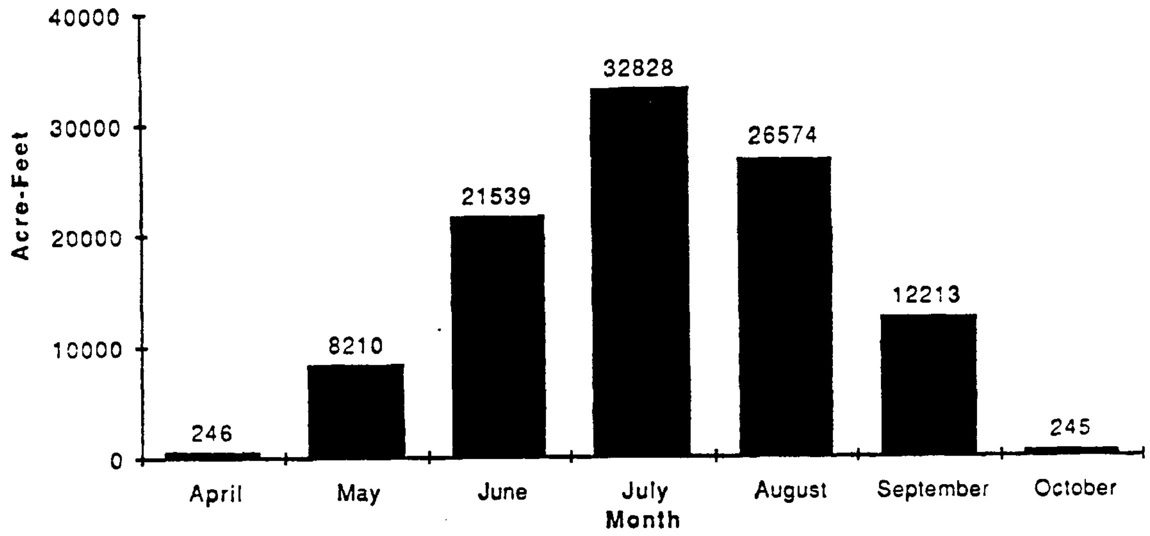


Figure 2. Estimated irrigation water requirements in the John Day River Basin.

Table 4. Water use in the John Day Subbasin (acre-feet per year).

Year	Agriculture	Municipal & Industrial
1987	102,000	700-800
1990	107,029	850
2000	111,570	900
2020	113,911	1,000

Streamflows

Streamflows in the John Day Basin fluctuate considerably during the year in response to seasonal changes in moisture conditions (Table 5). Watershed changes and loss of riparian diversity have exacerbated the problem. During spring months the John Day and tributaries swell under the strain of winter snowmelt and spring rain runoff. Streamflows then drop to low levels during July, August, and September when little precipitation occurs. Low flows on the mainstem and some lower tributaries are further reduced by irrigation withdrawal. During low water years, some stream reaches go dry or intermittent. Statistics from active gaging stations (Fig. 3) describing flows in the John Day River and major tributaries are shown in Table 6.

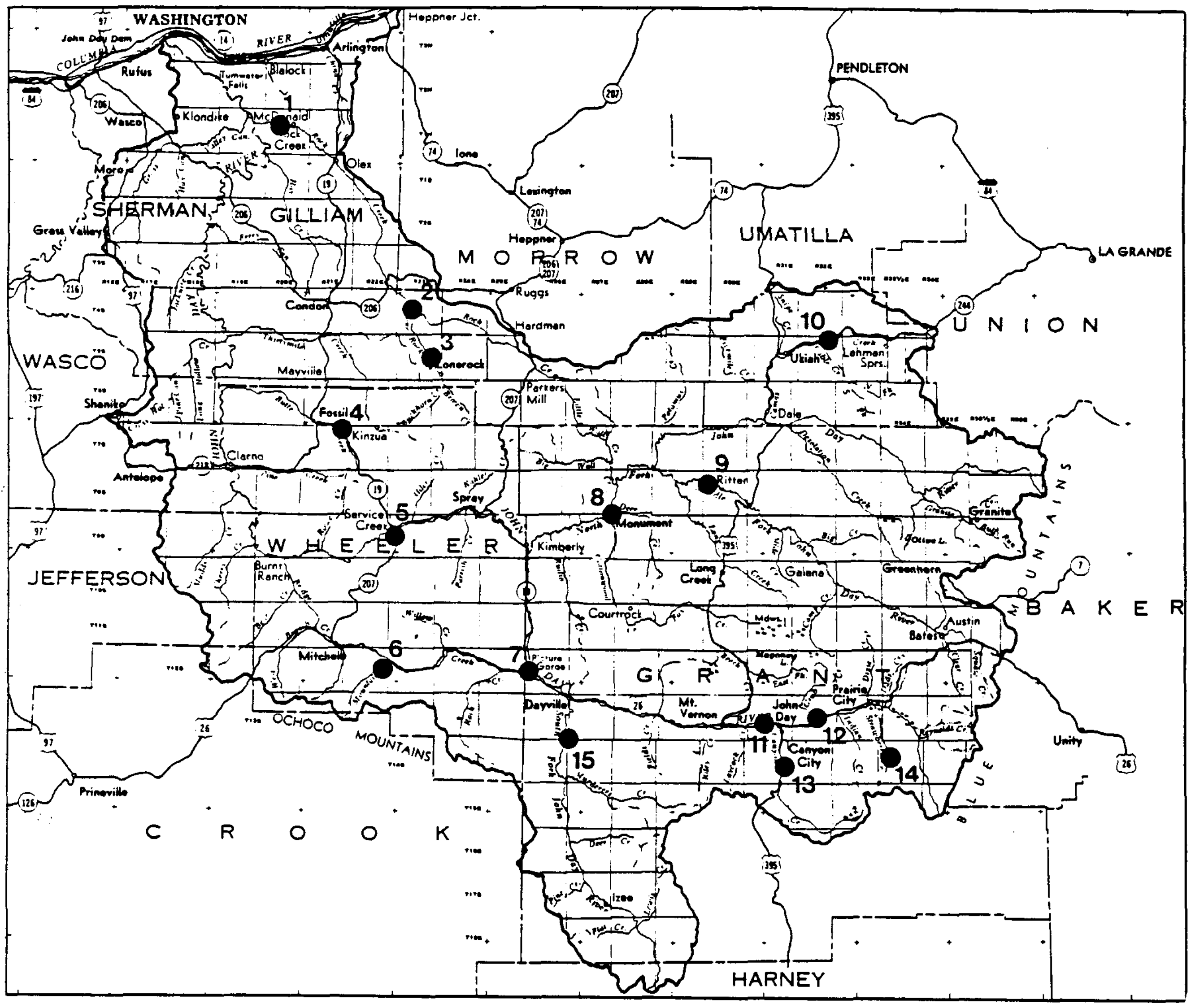
The Oregon Water Resources Department (1986) states that stream discharge in the John Day Basin is marked by extreme variability in both timing and quantity. Figure 4 depicts the wide variation in monthly discharge recorded at McDonald Ferry (RM 21). The John Day River at McDonald Ferry has reached a peak instantaneous discharge of over 42,000 cfs (December 24, 1964), and has essentially stopped flowing some years in August and September. Flow deficiencies occur during late summer and fall due to both high irrigation demands and natural low streamflows.

Currently, the John Day Basin has 17 minimum perennial streamflow points and reaches, which are identified in Figure 5 and Table 7. Minimum flows in the John Day Basin were approved by the state in 1962 and 1983 to assure some instream flow maintenance during low flow years. Under Oregon water law, these minimum flows are treated as natural flow rights and are regulated in essentially the same manner as water rights, according to priority.

Table 5. Maximum and minimum daily flows (cfs) and average annual discharge (AAD) for the John Day River and major tributaries (USGS 1980).

Stream	Location	Maximum Daily Year	Minimum Daily Year	AAD (cfs)	Years Data
North Fork John Day	Monument	33,400(1965)	17.0(1932)	1,230	55
Middle Fork John Day	Ritter	4,730(1965)	0.9(1966)	243	51
Mainstem John Day	John Day	5,830(1969)	3.5(1969)	193	12
Mainstem John Day	Service Creek	40,200(1964)	6.0(1973)	1,833	52
Mainstem John Day	McDonald	42,800(1964)	*	2,013	75

* No flow for several years.



GAGING STATION KEY

1. John Day at McDonald Ferry
2. Rock Creek above Whyte Park
3. Lone Rock Creek near Lonerock
4. Butte Creek near Fossil
5. John Day River at Service Creek
6. Mountain Creek near Mitchell
7. John Day River at Picture Gorge
8. North Fork John Day River at Monument
9. Middle Fork John Day River at Ritter
10. Camas Creek near Ukiah
11. Enterprise Ditch near John Day
12. John Day River near John Day
13. Canyon Creek near Canyon City
14. Strawberry Creek above Slide Creek
15. South Fork John Day River below Smokey Creek

Figure 3. John Day Basin gaging stations (OWRD 1986).

Table 6. Selected stream statistics by gaging station (OWRD 1986).

Stream, Location	Drainage Area (sq. mi.)	Mean Basin Elevation (ft.)	Annual Discharge (acre-ft)	Years of Record	Maximum Discharge (acre-ft)	Minimum Discharge (acre-ft)
John Day R. RM 21	7,580	3,880	1,475,000	81	2,787,000	436,500
John Day R. RM 157	5,090	4,400	1,350,000	56	2,523,000	448,000
John Day R. RM 204	1,680	4,580	346,300	59	630,000	90,100
John Day R. RM 251	386	5,064	150,000	17	267,900	53,220
NF John Day RM 15	2,520	4,580	904,200	60	1,658,000	319,000
MF John Day RM 15	515	4,800	179,000	56	327,200	61,590
SF John Day RM 1	590	4,780	123,800	12	194,800	45,300
Rock Creek RM 34	350	3,375	30,854	20	82,530	4,470
Desolation Cr. RM 1	108	5,204	73,100	9	104,600	42,510

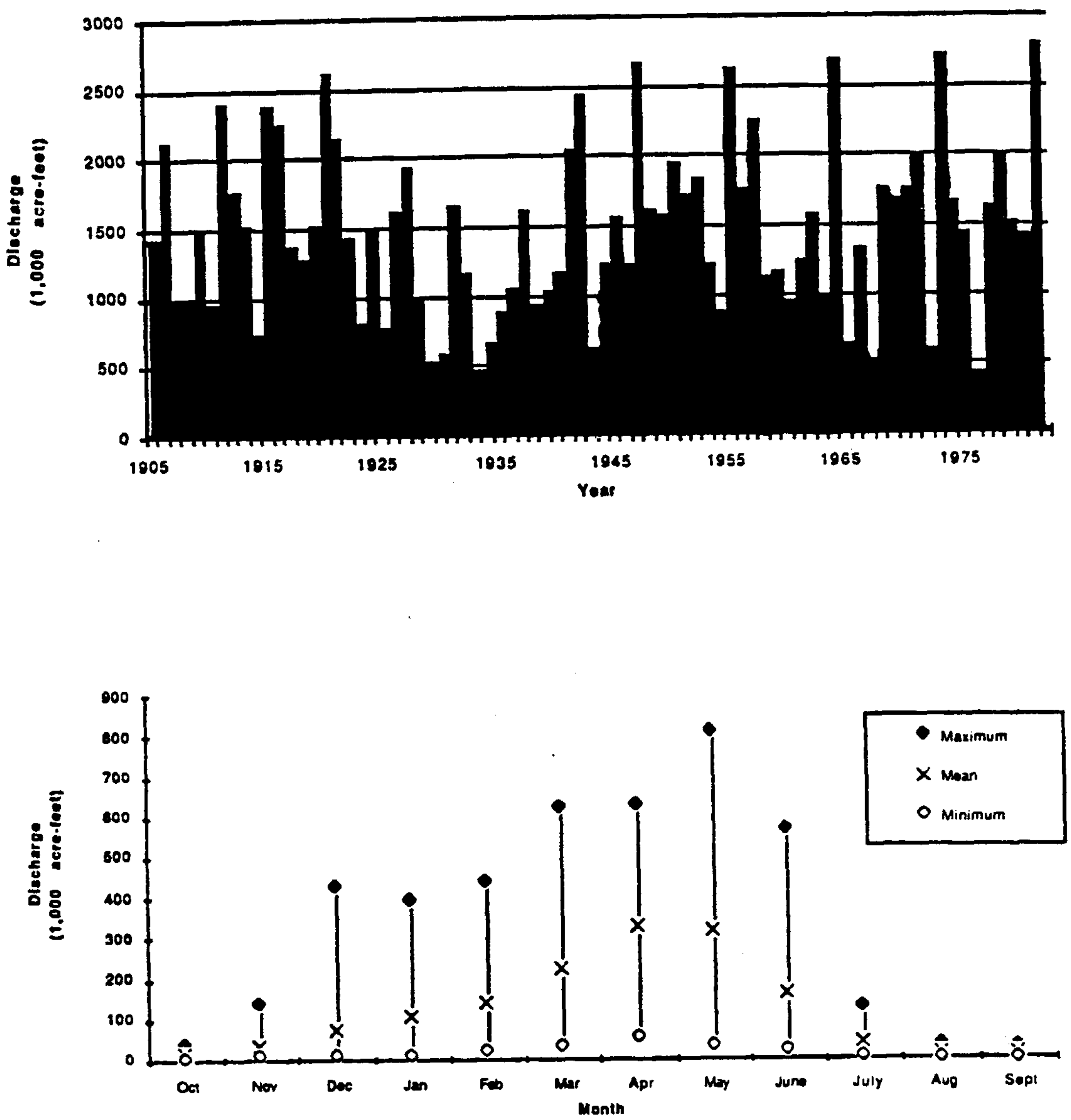
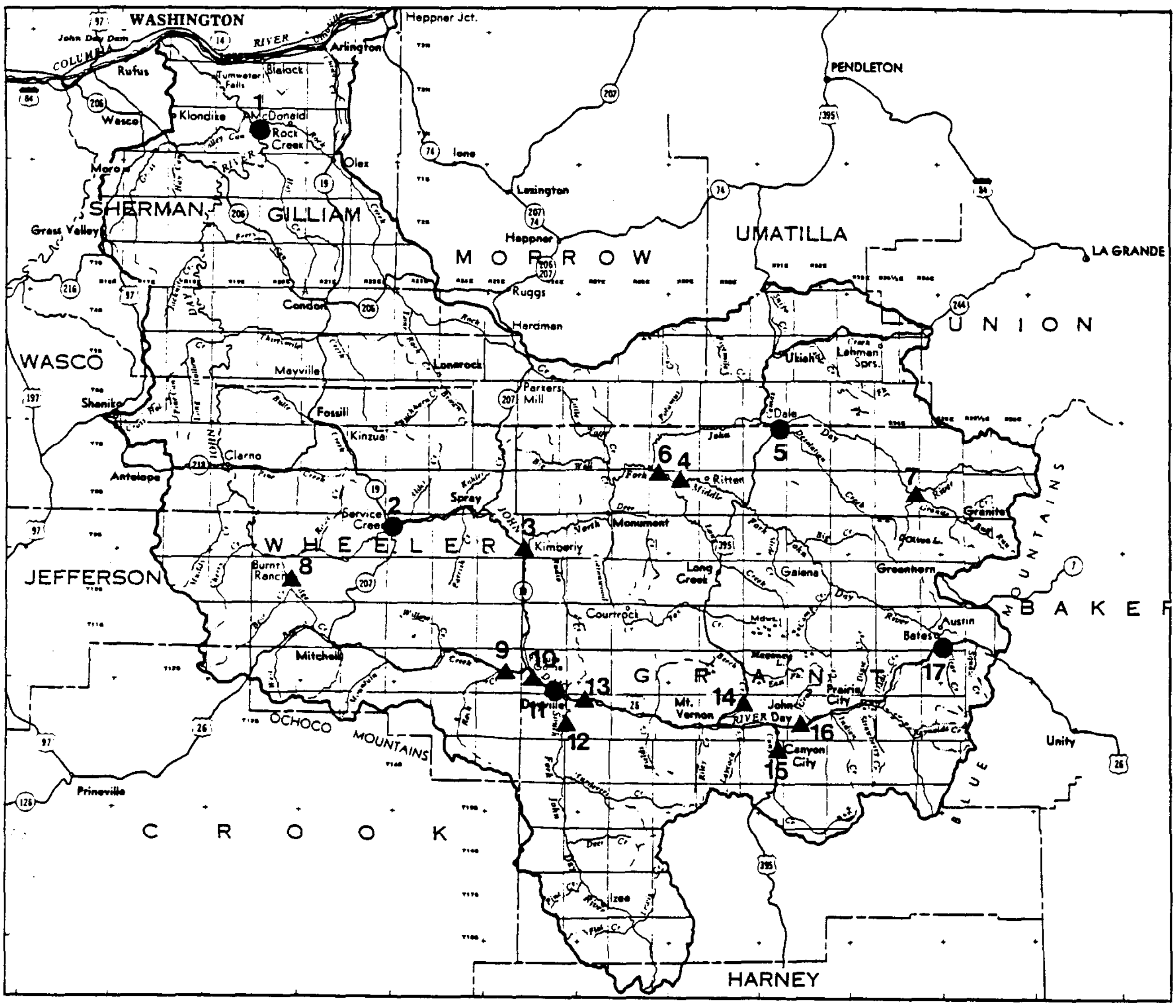


Figure 4. John Day River flow variability at McDonald Ferry (Rm 21).



● MINIMUM FLOW POINT ▲ MINIMUM FLOW REACH

1. John Day River at McDonald Ferry
2. John Day River at Service Creek
3. North Fork John Day River from Monument to mouth
4. Middle Fork John Day River from Ritter to mouth
5. North Fork John Day River at Dale
6. Middle Fork John Day River from Ritter to mouth
7. Granite Creek from Clear Creek to mouth
8. Bridge Creek from Bear Creek to mouth
9. Rock Creek from Mountain Creek to mouth
10. John Day River from South Fork to Picture Gorge
11. Cottonwood Creek at mouth
12. South Fork John Day River from Black Canyon to mouth
13. John Day River from John Day gage to South Fork
14. Beech Creek from East Fork to mouth
15. Canyon Creek from East Fork to mouth
16. John Day River from Rail Creek to John Day gage
17. Clear Creek at the mouth

Figure 5. Minimum perennial streamflow locations in the John Day Basin (OWRD 1986).

Table 7. Minimum perennial stream flows (cfs) in the John Day River Basin.

	OCT	NOV	DEC	JAN	FEB 1-15	FEB 16-29	MAR	APR	MAY	JUN	JUL 1-15	JUL 16-31	AUG 1-15	AUG 16-31	SEPT 1-15	SEPT 16-30	Priority Date
John Day River in the reach between the mouth of Rail Cr. and USGS gage 14-038530 (Sec. 19, T13S, R32E).	25	25	25	25	25	25	24	24	24	25	15	15	15	34	34	34	11/03/83
John Day River in the reach between USGS gage 14-038530 (Sec. 19, T13S, R32E) and the mouth of the South Fork John Day River.	50	80	80	80	80	118	118	118	118	80	50	30	30	30	30	30	11/03/83
John Day River in the reach between the mouth of the South Fork John Day River and the mouth of the North Fork John Day River.	60	120	120	120	120	160	160	160	160	120	60	60	60	60	60	60	11/03/83
John Day River above USGS gage 14-046500 at Service Creek (Sec. 18, T9S, R23E) as measured at the gage.	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	05/24/62
John Day River above its mouth as measured at USGS gage 14-048500 at McDonald Ferry (Sec. 11, T1N, R19E).	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	05/24/62
Canyon Creek in the reach between the mouth of East Fork Canyon Creek and the mouth of Canyon Creek (Sec. 23, T13S, R31E).	9	15	25	25	25	34	34	34	34	25	15	9	9	9	9	9	11/03/83
Beech Creek in the reach between the mouth of East Fork Beech Creek and the mouth of Beech Creek (Sec. 28, T13S, R30E).	8	15	30	30	30	44	44	44	44	30	15	8	8	8	8	8	11/03/83
South Fork John Day River in the reach between the mouth of Black Canyon Creek and the mouth of the South Fork John Day River.	25	50	100	100	100	133	133	133	133	100	50	25	25	25	25	25	11/03/83
Cottonwood Creek above its mouth as measured at the mouth (Sec. 28, T12S, R26E).	3	10	10	10	10	15	15	15	15	10	7	3	3	3	3	3	11/03/83
Rock Creek in the reach between the mouth of Mountain Creek and the mouth of Rock Creek (Sec. 17, T12S, R26E).	10	20	35	35	35	50	50	50	50	35	20	10	10	10	10	10	11/03/83
Bridge Creek in the reach between the mouth of Bear Creek and the mouth of Bridge Creek (Sec. 3, T10S, R20E).	6	25	25	25	25	40	40	40	40	25	15	6	6	6	6	6	11/03/83
Granite Creek in the reach between the Clear Creek and the mouth of Granite Creek (Sec. 13, T8S, R34E).	30	30	55	55	35	35	71	71	71	55	30	30	30	71	71	30	11/03/83
North Fork John Day River above former USGS gage 14-0415 near Dale (Sec. 35, T6S, R31E) as measured at the site of the gage.	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	05/24/62
North Fork John Day River above its mouth as measured at USGS gage 14-0460 at Monument (Sec. 2, T6S, R27E).	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	05/24/62
Clear Creek above its mouth as measured at the mouth (Sec. 34, T11S, R35E).	10	10	18	18	18	18	25	25	25	18	10	4	4	25	25	10	11/03/83
Middle Fork John Day River above its mouth as measured at USGS gage 14-0440 at Ritter (Sec. 8, T8S, R30E).	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	05/24/62
Middle Fork John Day River in the reach between USGS gage 14-0440 (Sec. 8, T8S, R30E) at Ritter and the mouth of the Middle Fork John Day River.	50	80	80	80	80	125	125	125	125	80	50	25	25	125	125	50	11/03/83

Five minimum streamflows were established in 1962 on the John Day River and on the North and Middle forks. These flow levels do not vary seasonally. The other 12 flow points and reaches were established in 1983 and include most of the John Day River above Kimberly. The flow levels specified for these vary by month. Minimum streamflows in the John Day Basin were requested primarily for maintenance of fish, aquatic life, pollution abatement, and recreation. Late summer and fall streamflows are most deficient in the lower main river, the lower North Fork and lower Middle Fork during low water years.

Mean monthly flows below minimum levels during the months of August through October usually only occur on extreme low flow years about one year in 10. Most low flow problems occur below juvenile salmonid rearing areas or are associated with streams or stream segments experiencing significant irrigation withdrawal. Improved irrigation management, water conservation, and restoration of upland and riparian systems would significantly improve water quality, quantity, rearing habitat, and fish transportation flows during critical low flow years in affected stream reaches. Water for domestic and livestock uses and water released from storage is not subject to minimum streamflow restrictions. In February 1988, the 17 minimum streamflows for the John Day Basin were converted to instream water rights. Mean monthly flows often drop below optimum flows during the summer and fall, but on most years minimum flows are met.

The treaty reserved fishing rights of the Umatilla and Warm Springs tribes included the right to sufficient water quantity and quality to maintain the fishery resources.

Hydroelectric Projects

The Federal Energy Regulatory Commission has issued three preliminary permits for hydroelectric projects in the basin. All are located in Grant County; two are on the North Fork and one on the South Fork at Izee Falls. None of these projects are being pursued. An application for a right to divert 20 cfs from Lost and Lake Creek to produce 2.5 megawatts of power has been approved. Outflow would return to Congo Gulch, a tributary of Clear Creek (OWRD 1986).

Land Use

Approximately 30 percent of the John Day Basin is managed by the U.S. Forest Service (Table 8). The headwaters of the John Day drain from four different national forests -- the Umatilla National Forest (North Fork), the Wallowa-Whitman National Forest (upper North Fork), the Malheur National Forest (Middle Fork, mainstem, and east and south portions of the South Fork), and the Ochoco National Forest (west side of the South Fork). The headwaters of Canyon, Pine, and Strawberry creeks in the Malheur National Forest originate in the Strawberry Wilderness Area. This area is managed as wilderness with access limited to hiking or horseback, and where timber harvest and associated road construction activities are prohibited. Outside of wilderness and projected areas, the primary use is for timber production.

Table 8. Land ownership in the John Day Basin (OHRD 1986).

Landholder	Area (sq. mi.)	Percent of Basin
Private	5,027	62
U.S. Forest Service	2,396	30
Bureau of Land Management	587	7
National Park Service	20	*
Corps of Engineers	2	*
Oregon Department of Fish & Wildlife	50	*
Oregon State Land Board	13	*
Oregon Forestry Department	4	*
Bureau of Indian Affairs	4	*

* Indicates less than 1 percent.

The Bureau of Land Management (BLM) manages approximately 7 percent of the John Day Basin in the form of leased lands below headwater areas. BLM lands are along the lower mainstem below Service Creek (RM 157), adjacent to the river between Kimberly (RM 184) and Dayville (RM 212), and along the lower 30 miles of the South Fork.

The Bureau of Indian Affairs, U.S. Department of Interior, manages approximately 20 off-reservation trust lands for the benefit of the Warm Springs Tribes and tribal members located on the lower John Day River. These allotments total 4,497 acres.

The National Park Service and the U.S. Army Corps of Engineers manage small areas in the basin.

The state of Oregon manages less than 1 percent of the John Day River Basin. State-owned lands consist mostly of wildlife management areas in the vicinities of Bridge Creek (near Dale in Umatilla County) and Murderers Creek (South Fork). In addition, the Oregon Department of Forestry is responsible for regulating commercial timber production and harvest on private land and manages about 2,500 acres of state land in the basin.

Over 60 percent of the John Day Basin is privately owned. Nearly all lands below headwater areas are privately owned or leased. Private and federally leased lands are used mainly for livestock grazing and forage production (OWRD 1986). Private land also extends to some headwater areas and high elevation meadows (upper Middle Fork).

Over 95 percent of the basin lands are zoned for agriculture and forestry uses. Urban lands comprise only 0.3 percent. Table 9 shows zoning types, by county, for the basin.

About 60,103 acres are currently irrigated in the John Day Basin and the Soil Conservation Service has identified 12,000 potentially irrigable acres (assuming adequate water supplies) in the lower North Fork and mid to lower mainstem (OWRD 1986). Most irrigation is by surface diversion, with the Oregon Department of Fish and Wildlife maintaining over 300 rotary drum screens to prevent loss of juvenile salmonids at diversions.

Irrigated agriculture comprises nearly 2 percent of the upper basin. Average annual precipitation in most agricultural areas is below 20 inches, and less than 2 inches occur during the three driest months of the year, July through September. Irrigation is essential to the growth of the major crops, which

Table 9. Zoning of the John Day Subbasin (in thousand acres).

County	Agriculture	Forestry	Public/ Park	Rural 1/	Urban	Total 2/
Crook		19.0				19.0
Gilliam	687.4		<0.1	3.4	2.5	693.3
Grant	918.6	1,384.0		15.1	7.5	2,325.2
Harney		19.1				19.1
Jefferson	105.0	8.1				13.2
Morrow	63.1	184.8		0.1		248.0
Sherman	299.7				0.8	300.5
Umatilla		148.7	163.5	0.3	0.2	312.7
Union		4.5				4.5
Wasco	111.6				3.2	114.8
Wheeler	765.2	276.0			1.6	1,042.9
Total 2/	2,950.6	2,044.3	163.5	18.9	15.9	5,193.1

1/ Includes lands zoned for service centers, residential, and industrial.
2/ Totals may not agree due to rounding.

Today, the John Day Basin has a population of about 14,000 people, 9,000 of whom live in the upper basin (Grant and Wheeler counties). Agriculture and timber production are the major income-producing industries in the basin. Livestock and forage production are the principal agricultural activities in the region. Irrigation increases the amount of forage produced, and in the upper John Day Basin nearly all irrigated lands are used to produce forage. Most irrigation occurs along the upper mainstem from Picture Gorge to the Blue Mountain Hot Springs (above Prairie City), in the Spray, Twickenham, and Clarno areas of the middle mainstem, and the lower areas of the North Fork (Kimberly to Monument) where orchard production and cattle grazing exist. Lands in the headwater areas are primarily publicly owned and managed by the U.S. Forest Service for timber production, summer rangelands for livestock, minerals, and recreational use. Expansion of the economy is limited by the basin's small population, its isolation from major population centers where trading occurs, and its limited transportation facilities.

PART II. HABITAT PROTECTION NEEDS

History and Status of Habitat

Historical descriptions of the John Day Subbasin indicate that the John Day River was once a relatively stable river with good summer streamflows, water quality, and heavy riparian cover. The writings of Peter Skene Ogden, a fur trader who traveled through the John Day River Basin during 1825 and 1829, reveal his experiences that support these findings (Hudson's Bay Record Society 1950). His journal describes an abundance of beaver and diverse riparian vegetation. The North Fork streams were well wooded with aspen, poplar and willow; had good streamflows (the party was unable to ford horses through the John Day River in July near the present town of Prairie City); and had good channel structure. Large spring and fall chinook salmon migrations and numerous beaver sightings indicate that John Day waters contained instream habitat diversity. These conditions are common in natural river systems, which have a tendency to meander and form a sequence of pools and riffles.

Watershed conditions in the John Day Subbasin changed significantly during the years following Ogden's expeditions. Several factors contributed to these changes. Placer mining in the late 1800s left many streams channelized with little or no shade, high silt loads, and diverted flows. Later, dredging overturned the stream channels in the larger streams, changing stream courses, silting gravel, and destroying stream cover. Inactive mine sites and their settling ponds in the upper North Fork continue to release turbid flows, some known to contain toxic heavy metals.

Following the discovery of gold, the harvest of pine forests in the upper watershed began to supply lumber to the growing communities. Early forest practices included removing timber from and building roads on steep slopes, along streambanks, across watersheds, and in other sensitive areas (OWRD 1986).

Farmers and ranchers settled the lower basin during the 1860s and 1870s. Sheep were introduced into the region in the 1880s. Herds were driven to summer range in the mountains of the upper basin and wintered in the lower basin. These animals (sheep, horses and cattle) foraged perennial grass and shrub ground covers. During this time many rangelands, under grazing pressure, converted from grass-forb-browse ecosystems to weed-forb ecosystems. As grass rangelands declined in the basin, and wildfire suppression increased, the invasion of juniper and sage increased.

More recently, livestock overgrazing, water withdrawals for irrigation, landowner clearing, road building, timber harvest, and channelization created further fish habitat problems by disturbing or destroying riparian vegetation and destabilizing streambanks and watersheds.

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 temperatures, high spring flows, depressed beaver populations, accelerated bank erosion, excessive stream sedimentation, and reduced cover. The Oregon Water Resources Department (1986) states that "...activities in the last 125 years may have had a significant impact on the basin's capacity to retain water and release it later in the season. Analysis of historical flow data suggests that more precipitation falling in the basin during winter now runs off immediately instead of staying in the basin. The use of the watershed's resources to satisfy consumer demand for forest products, grains, minerals, and other commodities probably has increased winter runoff and decreased spring runoff."

The basin's ability to naturally repair itself is slow in the John Day's semiarid environment, and some areas are adversely affected by activities that ceased long ago. In other cases, poor management practices still continue. The problems begin when water from rains and snowmelt runs off into streams more quickly. Soil erosion increases, flooding occurs, and streambanks erode away. In many tributary streams, excessive water volumes are deepening channels, thus lowering water tables in the immediate proximity (OWRD 1986).

High streamflows in the winter and spring are a major source of streambank erosion. Winter high flows are primarily responsible for the loss of streamside agricultural lands that degrade or eliminate fish habitat. By summer, flows are low and relatively clean. However, these low flows are effected further by water use. OWRD (1986) states "...diversions from streams in late summer can result in total dewatering of channels. The small amounts of water in remaining channels is subject to heating from a variety of sources. Elevated water temperatures in turn pose serious problems to fish life in the basin."

Water Quality Problems

Water quality problems of varying degrees in the John Day drainage are widespread (Fig. 6) and occur in approximately 750 stream miles, according to a Department of Environmental Quality study (DEQ 1978). About 20 percent of the problem areas are classified as severe. Both water chemistry and quantity effect the overall quality as related to production of anadromous and resident fish. Most water quality problems such as high water temperatures and low dissolved oxygen resulting from watershed degradation and loss of riparian systems occur during July through September. High sedimentation loads occur during spring runoff. Overwinter survival also effects production on years of below normal winter temperatures. Tables 10 and 11 list some physical characteristics of the subbasin at various locations.

Streamflow to support anadromous fish life must have a high dissolved oxygen content, low turbidity, a slightly acidic to slightly alkaline pH, and temperatures between 50 F and 65 F. Water temperatures in the Middle Fork and mainstem and smaller tributaries often exceed 80 F during summer months. Temperatures in the 70s impair fish growth, reduce the ability of juvenile salmonids to compete for food and to avoid predators, and are often ideal for nongame fish. Temperatures above 80 F kill fish, or cause them to move out of the affected area to cooler waters, essentially removing the impacted area from rearing and production capability. Table 12 lists streams in the John Day that do not meet state water quality standards due to high temperatures adversely affecting fish life.

From 1977 to 1987, the Oregon Department of Environmental Quality measured water temperatures at several locations in the John Day River Basin. Temperatures ranged as high as 84 F on the lower mainstem (RM 40) and 79 F on the upper mainstem at Dayville (RM 212), to lows of 32 F at RM 212 and RM 157 on the mainstem. In upper John Day Basin waters, 1979 and 1980 water temperatures measured by the Bureau of Reclamation were recorded as high as 76 F on the South Fork near Izee Junction (RM 44); 80 F on Owings Creek (tributary to Camas Creek) near Ukiah, and 80.4 F on the Middle Fork (RM 25). James (1984) indicated that these types of conditions have adversely affected growth and survival rates of juvenile salmonids during the summer and fall rearing period. Suitable rearing areas are now seasonally limited to the cooler waters of the upper John Day Basin.

Irrigation withdrawals in some stream segments limit production of salmon and steelhead in the John Day Basin. These problems are compounded during years showing below average discharge rates. Low streamflows mainly affect the rearing and instream movement of juvenile salmon and steelhead. Adequate streamflows generally exist for adult passage to spawning grounds, and minimum streamflows are met on most years. Presently, flows only reach minimum levels on a frequency of one to two years out of 10.

JOHN DAY SUBBASIN

Figure 6. Water quality problem areas in the John Day Basin (DEQ 1978).

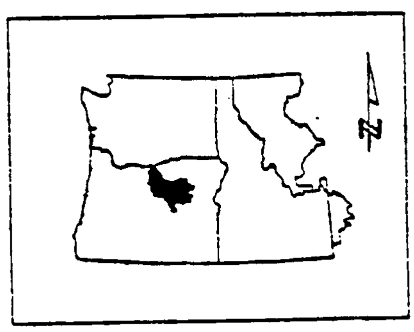


Table 10. Physical characteristics of the John Day Subbasin, 1977-1987 (ODEQ, unpubl. data).

Location	River mile	Conductivity (micro ohm) April-October	Dissolved Oxygen (mg/1) June-October	Dissolved Oxygen (mg/1) November-May
John Day River @ Dayville	215.5	264	9.7	12.2
South Fork John Day River @ Dayville	0.2	333	10.2	11.7
North Fork John Day River @ Kimberly	0.1	128	9.4	12.3
John Day River @ Service Creek	156.7	193	9.0	12.1
John Day River @ Highway 206	39.7	217	9.9	11.5
John Day River @ McDonald FY	20.9	247	9.6	11.7

Location	pH June-October
John Day River @ Dayville	8.1
South Fork John Day River @ Dayville	8.4
North Fork John Day River @ Kimberly	8.2
John Day River @ Service Creek	8.4
John Day River @ Highway 206	8.5
John Day River @ McDonald FY	8.5

Table 11. John Day Basin water temperatures (F), 1977-1987 (ODEQ, unpubl. data).

Station	River Mile	June-October			November-May		
		Minimum	Maximum	Mean	Minimum	Maximum	Mean
John Day River @ Dayville	215.5	46	79	63	32	61	44
South Fork John Day River @ Dayville	0.2	43	82	63	33	59	45
North Fork John Day River @ Kimberly	0.1	45	81	64	32	59	43
John Day River @ Service Creek	156.7	48	81	65	32	60	43
John Day River @ Highway 206	39.7	52	84	69	34	66	49

Table 12. John Day River Basin waters not meeting state water quality standards (DEQ 1978).

Stream	Temperature	Month	Miles Affected
Middle Fork John Day River	74	July	57.0
Long Creek	78	July	20.0
South Fork Long Creek	74	July	1.25[b]
Big Creek	74	July	1.25[b]
Camp Creek	77	July	5.0
Lick Creek	72	July	2.0[b]
Cougar Creek	71	July	2.0[b]
Big Boulder Creek	69	August	0.5[b]
Beaver Creek	73	August	1.0[b]
Granite Boulder Creek	72	August	1.5[b]
Vincent Creek	76	August	0.5[b]
Davis Creek	73	August	1.0[b]
Vinegar Creek	77	August	3.0[b]
Bridge Creek	73	August	3.0[b]
Clear Creek	69	June	1.5
South Fork John Day River	73	September	28.0
Murderers Creek	76	June	3.0
Widows Creek	71	August	2.5
Cummings Creek	69	August	2.0
Fields Creek	71	September	3.0[b]
Belshaw Creek	70	August	3.0[b]
Riley Creek	72	July	3.0
Beech Creek	73	September	11.5
East Fork Beech Creek	70	September	3.75
McClellan Creek	70	September	1.0[b]
Canyon Creek	69	August	15.25
Berry Creek	66[a]	July	1.5[b]
East Fork Canyon Creek	70	August	1.0[b]
Pine Creek	66[a]	August	3.5
Indian Creek	72	August	1.25
Dixie Creek	73	June	1.75[b]
Total & Averages	72°		185.5

[a] Meet state water quality standards but temperature increases limit to 2 F.

[b] Stream mileage computed to first major upstream tributary (exact location is on file at ODFW).

Numerous factors contribute to the water quality problems in the John Day Basin. These include livestock overgrazing, logging practices, road construction, stream channelization, water spouts, mining, and irrigation. Overall loss of habitat quantity and quality and instream diversity has caused the greatest negative impacts to fish resources in the basin. Since streamflow is a part of habitat quantity and quality, managers believe improved irrigation systems and restoration of the uplands and riparian systems would provide the greatest long-term natural benefits for fish, and improve late season streamflow as well.

Local problems with community sewer systems or individual septic tanks exist, but bacteria and nutrient loading do not pose serious fishery concerns.

A detailed paper by James (1984) identified habitat problems and recommended improvement measures for the John Day River Basin. The highest priority problems affecting salmon and steelhead in the John Day are directly related to degradation of riparian habitat. Riparian areas are considered degraded when there is a significant loss of natural streamside vegetation resulting in 1) greater extremes in water temperature, 2) unstable eroding streambanks, 3) loss of fish food and cover, 4) reduced instream flows, and 5) the widening of stream channels causing shallow stream depths and changes in geomorphic features along the banks resulting in the loss of vital summer and winter fish cover. All of these factors contribute to low fish production.

Livestock

Forest Service proposed land and resource management plans identify the need to maintain or enhance the unique and valuable characteristics of riparian areas and to maintain or improve water quality, streamflows, wildlife habitat, and fish habitat. Water quality will be maintained through the applications of "Best Management Practices" (BMPs) with the goal being to meet state water quality standards for temperature, turbidity, and other parameters where applicable.

Livestock damaged riparian areas in the John Day Subbasin are widespread. Severely damaged areas include lower North Fork tributaries, the Camas Creek area, the upper Middle Fork, the middle mainstem, and the upper South Fork. James (1984) notes that "Riparian areas in pasture lands receive severe damage because cattle are allowed to graze throughout the spring and summer, the maximum growth and establishment period for vegetation. The resulting riparian conditions are generally undesirable for providing streambank stability and shading of the water."

Riparian areas are also subject to overwintering cattle from private livestock winter feed operations, providing low elevation shelter and a good water supply. Resultant riparian and/or water quality problems include turbidity, fecal contamination, and high summer water temperatures. The associated fishery impacts are less severe than the widespread overgrazing impacts on pasture lands.

Several options are available for protecting riparian areas in the John Day Subbasin. Livestock control measures include limited grazing periods, reduced stocking rates, temporary or permanent stream corridor fencing, and management of riparian pasture systems.

Mining and Dredging

Mining and dredging have been other land use activities adversely affecting fish habitat and water quality in the John Day Basin. Associated problems include 1) reduction in the amount of suitable spawning habitat, 2) disturbance of incubating eggs that are uncovered or dislodged from gravel, 3) generation of sediment that slows and/or prevents egg development and renders gravel unsuitable for spawning, 4) disturbance of streambanks increasing erosion and sedimentation, 5) acid mine wastes leaching into spawning and rearing streams destroying fish food chains, and 6) destruction of riparian zones and watersheds adjacent to riparian corridors.

The Forest Service indicates that the protection of watershed values will be a major consideration in evaluating proposed mineral operating plans. Abatement of mine water discharge from abandoned mines appears to be the only means of improving water quality to levels that are safe for fish and that will meet state water quality standards. Protection of fish habitat from mining and dredging related activities require enforcement of regulations enacted by state, county, and federal authorizing agencies.

Roads

The construction of roads in the John Day Basin provides access to many resource and non-resource activities. Accompanying the construction of roads are problems that cause long- and short-term impacts on water quality and fish. Excessive stream sedimentation has been one of the major problems associated with road building. Improper placement and selection of culverts has resulted in [illegible]

Department of Fish and Wildlife, John Day, pers. commun.) notes that "road layout and design frequently does not take into consideration stream encroachment and the resultant impacts on water quality and fish." Therefore, layout, design, and construction of roads must be rigidly controlled.

The following factors are relevant to fish restoration efforts when constructing roads to service timber harvest activities, recreational areas, and cities in the John Day Basin.

1. Topography, geology, soils and climate.

2. Road densities and frequency, and retirement of unnecessary roads to restore resource production where possible.

3. Avoidance of springs, bogs, meadows and wet meadows.

4. Culvert placement to accommodate fish passage, runoff, and prevent scouring.

5. Crossing alternatives such as bridges to prevent culvert maintenance, potential plugging and subsequent road failures.

6. Social, economic, wildlife and recreation factors considered.

To the extent practical, the Forest Service indicates that roads will not be constructed through the length of riparian areas. Roads crossing riparian areas will not alter stream or groundwater flow characteristics to a degree that will impact the riparian characteristics. Road drainage will be designed and maintained to prevent the influx of road sediment runoff into stream courses.

Timber Harvest

Logging practices throughout the John Day Basin have degraded water quality in streams and caused both direct and indirect impacts to fish and aquatic resources. The following is a list of fishery related impacts that have resulted from logging activities.

1. Impaired water quality caused by sedimentation, increased stream temperatures, and lowered dissolved oxygen levels.

2. Direct stream habitat losses resulting from instream channel changes and loss or lack of large woody debris.

3. Debris and log jams that block fish passage to upstream production areas.

4. Removal of stream canopy resulting in a reduction of instream food production thus reducing total fish rearing potential.

5. Increased stream temperatures causing direct change in fish species composition from desirable game fish to competitors such as dace, Northern squawfish, and suckers. Wolf Creek, a tributary to the Middle Fork, for example, experienced an increase of 16 degrees directly as a result of clear-cutting in the riparian zone (E. Claire, ODFW, John Day, pers. commun.).

6. Impacts of silvicultural practices on downstream water quantity and quality where watersheds can no longer retain and store water, causing excessive flows during spring run-off months and the lack of water during critical low flow months in mid to late summer.

To protect existing fish habitat from adverse effects of logging activities, the following should be considered for site-specific planning.

1. Identifying soil types and slopes, and determining erosion hazards.

2. Enforcing and monitoring applicable state and federal water quality standards and the Oregon Forest Practices Act.

3. Examining, classifying and monitoring existing water quality and the fish and wildlife to be affected.

4. Improving or using low-impact silvicultural practices, such as selective cutting.

5. Using logging system alternatives that will minimize soil disturbance.

6. Using economic analysis that includes "new" methods for assessing fish and wildlife values.

Pesticide and Herbicide Use

Herbicides could also detrimentally affect salmonid populations in the John Day Subbasin. Salmonids prefer cold, clear streams, therefore, reduction of streamside cover caused by indiscriminate herbicide application may be adversely affecting salmonid populations. Reduction of streamside vegetation by forest herbicides would also adversely affect salmonid

stabilization, water storage, filtration and retention, cover, and wildlife values. Disturbance of riparian areas by livestock grazing, road building, logging, clearing, and channelization has caused major impacts on watersheds and associated fish and wildlife habitat. Major fish habitat quality problems caused by lack of good riparian areas in the John Day River Basin include:

A) Increased water temperatures. High summer temperatures frequently exceeding 80 F reduce rearing habitat; displace salmonids; increase competition from warm water tolerant species such as dace, squawfish, and suckers; and impair growth and survival. A healthy riparian canopy reduces solar insolation during summer and insulates many streams from winter freezing, thereby affecting overwinter survival of fish and aquatic life (Bottom et al. 1985).

B) Changes in timing and rate of peak and minimum flows. Reduction of riparian vegetation decreases the capacity of a stream's aquifer to retain water during high flows and its gradual release during low summer flows. This alters streamflow discharge, and intensifies winter and spring flooding, and extreme low summer flows.

C) Decreased bank stability and adverse channel geomorphic changes. Unstable banks with frequent cave-ins and shifting substrate destroys habitat for aquatic life and reduces productivity, increases sedimentation, reduces fish hiding and rearing cover from under cutbanks, and decreases a stream's ability to filter sediment and debris. Channel shape changes from narrow, deep channels to wide, shallow channels, reducing usable fish habitat.

D) Decreased abundance and diversity of aquatic organisms and food resources for salmonids. Loss of riparian cover alters and reduces production of aquatic invertebrates through reduced detritus, increased temperatures, increased turbidity and sedimentation, and altered substrate and flow patterns. There is also a reduction of aquatic and terrestrial insects and benthic invertebrates associated with the loss of large woody debris and gravel and rubble substrate (Bottom et al. 1985).

E) Increased sedimentation. Increases in fine sediment through loss of root structure and surface vegetation 1) cause direct mortality through smothering of eggs, 2) reduce winter survival of juvenile salmonids through embeddedness of cobble and boulder habitats, 3) cement spawning gravel, 4) reduce foraging efficiency of salmonids because of high turbidity, 5) decrease aquatic food production, 6) decrease pool area for juvenile rearing and adult holding sites, and 7) reduce or eliminate recreational opportunity.

F) Increased winter ice conditions. Increased anchor and surface ice can accelerate erosion on streambanks and cause physical damage to rearing juveniles through 1) dewatering of streams from ice jams, 2) stranding of fish in dewatered side channels, 3) collapsing snow and ice causing death by suffocation or crushing, 4) freezing of eggs or reduction of water interchange restricting the oxygen supply to eggs, and 5) entrapping fish in ice pockets causing death.

3. Lack of Habitat Diversity

Salmonids require a diversity of riffle and high quality pool areas to meet freshwater life history requirements for spawning and rearing. Disturbance of stream channels and associated riparian zones has resulted in wide, shallow channels with low pool-to-riffle ratios. Removal of woody debris and change in channel morphology by logging and channelization have resulted in loss of cover in the form of boulders, submerged logs, undercut banks, and overhanging vegetation necessary for juvenile salmonid resting and escape cover Logging and channelization have also resulted in sedimentation of cobble and boulder substrate.

4. Water Withdrawals

Over 4,500 water rights have been issued, primarily for irrigation and mining purposes, since the 1860s. Although current water rights are approximately 76 percent of the annual basin discharge, there is insufficient flow on many streams to satisfy all water rights and minimum streamflows. Due to the seasonal distribution of runoff, water uses for irrigation and minimum streamflows for fisheries conflict in certain reaches during critical low flow years. Water withdrawals compound water quality and temperature problems for salmonids, and restrict habitat use, particularly in the upper mainstem and Middle Fork subbasins, during low flow years.

Meeting and/or exceeding established minimum flows through restoration of uplands and riparian habitat, along with irrigation management and water conservation would increase the capacity of the basin to support salmon and steelhead.

Constraints and Opportunities for Protection

Institutional Considerations

Several federal, state, and local agencies (see Part III) regulate land and water use activities in the subbasin. Fish production in the basin must compete with other uses, primarily irrigation, agriculture, grazing, and timber production. The quality of fish habitat in streams that pass through private lands is often determined by the land management activities of the landowner. On land managed by other agencies, habitat quality for fish production is in part determined by the activities that are permitted on the land.

Fish managers must coordinate with regulatory agencies to promote the protection and enhancement of fish habitat. In many instances the agency involved will have little incentive to consider the fisheries resource in its internal decision making process. Where conflicts arise, it is important that the Oregon Department of Fish and Wildlife work closely with local representatives of all agencies that either regulate or enforce regulations that directly or indirectly impact populations of anadromous salmonids.

Habitat protection is the most important management activity and should receive highest priority. In practice, however, protecting fish habitat often means minimizing impacts from various land and water use practices.

The John Day River Implementation Plan supplements an ongoing fish habitat improvement program on private lands that began in 1984 to maximize production of spring chinook and summer steelhead. The Bonneville Power Administration funds this program as part of the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program under Program Measure 704(c)(1), Action Item 4.2. The goal of the passage, riparian, and instream work is to maintain wild gene pools and maximize production of chinook and steelhead smolts and adults to offset losses incurred by mainstem Columbia River dams. The private lands project is being implemented by the Oregon Department of Fish and Wildlife with assistance from the Soil Conservation Service, and Grant Soil and Water Conservation District. The Oregon Department of Fish and Wildlife maintains regular communication with the Malheur, Umatilla, and Wallowa-Whitman national forests for future cooperation on stream reaches where private and U.S. Forest Service lands are in mixed blocks of ownership.

Since project activities on private lands began in 1984, approximately $2.2 million has been spent on restoration of fish habitat on 50 stream miles and on two passage projects that have opened up an additional 35 miles of steelhead spawning and rearing habitat.

A summary of estimated funds expended on fish habitat in the John Day River Basin by state and federal agencies is shown on Table 13. Funding for 1986 and 1987 is nearly double that for the 13-year period from 1973 through 1985, indicating a strong movement toward fish habitat improvements.

Table 13. Total funds (in dollars) expended for fish habitat and riparian restoration within the John Day Subbasin by administering agency, 1973-1988.

Year	ODFW	BLM	USFS	SWCD	Total
1973-85	718,400	253,673	1,083,710		2,055,783
1986	500,000	88,000	485,000		1,073,000
1987	556,000		515,922		1,061,922
1888	266,761	5,000	427,328	126,000	825,089

Critical Data Gaps

1. Additional information needs to be gathered to further quantify the benefits of habitat improvement. Good data exists to show that riparian and instream improvement is beneficial. However, additional studies are needed to better define the degree or percent of improvement in so far as smolt production is concerned.

2. Monitoring of water quality and quantity by the USFS, Oregon Department of Environmental Quality, and Oregon Department of Water Resources is needed so that compliance with established standards can be enforced.

3. A basic requirement for evaluating fish production capacity within the basin is an adequate data base that allows for assessment of current habitat quantity and quality, identifies limiting factors, and provides a baseline against which future changes in habitat can be measured. Collecting

this information should be an interagency cooperative effort following accepted habitat and stream classification criteria.

Habitat Protection Objectives and Strategies

Objective

Protect existing anadromous fish habitat by preventing further watershed degradation and the resulting changes in water quality quantity, and instream habitat. Provide optimum habitat for all life history stages of anadromous salmonids.

Strategy

Protect and prevent further loss of riparian systems, instream habitat, water quality and quantity through local, state, tribal, and federal agency cooperation.

Actions

Grazing: Develop livestock control measures to include limited grazing periods, reduced stocking rates, temporary or permanent stream corridor fencing, and management of riparian pasture systems.

Mining: Require mining and dredging operations to meet county, state, and federal regulations. Ensure that the Department of Environmental Quality, Environmental Protection Agency, and Oregon Division of State Lands (DSL) jointly develop guidelines, standards, and enforcement procedures for protection of streambed conditions under provisions of the 1987 amendments to the Clean Water Act, Title III - Standards and Enforcement, Sections 301-310, and 404. Prevent mining activities in or near critical fish habitat.

Road Building: Enforce Forest Practices Rules requiring adequate maintenance or closure and rehabilitation of roads. Social, economic, wildlife, fisheries, and recreation factors must be considered and positive road management plans developed to close unnecessary roads and return them into resource production where possible. Examine alternative road construction sites in areas classified as having high erosion and slope failure potential.

Timber Harvest: Develop a system for classifying and mapping forest lands susceptible to erosion, including slope failures, streamside landslides, gully erosion, and surface erosion. Such a system should take into account the potential for damage to downstream resources in addition to the potential for on-site erosion.

Require the U.S. Forest Service, Bureau of Land Management, and Oregon Department of Forestry to increase monitoring of timber harvest activities for compliance with rules, guidelines, and recommendations for habitat protection.

Pesticide and Herbicide Use: Ensure that chemical treatments from federal, state, and private individuals for plant and insect control adjacent to waters in the John Day River Basin will not endanger fish life and aquatic organisms or damage watershed and riparian systems.

Water Quality and Quantity: Require the Environmental Protection Agency, Department of Environmental Quality, Bureau of Land Management, and U.S. Forest Service to establish monitoring programs required by the Clean Water Act (Sections 301-310), the National Forest Management Act, and the National Environmental Protection Act (NEPA).

Require the Department of Environmental Quality, Environmental Protection Agency, and Division of State Lands to enforce guidelines, standards, and procedures for protection of streambed conditions under provisions of the 1987 amendments to the Clean Water Act.

Continue landowner involvement and cooperation in protecting, restoring and enhancing riparian systems and watersheds.

Require the Division of State Lands to develop procedures and provide manpower to monitor compliance with fill and removal permit conditions.

Through agency and landowner cooperation, develop acceptable methods of erosion control where bank protection is needed.

Where possible, apply for instream water rights or recommend additional sites for adoption of minimum streamflow by the Water Resources Commission.

Require all diversion inlets be properly screened and maintained as required by the 1987 Fish Screen Law and ORS 509.615, which states that "...any person who diverts water from any body of water in this state in which fish exist shall install, operate and maintain, at the expense of the person, such fish screening or bypass devices that the department determines are necessary to prevent fish from leaving the body of water and entering the diversion."

Monitor irrigators to ensure that all diversion structures provide, at a minimum, adult and juvenile fish passage as required by state law.

Obtain funding for landowners through state and federal agencies to implement more efficient irrigation methods and develop water conservation practices benefitting landowners and instream flows.

Purchase, exchange, lease, or seasonally rent water rights for selected fish habitat during critical low flow periods.

Develop a comprehensive plan for the reintroduction, regulation and management of beaver in suitable sites in the John Day River Basin for the specific purpose of using beaver to restore streamflows, improve fish habitat, and improve watersheds.

Support and expand existing watershed programs, such as the Agricultural Stabilization and Conservation Service, Soil Conservation Service, Governor's Watershed Enhancement Board, and the soil and water conservation districts.

Develop a system of riparian natural areas associated with critical fish habitat throughout the basin.

PART III. CONSTRAINTS AND OPPORTUNITIES FOR ESTABLISHING PRODUCTION OBJECTIVES

Institutional Considerations

A variety of federal, tribal, state, and local agencies are involved in management activities that affect the fisheries of the John Day Basin. In most cases, the Oregon Department of Fish and Wildlife and the Warm Springs and Umatilla tribes are responsible for fish and wildlife resource management, while other agencies have direct responsibility for regulating land and water use activities.

Agencies and organizations involved in land and water management in the John Day River Basin are:

Federal
- Bureau of Land Management (BLM)
- U.S. Army Corps of Engineers (COE)
- U.S. Forest Service (USFS)
- U.S. Geological Survey (USGS)
- U.S. Soil Conservation Service (SCS)
- U.S. Bureau of Reclamation (BOR)
- U.S. Bureau of Indian Affairs (BIA)
- U.S. Federal Highway Administration (FHA)

State
- Oregon Department of Fish and Wildlife (ODFW)
- Department of Environmental Quality (DEQ)
- Division of State Lands (DSL)
- Land Conservation and Development Commission (LCDC)
- Oregon Department of Forestry (ODF)
- Oregon Water Resources Department/Commission (OWRD)
- Department of Geology and Mineral Industries
- Department of Transportation

Tribal
- Confederated Tribes of the Warm Springs Reservation of Oregon
- Confederated Tribes of the Umatilla Indian Reservation

Local
- Grant Soil and Water Conservation District
- Monument Soil and Water Conservation District
- John Day Basin Council

Fish and wildlife interests and managers in the John Day River Basin are:

National Marine Fisheries Service (NMFS)
U.S. Fish and Wildlife Service (USFWS)
Confederated Tribes of the Warm Springs Reservation of Oregon
Confederated Tribes of the Umatilla Indian Reservation
Oregon Department of Fish and Wildlife (ODFW)
U.S. Forest Service
Northwest Power Planning Council
Bonneville Power Association (BPA)

Each of the land and water management agencies has regulatory authority over some aspect of land or water use, or is responsible for overall management of specific land areas. Each has its own policies, procedures and management directives associated with its area of responsibility. None of these agencies by itself acts as manager of the entire watershed and regulates all the activities occurring in it.

Fishery managers coordinate with land and water managers to minimize impacts on fish habitat. Fishery agency biologists act in an advisory role to land and water managers. They comment on proposed activities that would impact fish habitat and suggest ways to minimize impacts on the fishery resource.

Fishery agencies work with land and water management agencies to identify potential threats to habitat, areas requiring protection, and habitat enhancement projects. Applications for permits issued by other agencies for land use activities are forwarded to the fishery agencies for review and comment.

By treaty with the United States, the Confederated Tribes of the Umatilla Indian Reservation reserved certain rights, including the right to fish at all usual and accustomed stations of the Columbia Basin, including portions of the John Day River Basin (Table 14). These reserved rights provide the basis for a wide range of rights and interests for the protection, enhancement, management, and harvest of anadromous fish in the John Day River Basin.

Table 14. Usual and accustomed fishing and hunting sites of the Confederated Tribes of the Umatilla Indian Reservation in the John Day Basin (Swindell Report 1941)

STREAM	LOCATION	INDIAN NAME	SPECIES[a]	TRIBES[b]	METHOD[c]	USAGE[d]
Camas Creek	near mouth of Wm. Spr. Cr	Tucg-kupin-was	TR + HG	UM	Hooks	No
Camas Creek	3 miles below Cable Cr	Couse-shets-pa	TR + WF	UM	Water Diversion	No
N Fk Cable Creek	near mouth of Neeves Cr	Tipas	TR + HG	UM	Water Diversion	Yes
N Fk Cable Creek	headwater area	Kolk-tie	TR + HG	UM	Hooks	Yes
Camas Creek	near Ukiah, OR	Tack-en-pala	TR	UM	Hooks	No
Camas Creek	Camas George	Wy-na-nets-pa	TR + WF	UM	Hooks	Yes
Owens Creek	2.5 miles north of Ukiah	Ukias	TR + HG	UM	Hook and Spear	No
Snipe Creek	near mouth	Wap-neet-pa	TR + HG	UM	Hook and Spear	No
Trail Creek	near mouth	O-yei-pa-wa-coas	TR + HG	UM	Hooks	Yes
Crane Creek	near mouth	Ne-ke-yoe-na-pa-tacken	HG	UM		No
Bull Rum Creek	near boundary G.S.	Kuts-kutsapa Tacken	SA, TR, HG	UM	Hook and Spear	Yes
Granite and Boulder Cr	near confluence	Pe-sown-e-a	SA, TR, HG	UM + RC	Hook and Spear	No
Big Creek	Big Creek Meadow	Tuna-pull-tla-pa	TR + HG	UM	Horn Hooks	Yes
Winom Creek	near Winom Meadows	Winonmp-smoot	TR + HG	UM	Hooks	Yes
N Fk Desolation Creek	Desolation Meadows	Tsopp-pa	TR + HG	UM, CR, RC, WS	Hooks	Yes
Wall Creek	near Wall Cr Forks	Wa-hoe-tanine-spa	TR + HG	UM + CR	Hooks	Yes
Little Wall Creek	3 miles up from mouth	Neineipa	TR + HG	UM + CR	Hooks	Yes

Table 14. continued.

STREAM	LOCATION	INDIAN NAME	SPECIES[a]	TRIBES[b]	METHOD[c]	USAGE[d]
Big Wall Creek	5 miles up from mouth	Shnups-pa	TR + HG	UM + CR	Hooks	Yes
Ditch Creek	9 miles up from mouth	Soo-la-yakt	TR + HG	UM + CR	Hooks	Yes
Rock Creek	confl. Tupper and Chapin Cr	Kutske-pa	TR + HG	UM + CR	Hooks	No
M Fk J.D.R.	M Fk - N Fk confl.	Pow-wa-chakt	SA	UM + CR	Weirs	No
M Fk J.D.R.	RM 30 - near Paradise Canyon	Ya-we-shin-ma	SA	UM	Weirs	No
M Fk J.D.R.	RM 55 - near Ragged Cr	Nook-sinmos-saw-us	TR, SA, HG	UM + RC	Hook and Nets	Yes
M Fk J.D.R.	RM 63 - near Caribou Cr	Tum-sque-pa	SA, TR, HG	UM + RC	Hook and Nets	No
M Fk J.D.R.	near Bates, OR	We-wa-nite	TR + HG	UM + RC	Hooks	No
Smith & Dunning Creek	near Fox, OR	A-my-yee	TR + HG	UM, CR, RC, WS	Hook and Spear	No
Beech Creek	near mouth of E. Fk	Pow-wa-sackt	TR	UM, RC, CR	Hooks	No
Upper Mainstem J.D.R.	RM 278 - near Call Cr	I-tie-meene-pa	TR	UM + CR	Hooks	No

[a]Species harvested: SA=Salmon; TR=Trout; WF=Whitefish; HG=Hunting Grounds also.

[b]Tribes which use fishing sites: UM=Confederated Tribes of the Umatilla Indian Reservation; RC=Rock Creek; CR=Columbia River; WS=Warm Springs.

[c]Fishing methods before 1941; present methods include grab hooks and hook and line only.

[d]Refers to site usage as of 1941; most sites used then are occasionally used today.

The Warm Springs Tribes are involved in the John Day River Basin plan due to the tribes' treaty-reserved, off-reservation hunting, fishing and food-gathering rights and also due to the fact that the entire John Day Basin is within the boundaries of lands ceded to the United States in the Warm Springs Treaty of June 25, 1855. In addition, the tribes and their members own 4,500 acres of trust allotments located along the lower John Day River. These lands are managed by the Bureau of Indian Affairs for the tribes and members and are not subject to state or local land use regulations.

The tribes and state agencies have regulatory authority over fisheries and fish production in the subbasin, but none have ultimate control in regulating land or water use activities that may adversely affect the fishery resource. The only way comprehensive management of the watershed can be achieved to the benefit of the watershed system and its resources is through the coordinated involvement and cooperation of the fishery, land and water managers. Some of the cooperative efforts are the Columbia River Fish Management Plan (United States vs. Oregon) and the Pacific Salmon Treaty.

Legal Considerations

Land and Water Protection

The national Wild and Scenic Rivers Act of 1968 was established to preserve and maintain the free-flowing characteristics of certain rivers possessing outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. The act provides protection to the rivers and their immediate environments for the benefit and enjoyment of present and future generations. The Omnibus Oregon Wild and Scenic Rivers Act (S.2148) of 1988 designated 40 additional rivers for inclusion in the national system. A total of about 250 river miles of the John Day River Basin are federally designated as wild and scenic.

The Oregon Scenic Waterways System is similar in statute to the federal system, but defines seven classifications of rivers. The classifications are more detailed in their criteria than those in the federal system. A total of about 217 river miles of the John Day River Basin are designated as wild and scenic by the Oregon system.

The scenic waterway designation provides for protection of the natural aesthetic condition of the river channel and adjacent land within one quarter of a mile of each bank. Dam or new road construction and placer mining are prohibited.

Consistent with the Clean Water Act, water quality in wild, scenic, and recreational rivers will be maintained or, where necessary, improved to levels that meet federal criteria or federally approved state standards for aesthetics and fish and wildlife propagation. River managers will work with local authorities to abate activities within the river area that are degrading or would degrade existing water quality.

Additional management principles stem from other sections of the act as follows.

Land Acquisition: Section 6
Water Resource Development: Section 7
Mining: Section 9
Management of Adjacent Federal Lands: Section 12(a)
Hunting and Fishing: Section 13(a)
Water Rights: Section 13(b)-(f)
Rights-of-Way: Section 13(g)

In 1988, the Northwest Power Planning Council designated certain reaches in the John Day River Basin as "protected areas," where the council believes hydroelectric development would have unacceptable risk of loss to fish and wildlife species of concern, their productive capacity, and their habitat. The council concluded that 1) studies had identified fish and wildlife resources of critical importance to the region; 2) mitigation techniques cannot assure that all adverse impacts of hydroelectric development on these fish and wildlife populations can be mitigated; 3) even small hydroelectric projects may have unacceptable impacts cumulatively on such resources; and 4) protecting these resources from hydroelectric development is consistent with an adequate, efficient, economical, and reliable electrical power supply in the Northwest. The Northwest Power Planning Council's document Final Protected Areas Designations identifies the river reaches the council has studied and indicates which of these river reaches the council has designated as "protected" in the Columbia River Basin Fish and Wildlife Program and the Northwest Conservation and Electric Power Plan.

Anadromous fish in the John Day River Basin can be found in two wilderness areas. The upper North Fork John Day River and tributaries are included in the North Fork John Day Wilderness Area from RM 76 to RM 100, and from RM 103 to RM 110. Several tributaries to Canyon Creek as well as the upper mainstem originate in the Strawberry Mountain Wilderness Area. These wilderness areas are protected under the 1964 Wilderness Act, which regulates forestlands to remain in their natural and pristine state.

The Endangered Species Act of 1973 requires that an evaluation of potential impacts on threatened and endangered species be conducted for all proposed federal projects. The Fish and Wildlife Service has reviewed the potential impact of the John Day Subbasin Plan and determined that the northern bald eagle (Haliaeetus leucocephalus) is the only species which may be present.

Bull trout, located in headwaters of the John Day River Basin, are listed by the U.S. Fish and Wildlife Service as a "Category Z," consideration for threatened species. Federally threatened and endangered protective measures for bull trout are pending due to insufficient information on distribution and abundance. Additional information on bull trout can be found in the John Day River Resident Fish Plan.

Indian Treaties

Umatilla Tribes

The Treaty of 1855 between the United States and the Walla Walla, Cayuse, and Umatilla tribes (the Confederated Tribes of the Umatilla Indian Reservation) is the basis for tribal involvement in the fisheries management and enhancement. The Treaty of 1855 entitles the tribal members to engage in fishing activities both on and off the reservation in the mainstem Columbia River, the Umatilla, Grande Ronde, Walla Walla, and John Day drainages.

The Umatilla Tribes adopt and enforce laws that regulate treaty fishing activity of tribal members, participate in the management of the fish resources, and implement management practices to protect the fish resources. The Tribal Wildlife Code delegates to the Fish and Wildlife Committee the authority to set seasons and establish other management restrictions, issue permits, and engage in programs or actions that will protect, promote, or enhance the wildlife resources the confederated tribes have an interest in pursuant to the Treaty of 1855.

The tribes may engage in fishing activities free from state regulation except when the state can show that regulation is necessary and reasonable for conservation of the resource.

The Treaty of 1855 provides the basis for tribal co-management of treaty fish resources off-reservation in the John Day drainage where the tribes have usual and accustomed fishing sites.

Warm Springs Tribes

The Confederated Tribes of the Warm Springs Reservation of Oregon is the legal successor in interest to the seven bands of Wasco- and Sahaptin-speaking Indians of the mid-Columbia area whose representatives were signatories to the Treaty with the Tribes of Middle Oregon of June 25, 1855, 12 Stats. 963. Article

I of the treaty describes the 10-million-acre area of eastern Oregon ceded by the tribes to the United States and sets out the boundaries of the Warm Springs Indian Reservation. The entire John Day River Basin is located within the boundaries of the Warm Springs treaty-ceded area. Article I of the treaty also contains the express reservation by the tribes to "the exclusive right of taking fish in the streams running through and bordering said reservation ... and at all other usual and accustomed stations, in common with citizens of the United States."

While the John Day River does not border or run through the Warm Springs Indian Reservation to which the tribes reserved an exclusive fishing right, it is a stream that has traditionally been fished by tribal members and their forefathers. Thus, the tribes' treaty rights attach at all usual and accustomed fishing places throughout the John Day River drainage. The tribal treaty rights include not only a harvest allocation right to take up to 50 percent of the harvestable number of each salmon and steelhead run (when populations are not threatened) passing the tribes' usual and accustomed fishing places, but also include the right to sufficient water quality and quantity to maintain these runs at harvestable levels.

The Warm Springs Tribes regulate the fishing activities of members on and off reservation lands. The Warm Springs Tribal Council regulates treaty-right fishing by tribal members in the John Day River Basin under the provisions of the Warm Springs Fishing Code (Chapter 340, Warm Springs Tribal Code).

Currently, no specific harvest management goals or agreements exist between the tribes and state for spring chinook salmon and summer steelhead in the John Day River Basin.

State Laws and Guidelines

The John Day River Subbasin Plan must also conform to other established guidelines. These include:

1) Oregon Administrative Rules (OAR) -- Goals and policies for commercial and sport fishing regulations, fish management, and salmon hatchery operation, including the Wild Fish Management Policy. Portions of the John Day Subbasin Plan will also be adopted as OARs.

2) Procedures developed by the Oregon Department of Fish and Wildlife -- Manual for Fish Management (1977); A Department Guide for Introductions and Transfers of Finfish into Oregon Waters (1982).

3) Agreements with other agencies, such as the U.S. Forest Service, Bureau of Land Management, U.S. Army Corps of Engineers, Columbia River Compact, Northwest Power Planning Council, National Marine Fisheries Service.

4) Rules and regulations of other federal, state, and local jurisdictions.

The Oregon Water Resources Department completed a 1986 John Day River Basin Report examining the current conditions and problems affecting the water resources of the John Day Basin. Its purpose is to provide information for use in formulating a basin water management program as required by Oregon law.

The Oregon State Marine Board prohibits the use of motorized flotation devices on the John Day River from Cottonwood Bridge (RM 40) to Clarno (RM 109) from May 1 through October 31.

The Oregon Department of Fish and Wildlife and the Oregon State Police monitor and enforce fisheries regulations within the basin. These regulations are consistent with annual sport fish regulations adopted by the Oregon Fish and Wildlife Commission.

The Oregon Fish and Wildlife Commission adopted a series of fish management policies as Oregon Administrative Rules, the most important one for the John Day Basin being the Wild Fish Management Policy (OAR 635-07-525), which states the protection and enhancement of wild stocks will be given first and highest consideration. In addition, John Day River spring chinook and summer steelhead will be managed under Option A of the Wild Fish Management Policy: Management Exclusively for Wild Fish. The intent of Option A is to ensure that the life history characteristics and productivity of the locally adapted wild stock are not altered by man's activities.

Statewide species plans pertinent to this subbasin plan that have been adopted by the Oregon Fish and Wildlife Commission are the Steelhead Plan, Trout Plan, and Warmwater Game Fish Plan. These statewide plans are consistent with Oregon's policies for fish management, and were developed as part of Oregon Department of Fish and Wildlife's planning program to provide a comprehensive, systematic, and long-term approach to management of the fish species in Oregon. They contain goals for production and management, guidelines, and objectives at the statewide level. Oregon's fish resources must be managed on a stock basis due to the diverse nature of fish species in the state, therefore the species plans act as umbrella documents that provide the direction for developing more specific river basin management plans. Statewide guidelines and direction relating to each species are stated in Oregon Administrative Rules (OARs):

635-070-510	(steelhead)
635-500-100	(trout)
635-500-045	(warmwater game fish)

Riparian Easements

The Oregon Department of Fish and Wildlife, with the assistance of Grant County Soil and Water Conservation District, has established a riparian lease program to promote riparian management in the John Day Basin to produce the benefits of fish and wildlife habitat, soil and water conservation, and increased productivity of adjacent lands.

Water Rights

Water has been appropriated in the basin since the early 1860s. Since that time, the state has issued over 4,500 water right certificates. It appears, however, that of the 4,500 rights representing 6,200 cfs, about 800 rights have been cancelled, accounting for around 3,600 cfs. The 50 years between 1920 and 1970 reflect a period of moderate water development. During the 1970s and early 1980s, the basin experienced an increase in water allocation (OWRD 1986). This was primarily due to stepped up enforcement of water rights. Many of the new applications were historical users without rights (J. Rodgers, Grant County water master, pers. commun.). Most recently, the number of water use applications has been declining. The total quantities of water (in cfs) applied for in each of the years between 1980 and 1985 were 74, 36, 40, 64, 5, and 30, respectively. Seventy percent to 95 percent of the water requested was for irrigation (OWRD 1986).

A summary of basin water rights is presented in Table 3. Data is current to 1988. Water rights issued after this date are not taken into account.

The John Day Basin has been adjudicated under four decrees -- Bridge Creek (RM 135) and its tributaries in 1937; Cherry Creek (Jefferson County) in 1922; Cochran Creek in the North Fork Subbasin in 1910; and the remainder of the John Day Basin in 1956. The resulting decrees established irrigation seasons and limitations on the rate of water use. Basin discharge is adequate to satisfy all water rights on an average annual basis, even in a critically low-flow year. However, because of the wide variance in seasonal distribution of runoff, streamflows on many streams during late summer are insufficient to satisfy all water rights.

Any further information regarding water rights (adjudications) can be found in the John Day River Basin Minimum Streamflow Report, July 1985, Oregon Water Resources Department.

PART IV. ANADROMOUS FISH PRODUCTION PLANS

Providing desirable spawning and rearing habitat for fall and spring chinook salmon and summer steelhead, the John Day River and tributaries supported some of the Pacific Northwest's largest anadromous fish runs. Historical data is sketchy, but historians and pioneer observations revealed great migrations of spring and fall chinook salmon and smaller salmon, commonly thought to be coho salmon that were probably steelhead. Historic photographs taken by pioneers (on file at the Grant County Museum) show wagons stacked high with salmon taken from the John Day River before the 1900s. Numerical records are not available on run sizes, but one can speculate based on historic estimates for the Columbia River that the John Day River contributed several hundred thousand salmon and steelhead to the Columbia system (E. Claire, Oregon Department of Fish and Wildlife, John Day, pers. commun.).

Today, adult anadromous returns to the mouth of the John Day River range from 2,000 to 5,000 wild spring chinook and 15,000 to 40,000 wild summer steelhead. These estimates are based on intense spawning ground surveys that the Oregon Department of Fish and Wildlife has conducted over the past 30 years.

Factors limiting distribution and abundance are generally high adult and juvenile mortality at the Columbia River dams combined with high egg and smolt mortality in the basin as a result of habitat degradation.

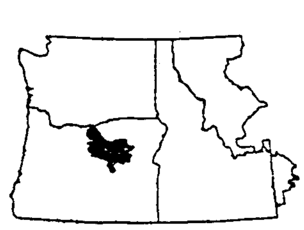
Wild anadromous fish remain in the John Day Basin for three primary reasons, 1) fish passage is almost totally uninhibited from the river's mouth to the headwaters, 2) enough suitable habitat remains in the basin to support major spawning and rearing populations, and 3) the basin is located above only three mainstem dams in the Columbia River.

JOHN DAY SUBBASIN

SPRING CHINOOK DISTRIBUTION*

——————— PRESENT/POTENTIAL

- - - - - - - - - - ABSENT



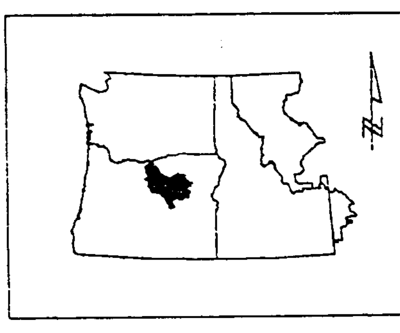
GEOGRAPHIC INFORMATION SYSTEM

BONNEVILLE POWER ADMINISTRATION

* Due to the limitations of scale, all streams which support anadromous fish are not shown on this map.

JOHN DAY SUBBASIN

SUMMER STEELHEAD DISTRIBUTION*



——————— PRESENT/POTENTIAL

- - - - - - - - - ABSENT

* Due to the limitations of scale, all streams which support anadromous fish are not shown on this map.

GIS GEOGRAPHIC INFORMATION SYSTEM

BONNEVILLE POWER ADMINISTRATION

SPRING CHINOOK SALMON

Fisheries Resource

Natural Production

General time periods for spring chinook salmon migration, spawning, egg incubation and rearing in the John Day Basin are shown in Table 15. The timing of each stage changes according to conditions within individual subbasins of the John Day. Spring chinook adults migrate into the basin in May and reach holding pools near spawning grounds by late June. Managers estimate annual spring chinook escapement levels from spawning ground index surveys. The Oregon Department of Fish and Wildlife and the Confederated Tribes of the Umatilla Indian Reservation conduct a total of 55 miles of index surveys and an additional 115 miles of extensive surveys. Escapement levels are estimated by multiplying the number of observed redds per mile in the John Day Basin by three fish (chinook) per redd. Table 16 provides a 30-year summary of chinook salmon spawning density (redds per mile) in the John Day Basin. Recent returns of spring chinook have indicated an upswing in survival. The 1986 through 1988 survey average of 14.8 redds per mile is 27 percent above the 30-year mean of 10.85 redds per mile. Reasons for this recent increase are likely a combination of the United States-Canada Pacific Salmon Treaty limiting harvest for north migrating stocks off Alaska and Canada, improvements in passage at mainstem Columbia River dams, better than average water flows in recent years and higher spilling rates to assist migrating smolts, and habitat improvements in the John Day River Basin.

During critical low water years, some fish may encounter passage and spawning difficulties in some upper basin streams. Flows necessary for migration are available most years, however, juveniles moving out of unfavorably high stream temperatures in some mainstem reaches to cooler water in tributaries are blocked from some streams because of low flows, passage problems, irrigation demands, or a combination of the three. Research studies in the John Day Basin revealed that when mean daily stream temperatures exceed 68 F, young chinook disappear from the habitat either by escaping to cooler tributaries where available or are lost to mortality.

Adult chinook spawn in late August or September, depending on water conditions. During normal water years, spawning habitat generally is available in the upper basin.

Table 15. Freshwater life history for spring chinook salmon in the John Day River. Developmental stage timing represents basin-wide averages.

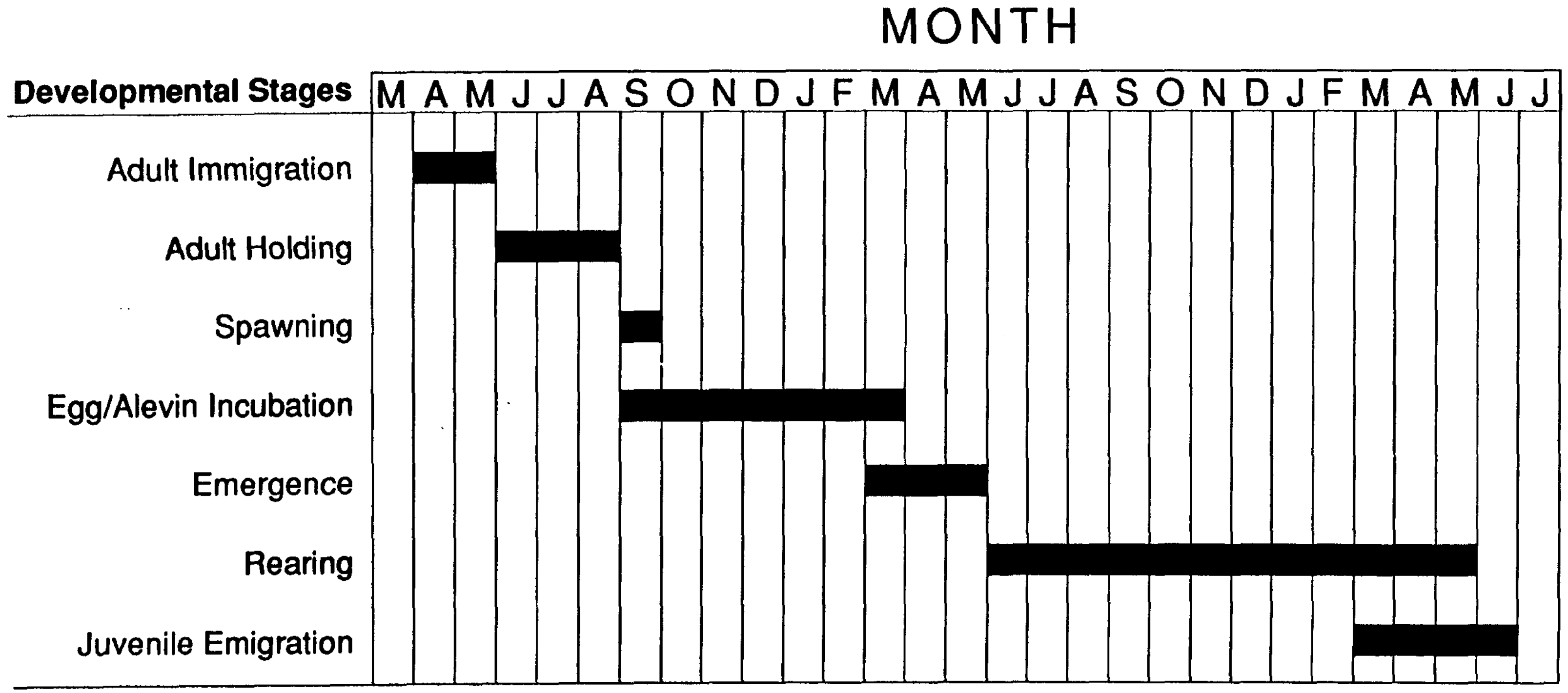


Table 16. Twenty-nine year summary of chinook salmon spawning density, John Day Fish District, 1959-88.

Year	Bull Run Creek	Clear Creek	Granite Creek	John Day River	Middle Fork John Day River	North Fork John Day River	Average Redds/mi
1959	*	4.3	6.0	0.3	0.0	*	2.6
1960	*	16.3	10.0	0.7	3.2	*	7.5
1961	*	3.3	5.3	3.0	1.1	*	3.2
1962	2.0	49.7	44.2	12.2	2.8	*	22.2
1963	7.0	29.2	26.4	0.8	0.4	*	12.7
1964	10.0	49.7	34.8	1.3	3.6	7.8	17.8
1965	7.5	16.7	24.4	5.8	3.7	8.1	11.0
1966	0.3	43.5	31.0	9.3	6.5	10.3	16.8
1967	6.0	38.5	19.4	7.4	1.7	5.5	13.0
1968	6.4	60.5	50.2	0.7	0.4	8.8	14.4
1969	15.6	13.7	16.8	9.3	4.8	20.5	13.3
1970	26.4	18.7	33.6	8.3	7.6	16.8	14.1
1971	11.6	18.8	31.2	7.0	4.1	11.8	11.5
1972	24.4	39.5	43.5	**3.9	5.1	10.5	14.2
1973	7.2	27.0	36.0	8.9	4.3	19.4	15.7
1974	7.6	8.0	25.5	2.5	8.1	7.2	8.2
1975	18.8	11.5	24.7	7.1	8.9	11.7	11.7
1976	9.2	7.0	20.2	4.6	6.6	6.2	7.5
1977	11.6	12.8	23.1	4.9	5.8	16.4	11.1
1978	12.4	6.3	19.8	4.5	10.7	5.9	8.3
1979	6.4	7.0	15.6	5.2	11.8	11.1	9.7
1980	1.2	7.0	8.5	1.2	5.8	4.3	4.3
1981	2.8	11.3	10.6	3.9	2.6	7.7	6.1
1982	5.2	10.8	12.0	3.8	6.2	5.5	6.4
1983	0.8	1.0	7.3	10.2	5.1	4.2	5.8
1984	3.2	2.0	5.8	5.6	6.7	3.5	4.4
1985	6.4	8.2	15.1	8.9	4.0	6.1	7.5
1986	2.4	11.5	20.2	12.2	6.3	14.3	11.9
1987	5.6	14.0	12.9	19.0	28.3	20.8	20.2
1988	1.2	11.0	12.5	6.3	20.1	13.6	12.4

* No survey.

** Count low due to rain and increased river flows which delayed survey and caused poor counting conditions.

Spring chinook eggs incubate for approximately five months. Time required for incubation varies significantly with water temperature. Alevin (newly hatched fry) may spend another month or so in the gravel before they absorb their yolk sacs and emerge as free-swimming fry.

Juvenile chinook grow for one year in the John Day Basin before migrating to the ocean as smolts. Migration generally occurs before spring freshets. During this time, fish size and number are determined largely by the quantity and quality of the habitat that has been available to the developing salmon.

Survival rates for John Day River juvenile spring chinook salmon are listed in Table 17. Further information regarding survival rates can be found in the John Day River Spring Chinook Report (Lindsay et al. 1985). Habitat carrying capacity (standard estimate of potential smolt production) and alternative smolt production estimates are presented in Table 18.

The John Day River Basin has never been supplemented with artificially propagated spring chinook salmon.

Schreck et al. (1986) indicates that wild stocks may be particularly important gene resources in view of the potential loss of genetic diversity through inbreeding and selection and the possible lower vitality of hatchery stocks. Introduced stocks could also potentially harm the native stocks through introgression, reducing the productivity of the wild stock.

Spring chinook production in the John Day River Basin is limited primarily by existing rearing conditions. Livestock overgrazing, water withdrawals for irrigation, landowner clearing, road building, logging, mining and channelization create fish habitat problems by disturbing or destroying riparian vegetation, and destabilizing streambanks and watersheds. The results are wide, shallow channels; low, warm summer flows; high turbid spring flows; high sediment loads; and decreased fish production. Additional and more detailed constraints can be found in Part II of this document.

Table 17. Juvenile spring chinook survival (%), John Day River (Lindsay et al. 1985).

Year	Egg-Fry	Fry-Smolt	Egg-Smolt
1978	22.8	29.5	6.7
1979	14.5	24.7	3.6
1980	14.5	35.2	8.6
1981	--	--	4.4
1982	--	--	4.5

Table 18. Potential smolt production estimates for John Day River spring chinook salmon (United States vs. Oregon Report).

1. 1988 smolt production estimates determined from 1987 estimated escapement of 4,596 adults
   = 306,400 smolts.

2. Five year average estimated from spawning ground surveys
   = 240,000 smolts.

3. United States vs. Oregon
   = 279,000 (current)
   = 356,250 (future)

John Day Subbasin extensive spawning ground surveys based on actual redd counts, several years of data, egg-to-smolt survival rates, and data available on current spawning distribution.

Hatchery Production

No hatcheries exist in the John Day River Basin.

Harvest

The spring chinook sport fishery in the John Day has been closed since 1978 due to the declining trend in redd counts (Table 16) up to 1986. Recent subsistence harvest of spring chinook by Umatilla tribal members (Table 19) reveal that tribal harvest rates are small. There is no documented harvest of spring chinook by Warm Springs tribal members.

If future escapement continues to increase, limited sport and tribal harvest will be considered. The Confederated Tribes of the Umatilla Indian Reservation believe a method should be developed between the tribes and Oregon Department of Fish and Wildlife for providing increased tribal harvest opportunity while allowing the rebuilding of chinook populations. The harvest percentages in this document represent a tentative agreement reached between the Oregon Department of Fish and Wildlife and the Warm Springs and Umatilla tribes regarding specific future tributary harvest rates for spring chinook salmon in the John Day Basin. Harvest percentages were developed on the assumption that good run size predictors based on spawning ground counts will be developed so that adequate escapement is assured. Success of tributary harvest opportunities will also depend on control of ocean and Columbia River treaty and non-treaty fisheries to allow adequate escapement of wild chinook stocks for harvest in the tributaries.

The Oregon Department of Fish and Wildlife coordinates annually with the Confederated Tribes of the Umatilla Indian Reservation to discuss tribal harvest strategies for chinook salmon and to set harvest levels. Harvest information is gathered from questionnaires and by personal interviews with tribal fishermen.

Specific Considerations

The Oregon Fish and Wildlife Commission adopted a series of fish management policies as Oregon Administrative Rules, the most important for the John Day River Basin being the Wild Fish Management Policy (OAR 635-07-525), which states the protection and enhancement of wild stocks will be given first and highest consideration. In addition, John Day River spring chinook will be managed under Option A of the Wild Fish Management Policy, management exclusively for wild fish. The intent of Option A is to ensure that the life history characteristics and productivity of the locally adapted wild stock are not altered by man's activities.

Table 19. John Day River Basin adult spring chinook harvest and estimated spawning escapement (Oregon Department of Fish and Wildlife, unpubl. data).

Year	Sport Catch[1]	Tribal Catch[2]	Escapement[3]	Total Return
1977	205	n/a	2,355	2,560
1978	0	n/a	1,833	1,833
1979	0	n/a	1,923	1,923
1980	0	n/a	918	918
1981	0	n/a	1,203	1,203
1982	0	n/a	1,494	1,494
1983	0	n/a	1,167	1,167
1984	0	n/a	1,125	1,125
1985	0	n/a	1,548	1,548
1986	0	31	2,646	2,677
1987	0	41	4,596	4,637
1988	0		2,825	

[1] River closed to all sport salmon angling for conservation reasons in 1978.

[2] These figures are only for the catch by Umatilla tribal members.

[3] Estimated from extensive spawning ground surveys.

Efforts have been under way to rebuild runs of wild spring chinook in the John Day River Basin. Tribal harvest has been a minimal subsistence harvest only, and the sport fishery has been closed since 1978 in an effort to restore runs to harvestable levels.

The highest priority problems affecting salmon in the John Day River Basin are directly related to degradation of riparian habitat and watershed by improper mining, agriculture, forest and range practices. These practices degraded fish habitat by causing low summer streamflows, high summer and low winter water temperatures, accelerated bank erosion, excessive stream sedimentation, and reduced cover. Recent Oregon Department of Fish and Wildlife field studies on the Middle Fork reveal chinook habitat is fully seeded in its present condition. Increased smolt carrying capacities must be accomplished through improving habitat quantity and quality.

Recent spawning ground index surveys indicate an increase in chinook salmon escapement levels due in part to ongoing habitat improvement efforts; proper management of mining, agriculture, forest and range practices; screening of turbine intakes on Columbia River dams; the United States-Canada Treaty; and increased ocean survival.

Habitat restoration in the John Day River Basin has been ongoing for several years. The John Day River is given high priority for restoration and rebuilding of wild salmon runs by regional, state, tribal, and federal fisheries agencies. Recent efforts to protect and restore habitat have increased dramatically. Expenditures for 1986 through 1988 more than doubled the expenditures during the entire 1973 through 1985 period (Table 11). Managers believed this expanded effort was necessary to protect and maintain wild gene pools, to maximize production of chinook smolts and adults, and to offset losses incurred by mainstem Columbia River dams and subbasin related habitat problems. This habitat and passage improvement effort not only benefits the fishery, but reduces soil erosion, improves water quantity and quality, and improves the seasonal distribution of water, benefiting landowners and recreational users.

Several agencies and private landowners in the John Day River Basin are involved with some of the most ambitious habitat protection and improvement programs in the entire Columbia River System. The John Day River Implementation Plan outlines an ongoing fish habitat improvement program on private lands that began in 1984. The Bonneville Power Administration has provided the funding for this program as part of the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program under Measure 704(c)(1), Action Item 4.2. The Oregon Department of Fish and Wildlife implements the private lands project with assistance from the Soil Conservation Service and Grant County Soil and Water Conservation District. Regular communication with the Malheur National Forest, Umatilla National Forest, and Bureau of Land Management is maintained to enhance cooperation on stream reaches where private and U.S. Forest Service lands are in mixed blocks of ownership.

Soil and water conservation districts in the John Day Basin also set priorities for watershed conservation work in their districts. They receive watershed enhancement grants from the Governor's Watershed Enhancement Board (GWEB), the Department of Water Resources, the Bureau of Reclamation, the Environmental Protection Agency, and the Soil and Water Conservation District. The districts conduct fish habitat work as an integral part of comprehensive watershed treatments. Soil and water districts also initiate coordinated resource management plans with agencies and landowners and serve as local coordinator for all associated resources.

The U.S. Forest Service (Malheur, Umatilla, and Wallowa-Whitman national forests) and Bureau of Land Management (Burns and Prineville districts) have also contributed significantly to habitat protection and improvement in the John Day River Basin. The Forest Service receives funding through Bonneville Power Administration, Knutsen-Vandenburg (K-V) timber sale monies, direct appropriations, and other sources to implement projects. The Bureau of Land Management receives funding through the Sykes Act and direct appropriations.

In 1988, the Bureau of Reclamation was assigned to assist the John Day Basin Advisory Council in implementing a plan to optimize water flow in the John Day Basin for fish enhancement and other uses.

Additional funding and technical assistance for screening and habitat restoration in the John Day River Basin has been provided by the National Marine Fisheries Service (NMFS), Agricultural Stabilization and Conservation Service (ASCS), Oregon Department of Agriculture, Oregon Department of Forestry, Oregon State University Agricultural Extension Service, John Day Basin Council, landowners, and Youth Conservation Corps.

To date, in excess of 100 miles of instream and riparian habitat work have been completed in the John Day River Basin to protect and improve one of the Northwest's largest, completely wild runs of spring chinook. This cooperative effort to protect and rebuild anadromous fish runs in the John Day River should receive the highest priority for current and future funding and implementation.

Critical Data Gaps

The following is a list of critical data needs for spring chinook in the John Day Subbasin.

1. Monitor and evaluate all completed and ongoing habitat improvement projects to determine if stated physical and biological objectives are being met.

2. Calculate returns per spawner from index surveys to determine if this relationship is improving as smolt passage facilities are modified at Columbia River dams.

3. Determine impacts from logging operations on watersheds and riparian areas, and how those operations affect anadromous fish production.

4. Secure current run size predictors needed to implement current year's harvest objectives.

5. Monitor spring chinook and summer steelhead by examining drainage escapements and populations trends, and develop modeling and monitoring "tools" to determine out of basin impacts to John Day River spring chinook.

6. Determine the number of adults and smolts needed to fully seed current and future (post improvements) spring chinook habitat.

7. Develop a program to provide adequate control and reporting of sport and tribal harvest.

Objectives

Biological Objective

Develop an average annual return of approximately 7,000 spring chinook salmon to the mouth of the John Day River to provide approximately 5,950 fish to meet escapement needs for natural reproduction.

Utilization Objective

Provide approximately 1,050 fish for sport and tribal harvest.

Spring chinook estimates were based on production factors developed from United States vs. Oregon and the Pacific Salmon Treaty. The estimate for future fish production was based on the assumption that major mortality factors will be eliminated or reduced. These include 1) improved upstream and downstream passage at Columbia River dams, 2) harvest regulation in the ocean, Columbia and John Day rivers, 3) regulation and enforcement of high seas drift net fishery, 4) inbasin habitat and passage improvements, 5) improved forest planning and silviculture practices, 6) strict adherence to state forest practice rules, and 7) strict enforcement of inbasin regulations designed to decrease poaching and harassment of holding adults prior to spawning.

Alternative Strategies

Modeling results for each strategy are presented in Table 19a as fish produced at "maximum sustainable yield" (MSY). The sustainable yield of a fish population refers to that portion of the population that exceeds the number of fish required to spawn and maintain the population over time. Sustainable yield can be "maximized," termed MSY, for each stock at a specific harvest level. The MSY is estimated using a formula (Beverton-Holt function) that analyzes a broad range of harvest rates. Subbasin planners have used MSY as a tool to standardize results so that decision makers can compare stocks and strategies.

In MSY management, managers set a spawning escapement level and the remaining fish (yield) could theoretically be harvested. In practice, a portion of the yield may be reserved as a buffer or to aid rebuilding. Thus, managers may raise the escapement level to meet a biological objective at the expense of a higher utilization objective.

The amount of buffer appropriate for each stock is a management question not addressed in the subbasin plans. For this reason, the utilization objective, which usually refers to harvest, may not be directly comparable to the MSY shown in Table 19a. At a minimum, a strategy should produce an estimated MSY equal to or greater than the utilization objective. A MSY substantially larger than the subbasin utilization objective may be needed to meet subbasin biological objectives.

All five actions incorporated into the strategies below will benefit summer steelhead production as well. The expected fishery benefits from all five actions are 1) increased egg-to-smolt survival, 2) increased smolt carrying capacity, and 3) increased pre-spawner survival.

Estimated costs of the alternative strategies below are summarized in Table 19b.

STRATEGY 1: Improve habitat on the mainstem John Day River and the Middle Fork, enhance streamflows, and improve screens on water diversions.

Potential escapement to the subbasin based on the System Planning Model at natural maximum sustained yield rate equals 3,100 adults.

ACTIONS: 1, 2, 4, 5

1. Improve habitat on the mainstem John Day River and selected tributaries (listed in steelhead section) from

the city of John Day (RM 248) to Call Creek (RM 278). Bank stabilization through fencing, controlled livestock use, planting and rock or juniper riprap, boulder placement, deflectors, weirs, and pool excavation will decrease erosion, increase flow, restore riparian cover for stream temperature control, and improve pool-to-riffle ratios thus improving juvenile rearing and pre-spawner survival.

Estimated 50-year cost expenditure for habitat improvements is $5,823,182.

2. Improve habitat on the Middle Fork John Day River and selected tributaries (listed in the steelhead section) from Mosquito Creek (RM 39) to Summit Creek (RM 72). Bank stabilization through fencing, controlled livestock use, planting, and rock or juniper riprap, boulder placement, deflectors, weirs, channel restoration, pool excavation, and possible land exchanges or purchases to create riparian natural areas will decrease erosion, increase flow, improve riparian cover and pool-to-riffle ratio, and decrease high summer water temperatures restricting juvenile rearing. An increase in law enforcement activities and changes in trout angling regulations will improve pre-spawner survival as well.

   Estimated 50-year cost expenditure for habitat improvements is $5,787,031.

4. Enhance streamflows for optimum fish production. Possible projects to investigate and implement include:

   A) Improvement of irrigation efficiency.
   B) Water conservation program involving the Oregon Department of Water Resources and irrigators.
   C) Enforcement of established minimum streamflows by the Oregon Department of Water Resources.
   D) Application for and obtaining of instream water rights.
   E) Improve seasonal distribution of water through watershed improvement, riparian storage, and beaver management.

5. Maintain and improve proper screening of water diversions.

STRATEGY 2: Improve habitat on the Middle Fork and North Fork, enhance streamflows, and improve screens on water diversions.

Potential escapement to the subbasin based on the System Planning Model at natural maximum sustained yield rate equals 2,854 adults.

ACTIONS: 2-5

2. -

3. Improve habitat and protect spawners on the North Fork John Day River from Dale (RM 60) to North Fork Campground (RM 102), including North Fork tributaries of Desolation, Camas, Big Wall, Potamus, Mallory, Ditch, Deer, Rudio, Cottonwood, Granite, and Bull Run creeks.

   The North Fork John Day River and Granite and Clear creeks will experience an increase in pre-spawner survival through increased law enforcement activities and changes in trout angling regulations. Other North Fork tributaries will experience bank stabilization through fencing, controlled livestock use, planting, and rock or juniper riprap. Boulder placement, deflectors, weirs, and pool excavation will provide better quantity and quality of instream habitat. These practices will decrease erosion, increase flow, improve riparian cover and pool-to-riffle ratios thus improving juvenile rearing and pre-spawner survival.

   Estimated 50-year cost expenditure for habitat improvements is $12,665,141.

4. -
5. -

STRATEGY 3: Improve habitat on the mainstem, Middle Fork and North Fork John Day rivers, enhance streamflows, and improve screens on water diversions.

Potential escapement to the subbasin based on the System Planning Model at natural maximum sustained yield rate equals 3,671 adults.

ACTIONS: 1-5 (see above)

Table 19a. System Planning Model results for spring chinook in the John Day Subbasin. Baseline value is for pre-mainstem implementation, all other values are post-implementation.

Utilization Objective:
Provide 1,050 fish for sport and tribal harvest.

Biological Objective:
Develop an average annual return of approximately 7,000 adults to the subbasin to provide approximately 5,950 fish for escapement needs for natural production.

Strategy[1]	Maximum[2] Sustainable Yield (MSY)	Total[3] Spawning Return	Total[4] Return to Subbasin	Out of[5] Subbasin Harvest	Contribution[6] To Council's Goal (Index)
Baseline	1,186 -C	808	2,196	451	0(1.00)
All Nat	2,313 -C	1,199	3,671	754	2,347(1.67)
1	1,891 -C	1,010	3,100	637	1,439(1.41)
2	1,712 -C	954	2,854	587	1,047(1.30)
3*	2,684 -C	1,276	4,130	849	3,077(1.88)

*Recommended strategy.

[1] Strategy descriptions:

For comparison, an "all natural" strategy was modeled. It represents only the natural production (non-hatchery) components of the proposed strategies plus current management (which may include hatchery production). The all natural strategy may be equivalent to one of the alternative strategies below.

1. Improve habitat on the mainstem John Day River and the Middle Fork, enhance streamflows, and improve screens on water diversions. Post Mainstem Implementation.
2. Improve habitat on the Middle Fork and North Fork, enhance streamflows, and improve screens on water diversions. Post Mainstem Implementation.
3. Strategies 1 and 2. Post Mainstem Implementation.

[2] MSY is the number of fish in excess to those required to spawn and maintain the population size (see text). These yields should equal or exceed the utilization objective. C = the model projections where the sustainable yield is maximized for the natural and hatchery components combined and the natural spawning component exceeds 500 fish. N = the model projection where sustainable yield is maximized for the naturally spawning component and is shown when the combined MSY rate results in a natural spawning escapement of less than 500 fish.

[3] Total return to subbasin minus MSY minus pre-spawning mortality equals total spawning return.

[4] Total return to the mouth of the subbasin.

[5] Includes ocean, estuary, and mainstem Columbia harvest.

[6] The increase in the total return to the mouth of the Columbia plus prior ocean harvest (as defined by the Northwest Power Council's Fish and Wildlife Program), from the baseline scenario. The index () is the strategy's total production divided by the baseline's total production.

Table 19b. Estimated costs of alternative strategies for John Day spring chinook. Cost estimates represent new or additional costs to the 1987 Columbia River Basin Fish and Wildlife Program; they do not represent projects funded under other programs, such as the Lower Snake River Compensation Plan or a public utility district settlement agreement. (For itemized costs, see Appendix C.)

	Proposed Strategies		
	1	2	3*
Hatchery Costs			
Capital[1]	0	0	0
O&M/yr[2]	0	0	0
Other Costs			
Capital[3]	7,013,193	10,169,152	13,712,334
O&M/yr[4]	111,725	185,445	231,045
Total Costs			
Capital	7,013,193	10,169,152	13,712,334
O&M/yr	111,725	185,445	231,045

* Recommended strategy.

[1] Estimated capital costs of constructing a new, modern fish hatchery. In some subbasins, costs may be reduced by expanding existing facilities. For consistency, estimate is based on $23/pound of fish produced. Note that actual costs can vary greatly, especially depending on whether surface or well water is used and, if the latter, the number and depth of the wells.

[2] Estimated operation and maintenance costs per year directly associated with new hatchery production. Estimates are based on $2.50/pound of fish produced. For consistency, O&M costs are based on 50 years.

[3] Capital costs of projects (other than direct hatchery costs) proposed under a particular strategy, such as enhancing habitat, screening diversions, removing passage barriers, and installing net pens (see text for specific actions).

[4] Estimated operation and maintenance costs per year of projects other than those directly associated with new hatchery production. For consistency, O&M costs are based on 50 years.

The following non-modeled actions are primarily monitoring and evaluation procedures that managers would implement in concert with the actions discussed above.

A) Develop run size estimate models for run size monitoring based on previous years escapement and spawning ground information to make sound harvest allocation decisions.

B) Provide for a regulated tribal and sport harvest of John Day River spring chinook. The tribes and Oregon Department of Fish and Wildlife each year will jointly determine the number of fish to be harvested by sport and tribal anglers based on established harvest guidelines and run size predictors. Both will cooperatively develop a sport and tribal harvest program addressing the:

   1) Location and timing of sport and tribal harvest.
   2) Apportionment of harvest by individual tributary.
   3) Method of harvest.
   4) Reporting of harvest.

Recommended Strategy

The John Day Subbasin Fish Management Committee recommends Strategy 3 to meet production and harvest objectives. The committee estimates that Strategy 3 will produce average escapement levels of 7,000 wild spring chinook salmon to the mouth of the John Day River based upon production factors developed from United States vs. Oregon and the Pacific Salmon Treaty. The System Planning Model (SPM) appears to underestimate the full potential of efforts targeted towards increased chinook production.

Strategy 3 was chosen as the preferred strategy because it proposes implementing habitat improvement projects in the mainstem, Middle, and North forks of John Day River and more closely approaches the production objective than the other strategies. The habitat improvement projects proposed in Strategies 1 and 2 do not encompass the entire distribution of spring chinook and fail to increase wild spring chinook runs to acceptable levels. Strategy 3 manages for the production and regulated harvest of wild spring chinook salmon with no hatchery supplementation.

Planners have developed additional spring chinook guidelines or considerations to ensure implementation of planning objectives to their full potential:

1. The John Day River Basin has been managed for the production and regulated harvest of wild spring chinook salmon with no hatchery supplementation. This has maximized maintenance of the genetic integrity of John Day River Basin spring chinook by minimizing interactions between hatchery and wild fish within the John Day River Basin. To continue management in this vane, efforts should be made to improve out-of-basin hatchery techniques and release strategies to reduce straying of hatchery chinook into the John Day Basin.

2. Development and implementation of certain harvest regulations may help to reduce potential adverse impacts to the genetic diversity of spring chinook populations within the John Day River Basin resulting from overharvesting certain tributary populations and age classes.

3. Determination of the impacts of inbasin and out-of-basin harvest, disease, and straying on John Day spring chinook is needed. Ocean and Columbia River spring chinook salmon fisheries should be monitored to determine if John Day River stock is intercepted and at what rate. Efforts to monitor John Day River Basin spring chinook by examining drainage escapements, population trends, and develop modeling and monitoring "tools" to assess appropriate harvest levels of wild John Day River spring chinook are needed.

   Managers should continue to improve the data base for John Day spring chinook salmon by conducting intensive spawning ground inventories; monitoring seeding densities in mainstem and tributaries; monitoring harvest; and determining age class and length frequency distributions of adults; and should develop smolt production goals from stock-recruitment relationships for the North Fork, Middle Fork, and mainstem John Day River to guide habitat management plans. The relationship between each of these parameters should be refined annually to improve the accuracy of optimal harvests and escapement requirements of spawning adults.

4. Managers cannot increase the productivity of John Day River Basin spring chinook without providing protection for and maintenance of existing habitat conditions in the John Day River Basin consistent with the objectives listed in Part II of this plan.

SUMMER STEELHEAD

Fisheries Resource

Natural Production

General time periods for steelhead (juvenile and adult) migration, spawning, egg incubation and rearing in the John Day Basin are shown in Table 20. Migrating adult summer steelhead enter the John Day Basin in late August or September when stream temperatures drop and streamflows increase. Recent returns of summer steelhead have indicated an upswing in survival. The 1986 to 1988 survey average of 11.5 redds per mile is 38 percent higher than the 30-year mean of 7.4 redds per mile (Table 21). Reasons for this increase were covered in the spring chinook section and apply to summer steelhead as well.

Steelhead reach spawning and rearing areas from March through May while streamflows are good. They spawn from March through mid-June. Steelhead eggs take approximately 30 days at 50 degrees Fahrenheit to hatch, and another two to three weeks to reach fry stage. Time required for incubation varies significantly with water temperature. Juvenile summer steelhead grow for two to three years in the basin before migrating to the ocean as smolts.

Survival rates for John Day summer steelhead are shown in Table 22. Habitat carrying capacity at full seeding is estimated at 900,000 smolts (Table 23).

In the early 1960s, managers released approximately 500,000 hatchery winter steelhead fry and limited numbers of pre-smolts used for experimental purposes. Few likely survived due to the use of improper stocks and hauling mortality (90 percent of the fish were dead upon arrival to release site). No production releases of hatchery steelhead smolts were ever made in the John Day Subbasin. Hatchery releases for any purpose ceased in 1966 in favor of wild stocks. Since that time, managers have not released hatchery steelhead into the John Day River Basin.

Today, the John Day steelhead run is made up entirely of wild stock, with stray rates running 4 percent to 8 percent or less, a rate accepted by experts to be normal and necessary to maintain genetic diversity of the wild stock.

Table 20. Freshwater life history for wild summer steelhead in the John Day River. Developmental stage timing represents basin-wide averages.

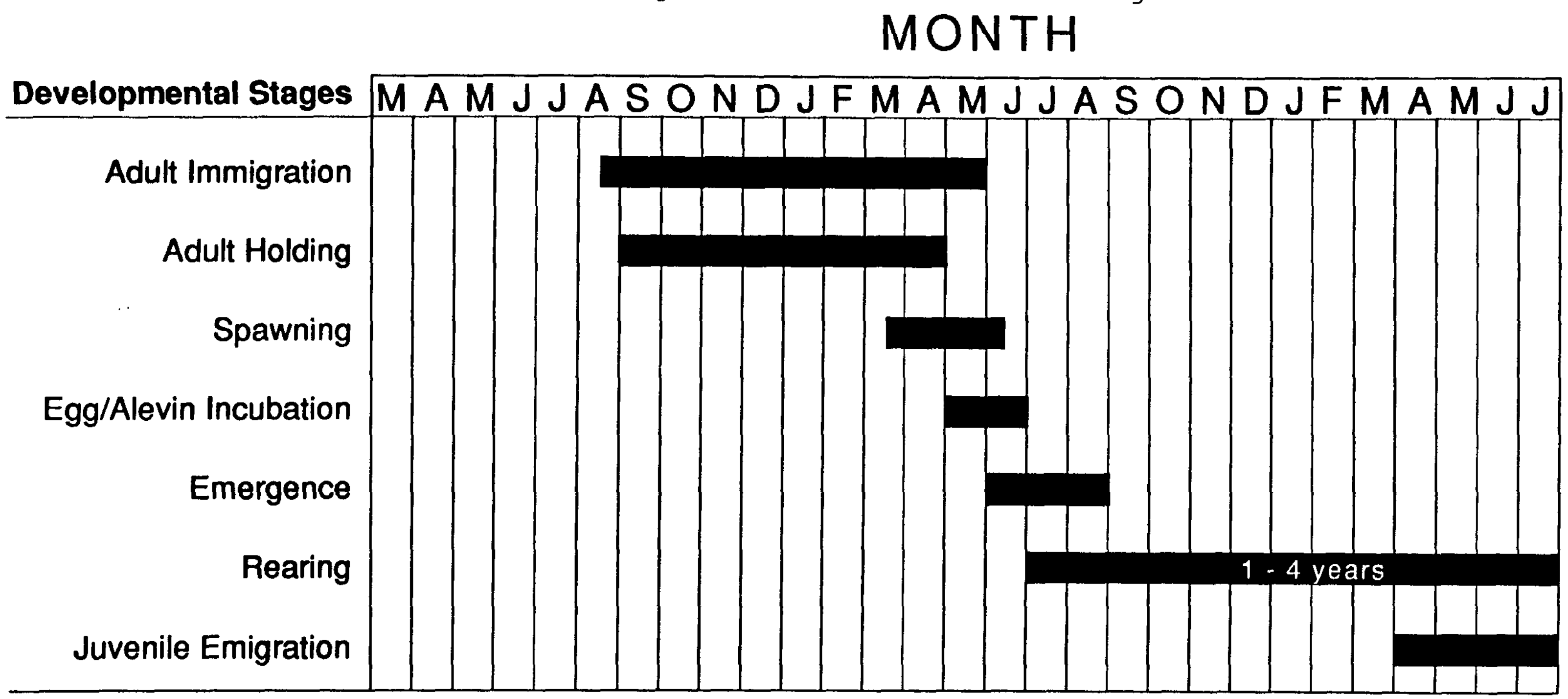


Table 21. Thirty-one year steelhead spawning ground summary*

Year	Number of Streams Surveyed	Miles Surveyed	Steelhead	Redds	Redds /Mile
1959	6	14.5	30	108	7.4
1960	10	22.0	60	194	8.8
1961	8	24.5	56	166	6.8
1962	10	26.5	56	184	6.9
1963	11	30.5	47	216	7.1
1964	13	43.5	51	266	6.1
1965	19	45.0	88	344	7.6
1966	23	69.0	141	1,103	16.0
1967	25	78.0	61	905	11.6
1968*	23	74.5	19	358	4.8
1969	27	91.5	76	806	8.9
1970	21	65.0	58	530	8.1
1971	8	22.5	18	181	8.0
1972	16	53.5	41	409	7.6
1973	25	76.4	22	402	5.3
1974**	14	38.0	4	167	4.4
1975**	14	34.0	21	302	8.9
1976	21	59.8	8	308	5.2
1977	30	75.5	69	535	7.1
1978	35	102.7	21	438	4.3
1979	29	78.7	4	81	1.0
1980	34	90.1	11	305	3.4
1981	33	86.1	12	319	3.7
1982	32	71.8	34	301	4.2
1983	31	89.3	39	438	4.9
1984	29	76.7	33	299	3.9
1985	39	120.3	88	1,016	8.5
1986	43	120.6	129	1,323	11.0
1987	61	154.3	82	1,757	11.4
1988	46	128.1	111	1,551	12.1
1989	35	106.5	42	340	3.2
Totals and Averages	771	2,169.4	1,532	15,652	7.2

(continued)

Table 21 continued.

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* 1968 was a low water year with an absence of spring runoff. Irrigation took entire streamflows on several tributaries causing steelhead spawning escapement to be nil in some areas. The poor count is reflected in redd/mile figure for that season.

** Counts low due to high water in spring which smoothed out early redds and caused poor counting conditions.

Table 22. Juvenile summer steelhead survival, (%), John Day River (<u>United States vs. Oregon</u> Report).

% of Maximum Adult Escapement	Smolt Seeding Level	Egg-to-Smolt Survival (%) Natural
100	100	0.75
75	88	0.90
50	76	1.20
25	64	2.00
10	40	3.00

Table 23. Potential smolt production estimates for John Day River summer steelhead (United States vs. Oregon Report, Oregon Department of Fish and Wildlife unpubl. data).

1. Estimated smolt production from 1987 adult escapement
   = 76,325 smolts.

2. United States vs. Oregon summer steelhead smolt production estimates (full seeding)
   = 518,581 (current)
   = 606,498 (future)

The John Day Subbasin Fish Management Committee prefers smolt production estimates generated from extensive spawning ground surveys due to the following:

1. Based on actual redd counts.
2. There are many years of data.
3. Egg to smolt survival rates available.
4. Data available on current spawning distribution.

Currens and Stone (1987) researched whether genetic differences existed between the rainbow trout located above and below Izee Falls using biochemical and morphological characters. Results indicated that there were not significant variations between fish above and below Izee Falls, and that naturally introduced summer steelhead upon completion of the Izee Falls Project would not genetically conflict with resident trout populations.

In the John Day River Basin, summer steelhead production is limited primarily by existing rearing conditions. Livestock overgrazing, water withdrawals for irrigation, landowner clearing, road building, logging, and channelization create fish habitat problems by disturbing or destroying riparian vegetation, and destabilizing streambanks and watersheds. The results are wide, shallow channels; low, warm summer flows; high turbid spring flows; high sediment loads; and decreased fish production. Additional and more detailed constraints can be found in Part II, the habitat section.

Hatchery Production

No hatchery supplementation exits for John Day River summer steelhead.

Harvest

John Day Basin summer steelhead harvest for 1975 through 1987 is shown in Table 24. Recent increases in harvest are due in part to increased escapement, angler pressure (Table 25), and habitat improvement. The tribal harvest by Warm Springs and Umatilla tribal members of steelhead in the John Day Basin is not known, but is suspected to be low.

Annually, anglers spend about 15,000 sport-angler days fishing for summer steelhead on the North Fork, 9,000 angler days on the lower mainstem (mouth to RM 120), 2,150 angler days on the middle mainstem (RM 120 to RM 205), and 800 angler days on the upper mainstem (RM 205 to RM 257). Oregon Department of Fish and Wildlife statistical steelhead catch data for 1987 reveals that the John Day River is the top Oregon sport producer of summer steelhead in the Columbia River Basin.

With annual steelhead escapement increasing, the Oregon Department of Fish and Wildlife has set sport harvest goals for wild summer steelhead at 25 percent of annual run size, assuming escapement to the mouth of the John Day River is greater than or equal to 35,000 adults.

The harvest of John Day summer steelhead by non-Indians is monitored by steelhead punch-card returns and random creel surveys performed by Oregon Department of Fish and Wildlife and Oregon State Police. State police enforce angling regulations for steelhead in the basin and collect creel data during routine enforcement activities. The Warm Springs Tribal Council regulates treaty-right fishing by tribal members for summer steelhead in the John Day River Basin under the provisions of the Warm Springs Fishing Code (Chapter 350, Warm Springs Tribal Code). The Confederated Tribes of the Umatilla Indian Reservation regulate treaty fishing by tribal members under the Wildlife Code of the Confederated Tribes of the Umatilla Indian Reservation.

Table 24. John Day River summer steelhead sport catch history and spawner escapement.

Run Year	Mainstem	Middle Fork	North Fork	Total Harvest	Escapement to Spawning Grounds	Escapement to Mouth
75-76	1,511	--	--	1,511		
76-77	2,589	40	295	2,924	19,066	21,990
77-78	948	112	415	1,475	11,547	13,022
78-79	292	0	13	305	2,685	2,990
79-80	380	59	230	669	9,130	9,799
80-81	1,391	35	295	1,721	9,936	11,657
81-82	2,512	120	350	2,982	11,279	14,261
82-83	836	54	100	990	13,158	14,148
83-84	1,734	20	220	1,974	10,204	12,178
84-85	1,598	44	369	2,011	22,826	24,837
85-86	2,088	84	319	2,491	29,539	32,030
86-87	4,484	250	738	5,472	30,594	36,066
87-88*	5,044	31	31	5,106	32,493	37,599

* Does not include 1988 portion of run (Jan-April).

Table 25. Thirty-one year steelhead creel summary, John Day River.

Year	Anglers Checked	Hours Angled	Number of Fish	Hours/ Landed Fish	Fish Landed /Angler
1958	197	457	72	6.3	0.36
1959	373	1,499	78	19.2	0.21
1960	270	993	99	10.7	0.36
1961	200	654	29	22.5	0.14
1962	193	639	35	18.2	0.18
1963	263	991	42	23.6	0.16
1964	430	1,386	53	26.1	0.12
1965	278	946	79	11.9	0.28
1966	495	1,505	153	9.3	0.31
1967	437	1,523	104	14.6	0.24
1968	298	1,171	62	18.8	0.21
1969	500	1,351	122	11.1	0.24
1970	229	597	50	11.9	0.21
1971	111	401	34	10.8	0.31
1972	341	928	38	24.4	0.11
1973	581	1,966	69	28.5	0.12
1974	353	1,094	44	24.9	0.12
1975	517	1,628	128	12.7	0.25
1976	242	1,002	46	21.8	0.19
1977	613	2,200	139	15.8	0.23
1978	454	1,330	63	21.1	0.14
1979	166	436	4	109.0	0.02
1980	296	1,094	32	34.2	0.11
1981	365	1,054	41	25.7	0.11
1982	489	2,096	136	15.4	0.28
1983	373	1,604	54	29.7	0.15
1984	468	1,801	131	13.8	0.28
1985	540	1,765	127	13.9	0.24
1986	624	2,242	183	12.3	0.29
1987	1,053	3,175	514	6.2	0.49
1988	1,479	5,801	546	10.6	0.37
TOTALS and AVERAGES	13,228	45,329	3,245	14.0	0.25

Specific Considerations

As mentioned earlier, the Oregon Fish and Wildlife Commission adopted a series of fish management policies as Oregon Administrative Rules, the most important for the John Day River Basin being the Wild Fish Management Policy (OAR 635-07-525), which states the protection and enhancement of wild stocks will be given first and highest consideration. In addition, John Day River summer steelhead, like spring chinook, will be managed under Option A of the Wild Fish Management Policy: Management Exclusively For Wild Fish. The intent of Option A is to ensure that the life history characteristics and productivity of the locally adapted wild stock are not altered by man's activities.

Efforts have been under way to rebuild runs of wild summer steelhead in the John Day River Basin. Tribal harvest has been a minimal subsistence harvest only, and the sport fishery has been closed since 1978 to restore runs to harvestable levels.

As with spring chinook, the highest priority problems affecting steelhead in the John Day River Basin are directly related to degradation of riparian habitat and watershed by improper mining, agriculture, forest and range practices. These practices degraded fish habitat by causing low summer streamflows, high summer and low winter water temperatures, accelerated bank erosion, excessive stream sedimentation, and reduced cover. Recent Oregon Department of Fish and Wildlife field studies on the Middle Fork reveal steelhead habitat is fully seeded in its present condition. Increased smolt carrying capacities must be accomplished through improving habitat quantity and quality.

Recent spawning ground index surveys indicate an increase in summer steelhead escapement levels due in part to ongoing habitat improvement efforts, proper management of mining, agriculture, forest and range practices, screening of turbine intakes on Columbia River dams, the United States-Canada Treaty, and increased ocean survival.

Habitat restoration in the John Day River Basin has been ongoing for several years. The John Day River is given high priority for restoration and rebuilding of steelhead runs by regional, state, tribal, and federal fisheries agencies. Recent efforts to protect and restore habitat have increased dramatically. Expenditures for the 1986 through 1988 period more than doubled the expenditures during the entire 1973 through 1985 period (Table 13). Managers believe this expanded effort is necessary to protect and maintain wild gene pools, to maximize production of steelhead smolts and adults, and to offset losses incurred by mainstem Columbia River dams and subbasin related habitat problems. This habitat and passage improvement effort not only benefits the fishery, but reduces soil erosion, improves water quantity and quality, and improves the seasonal distribution of water, benefiting landowners and recreational users.

Several agencies and private landowners in the John Day River Basin are currently involved with some of the most ambitious habitat protection and improvement programs occurring in the entire Columbia River System. The John Day River Implementation Plan outlines an ongoing fish habitat improvement program on private lands that began in 1984 (see specific considerations for spring chinook).

Critical Data Gaps

The following is a list of critical data needs for summer steelhead in the John Day Subbasin.

1. Monitor and evaluate all completed and ongoing habitat improvement projects to determine if stated physical and biological objectives are being met.

2. Calculate returns per spawner from index surveys to determine if this relationship is improving as smolt passage facilities are modified at Columbia River dams.

3. Determine impacts from logging operations on watersheds and riparian areas, and how those operations affect anadromous fish production.

4. Secure current run size predictors needed to implement current year's harvest objectives.

5. Monitor spring chinook and summer steelhead by examining drainage escapements and populations trends, and develop modeling and monitoring "tools" to determine out of basin impacts to John Day River spring chinook.

6. Determine the number of adults and smolts needed to fully seed current and future (post improvements) spring chinook habitat.

7. Develop a program to provide adequate control and reporting of sport and tribal harvest.

Objectives

Biological Objective

Develop an average annual return of approximately 45,000 summer steelhead to the mouth of the John Day River to provide approximately 33,750 fish to meet escapement needs for natural reproduction.

Utilization Objective

Provide approximately 11,250 fish for sport and tribal harvest.

Production estimates for John Day River summer steelhead were based on recent (1986 through 1988) increases in adult escapement to spawning grounds as well as production factors developed from the Pacific Salmon Treaty production report.

Alternative Strategies

Modeling results for each strategy are presented in Table 26 as fish produced at "maximum sustainable yield" (MSY). The sustainable yield of a fish population refers to that portion of the population that exceeds the number of fish required to spawn and maintain the population over time. Sustainable yield can be "maximized," termed MSY, for each stock at a specific harvest level. The MSY is estimated using a formula (Beverton-Holt function) that analyzes a broad range of harvest rates. Subbasin planners have used MSY as a tool to standardize results so that decision makers can compare stocks and strategies.

In MSY management, managers set a spawning escapement level and the remaining fish (yield) could theoretically be harvested. In practice, a portion of the yield may be reserved as a buffer or to aid rebuilding. Thus, managers may raise the escapement level to meet a biological objective at the expense of a higher utilization objective.

The amount of buffer appropriate for each stock is a management question not addressed in the subbasin plans. For this reason, the utilization objective, which usually refers to harvest, may not be directly comparable to the MSY shown in Table 26. At a minimum, a strategy should produce an estimated MSY equal to or greater than the utilization objective. A MSY substantially larger than the subbasin utilization objective may be needed to meet subbasin biological objectives.

The expected benefits from the three actions incorporated into the strategies below are 1) increased egg-to-smolt survival (due largely to improved spawning and incubation conditions), 2) increased smolt carrying capacity, and 3) increased pre-spawner survival.

Estimated costs of the alternative strategies below are summarized in Table 26a.

STRATEGY 1: Improve habitat and enhance streamflows.

Potential escapement to the mouth of the subbasin based on the System Planning Model equals 29,500 adults.

ACTIONS: 1, 3

1. Improve habitat (including screening) on the following streams in the John Day River Basin.

   North Fork Tributaries: Clear, Desolation, Camas, Fivemile, Owens, Hidaway, Cable, Butcherknife, Frazier, Rancheria, Bear Wallow, Lane, Bowman, Salsbury, Big Wall, Little Wall, Three Trough, Skookum, Alder, Swale, Porter, Stony, East Fork Meadowbrook, Wilson, Cottonwood, Rudio, Gilmore, Potamus, Mallory, Ditch, Deer, Trail, Beaver, Granite, Boulder, Bull Run, Corral, Boundary, Deep, Olive, Crane, North Trail, South Trail, Middle Trail, and Davis creeks.

   Middle Fork Tributaries: Camp, Long, Davis, Vincent, Caribou, Clear, Beaver, Slide, Butte, Placer Gulch, Bridge, Summit, Idaho, and Squaw creeks.

   Upper Mainstem Tributaries: Cottonwood, Mountain, Rock, Badger, Beech, East Fork Beech, McClellan, Tinker, Canyon, East Fork Canyon, Middle Fork Canyon, Reynolds, Deardorff, Fields, Riley, Bear, Hall, Pine, Indian, Grub, Dixie, and Roberts creeks.

   South Fork John Day River and Tributaries: Upper Murderers, Tex, Deer, Sunflower, Pine, Brisbois, Utley, Rosebud, Lewis, Lonesome, Grasshopper, Flat, Alder, Corral, Vestor and Venator creeks, and the mainstem South Fork (including 13 screens).

   Lower John Day River Tributaries: Rock (including 12 screens), Hay, Ferry Canyon, Indian Springs Canyon, Lamberson Canyon, Robinson Canyon, Jackknife, Parrish, Alder, Thirtymile (including six screens), East Fork Thirtymile, Trail Fork, Pinehollow, Butte including six screens, Pine, Cherry, Bridge, Bear, and Horseshoe creeks.

Action includes bank stabilization through fencing, controlled livestock use, planting and rock or juniper riprap, boulder placement, deflectors, weirs, screening and pool excavation. These should decrease erosion, improve flow, improve riparian cover and pool-to-riffle ratios, and improve quantity and quality of habitat for summer and overwinter survival of juveniles.

3. Enhance streamflows for optimum fish production. Possible projects to investigate and implement include:

   A) Improvement of irrigation efficiency.
   B) A water conservation program involving Oregon Department of Water Resources and irrigators.
   C) Enforcement of established minimum streamflows by the Oregon Department of Water Resources.
   D) Application for and obtaining of instream water rights.
   E) Improvement of seasonal distribution of water through watershed improvement, riparian storage, and beaver management.

Estimated 50-year cost expenditure for habitat improvements is $25,540,581.

STRATEGY 2: Provide adult passage at certain locations and enhance streamflows.

Potential escapement to the mouth of the subbasin based on the System Planning Model equals 23,134 adults.

ACTIONS: 2, 3

2. Provide adult summer steelhead passage at the following locations.

   A) Izee Falls, South Fork John Day River through construction of a fish ladder. Estimated cost is $1 million. Passage will open 81 miles of spawning and rearing habitat. Following five years of self-seeding, managers will survey area to estimate summer steelhead distribution and abundance.

   B) Rock Creek (lower John Day River) through construction of four low-cost fish ladders. Estimated cost is $100,000. Passage will open 100 miles of historical spawning and rearing habitat.

C) Bridge Creek (upper Middle Fork) above Bates Pond.

Estimated cost is $80,000. Passage over Bates Pond will open 10 miles of historical spawning and rearing habitat.

3. -

STRATEGY 3: Improve habitat, provide adult passage and enhance streamflows.

Potential escapement to the mouth of the subbasin based on the System Planning Model equals 33,559 adults.

ACTIONS: 1-3 (see above)

Table 26. System Planning Model results for summer steelhead (A's) in the John Day Subbasin. Baseline value is for pre-mainstem implementation, all other values are post-implementation.

Utilization Objective:
Provide 11,250 fish for sport and tribal harvest.

Biological Objective:
Develop an average annual return of approximately 45,000 adults to the subbasin to provide approximately 33,700 fish to meet escapement needs for natural production.

Strategy[1]	Maximum[2] Sustainable Yield (MSY)	Total[3] Spawning Return	Total[4] Return to Subbasin	Out of[5] Subbasin Harvest	Contribution[6] To Council's Goal (Index)
Baseline	4,186 -C	10,752	15,504	2,802	0(1.00)
All Nat	14,766 -C	17,853	33,559	6,066	28,481(2.16)
1	12,742 -C	16,046	29,633	5,356	22,287(1.91)
2	8,097 -C	14,285	23,134	4,181	12,036(1.49)
3*	14,766 -C	17,853	33,559	6,066	28,481(2.16)

*Recommended strategy.

[1] Strategy descriptions:

For comparison, an "all natural" strategy was modeled. It represents only the natural production (non-hatchery) components of the proposed strategies plus current management (which may include hatchery production). The all natural strategy may be equivalent to one of the alternative strategies below.

1. Improve habitat and enhance streamflows. Post Mainstem Implementation.
2. Provide adult passage at certain locations and enhance streamflows. Post Mainstem Implementation.
3. Strategies 1 and 2. Post Mainstem Implementation.

[2] MSY is the number of fish in excess to those required to spawn and maintain the population size (see text). These yields should equal or exceed the utilization objective. C = the model projections where the sustainable yield is maximized for the natural and hatchery components combined and the natural spawning component exceeds 500 fish. N = the model projection where sustainable yield is maximized for the naturally spawning component and is shown when the combined MSY rate results in a natural spawning escapement of less than 500 fish.

[3] Total return to subbasin minus MSY minus pre-spawning mortality equals total spawning return.

[4] Total return to the mouth of the subbasin.

[5] Includes ocean, estuary, and mainstem Columbia harvest.

[6] The increase in the total return to the mouth of the Columbia plus prior ocean harvest (as defined by the Northwest Power Council's Fish and Wildlife Program), from the baseline scenario. The index () is the strategy's total production divided by the baseline's total production.

Table 26a. Estimated costs of alternative strategies for John Day summer steelhead. Cost estimates represent new or additional costs to the 1987 Columbia River Basin Fish and Wildlife Program; they do not represent projects funded under other programs, such as the Lower Snake River Compensation Plan or a public utility district settlement agreement. (For itemized costs, see Appendix C.)

	Proposed Strategies		
	1	2	3*
Hatchery Costs			
Capital[1]	0	0	0
O&M/yr[2]	0	0	0
Other Costs			
Capital[3]	8,712,239	1,180,000	9,892,239
O&M/yr[4]	284,430	15,000	299,430
Total Costs			
Capital	8,712,239	1,180,000	9,892,239
O&M/yr	284,430	15,000	299,430

* Recommended strategy.

[1] Estimated capital costs of constructing a new, modern fish hatchery. In some subbasins, costs may be reduced by expanding existing facilities. For consistency, estimate is based on $23/pound of fish produced. Note that actual costs can vary greatly, especially depending on whether surface or well water is used and, if the latter, the number and depth of the wells.

[2] Estimated operation and maintenance costs per year directly associated with new hatchery production. Estimates are based on $2.50/pound of fish produced. For consistency, O&M costs are based on 50 years.

[3] Capital costs of projects (other than direct hatchery costs) proposed under a particular strategy, such as enhancing habitat, screening diversions, removing passage barriers, and installing net pens (see text for specific actions).

[4] Estimated operation and maintenance costs per year of projects other than those directly associated with new hatchery production. For consistency, O&M costs are based on 50 years.

The following non-modeled actions are primarily monitoring and evaluation procedures that managers would implement in concert with the actions discussed above.

A) Develop run size estimate models for run size monitoring based on previous years escapement and spawning ground information to make sound harvest allocation decisions.

B) The tribes and the Oregon Department of Fish and Wildlife each year jointly determine the number of fish to be harvested by sport and tribal anglers based on established harvest guidelines and run size predictors to provide for a regulated sport and tribal harvest of John Day River summer steelhead.

Recommended Strategy

The John Day Subbasin Fish Management Committee recommends Strategy 3 to meet production and harvest objectives for summer steelhead. Common with spring chinook, initial modeling efforts appear to underestimate the full potential of efforts targeted toward increased steelhead production in comparison with production estimates developed using information from United States vs. Oregon and Pacific Salmon Treaty reports. Through implementation of Strategy 3, escapement could potentially increase by 15,000 summer steelhead.

Strategy 3 was chosen as the preferred strategy not only because it more closely approaches the production objective than Strategies 1 and 2, but because it also maintains the genetic integrity of John Day River Basin summer steelhead by minimizing hatchery and wild fish interactions within the subbasin. Strategies 1 and 2 independently fail to meet the production objective. However, the combination of habitat improvement projects proposed in Strategy 1 plus the three fish passage projects proposed in Strategy 2 will nearly satisfy the production objective while maintaining and rebuilding one of the Columbia River Basin's largest wild summer steelhead runs.

Planners have developed additional considerations for Actions 1, 2, and 3 to ensure implementation of planning objectives to their full potential:

1. The John Day River Basin has been managed for the production and harvest of wild summer steelhead with no hatchery supplementation. This has maximized maintenance of the genetic integrity of John Day River Basin summer steelhead by minimizing interactions between hatchery and wild fish within the John Day River Basin. To continue management in this vane, attempts should be made to reduce potential

straying of non-indigenous summer steelhead hatchery stocks by improving Columbia Basin hatchery practices and hatchery supplementation techniques outside of the John Day drainage.

2. Efforts are needed to monitor the productivity of John Day River Basin summer steelhead by examining drainage escapements, harvest, age class structure, population trends, genetic characteristics, diseases, and develop modeling and monitoring "tools" to determine out-of-basin impacts to John Day River summer steelhead.

3. Determination of the impacts from Columbia River mainstem harvest and straying on John Day River summer steelhead should be assessed.

4. Managers cannot increase the productivity of John Day River Basin summer steelhead without providing protection for and maintenance of existing habitat conditions in the John Day River Basin consistent with the objectives, strategies, and actions listed in Part II.

5. Managers should continue to improve the data base for John Day River Basin summer steelhead by conducting intensive spawning ground inventories; monitoring seeding densities in mainstem and tributaries; and monitoring tribal and non-tribal harvest. Managers should also develop smolt production goals from stock-recruitment relationships for the North Fork, Middle Fork, mainstem, and South Fork to guide habitat management plans. The relationships between each of these parameters should be refined annually to improve the accuracy of optimal harvest and escapement requirements of spawning adults.

PART V. SUMMARY AND IMPLEMENTATION

Objectives and Recommended Strategies

Spring Chinook

The objective for spring chinook in the John Day River Subbasin is to develop an average annual return of approximately 7,000 spring chinook salmon to the mouth of the John Day River with approximately 1,050 fish for sport and tribal harvest and approximately 5,950 fish to meet needs for natural reproduction.

Planners recommend Strategy 3 to enhance approximately 105 miles of riparian habitat, enhance streamflows, and improve and maintain screening of water diversions. The strategy is projected to fully meet the production objective. This projection is based upon an alternative analysis to the System Planning Model. The SMART analysis did not differentiate among the alternative strategies (Appendix B).

Summer Steelhead

The objective for summer steelhead is to develop an average annual return of approximately 45,000 summer steelhead to the mouth of the John Day River with approximately 11,250 fish for sport and tribal harvest and approximately 33,750 fish to meet escapement needs for natural reproduction.

Planners recommend Strategy 3 to enhance approximately 105 miles of riparian habitat, improve and maintain screening of water diversions, remove barriers to adult fish passage, and enhance streamflows. The strategy is projected to fully meet the production objective. This projection is based upon an alternative analysis to the System Planning Model. The SMART analysis indicated that Strategy 3 had an intermediate discount value score between the two other alternatives (Appendix B). Strategy 3, however, is the most productive of the three alternatives.

Implementation

In the summer of 1990, the Columbia Basin Fish and Wildlife Authority submitted to the Northwest Power Planning Council the Integrated System Plan for salmon and steelhead in the Columbia Basin, which includes all 31 subbasin plans. The system plan attempts to integrate this subbasin plan with the 30 others in the Columbia River Basin, prioritizing fish enhancement projects and critical uncertainties that need to be addressed.

From here, the Northwest Power Planning Council will begin its own public review process, which will eventually lead to amending its Columbia River Basin Fish and Wildlife Program. The actual implementation schedule of specific projects or measures proposed in the system plan will materialize as the council's adoption process unfolds.

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APPENDIX A
NORTHWEST POWER PLANNING COUNCIL
SYSTEM POLICIES

In Section 204 of the 1987 Columbia River Basin Fish and Wildlife Program, the Northwest Power Planning Council describes seven policies to guide the systemwide effort in doubling the salmon and steelhead runs. Pursuant to the council's plan, the basin's fisheries agencies and Indian tribes have used these policies, and others of their own, to guide the system planning process. The seven policies are paraphrased below.

1) The area above Bonneville Dam is accorded priority.

Efforts to increase salmon and steelhead runs above Bonneville Dam will take precedence over those in subbasins below Bonneville Dam. In the past, most of the mitigation for fish losses has taken the form of hatcheries in the lower Columbia Basin. According to the council's fish and wildlife program, however, the vast majority of salmon and steelhead losses have occurred in the upper Columbia and Snake river areas. System planners turned their attention first to the 22 major subbasins above Bonneville Dam, and then to the nine below.

2) Genetic risks must be assessed.

Because of the importance of maintaining genetic diversity among the various salmon and steelhead populations in the Columbia River Basin, each project or strategy designed to increase fish numbers must be evaluated for its risks to genetic diversity. Over millions of years, each fish run has evolved a set of characteristics that makes it the best suited run for that particular stream, the key to surviving and reproducing year after year. System planners were to exercise caution in their selection of production strategies so that the genetic integrity of existing fish populations is not jeopardized.

3) Mainstem survival must be improved expeditiously.

Ensuring safe passage through the reservoirs and past the dams on the Columbia and Snake River mainstems is crucial to the success of many efforts that will increase fish numbers, particularly the upriver runs. Juvenile fish mortality in the reservoirs and at the dams is a major cause of salmon and steelhead losses. According to estimates, an average of 15 percent to 30 percent of downstream migrants perish at each dam, while 5 percent to 10 percent of the adult fish traveling upstream perish. Projects to rebuild runs in the tributaries have and will represent major expenditures by the region's ratepayers -- expenditures and long-term projects that should be protected in the mainstem.

4) Increased production will result from a mix of methods.

To rebuild the basin's salmon and steelhead runs, fisheries managers are to use a mixture of wild, natural and hatchery production. Because many questions still exist as to whether wild and natural stocks can coexist with significant numbers of hatchery fish, no one method of production will be solely responsible for increasing fish numbers. System planners were to take extra precaution when considering outplanting hatchery fish into natural areas that still produce wild fish. The council is relying on the fish and wildlife agencies and tribes to balance artificial production with wild and natural production.

5) Harvest management must support rebuilding.

Like improved mainstem passage, effective harvest management is critical to the success of rebuilding efforts. A variety of fisheries management entities from Alaska to California manage harvest of the Columbia Basin's salmon and steelhead runs. The council is calling on those entities to regulate harvest, especially in mixed-stock fisheries, in ways that support the basin's efforts to double its runs.

6) System integration will be necessary to assure consistency.

The Northwest Power Planning Council intends to evaluate efforts to protect and rebuild Columbia River Basin salmon and steelhead from a systemwide perspective. Doubling the runs will require improvements in mainstem passage, fish production and harvest management -- three extremely interdependent components. System planners from all parts of the basin are to coordinate their efforts so, for example, activities in the lower Columbia are consistent with and complement the activities 800 miles upstream in Idaho's Salmon River. The fisheries management organizations and their plans vary from subbasin to subbasin, but the council is calling upon the agencies and tribes to help resolve conflicts that arise.

7) Adaptive management should guide action and improve knowledge.

System planners were to design projects so that information can be collected to improve future management decisions. By designing projects that test quantitative hypotheses and lend themselves to monitoring and evaluation, managers can learn from their efforts. This learning by doing is called "adaptive management." Using such an approach, managers can move ahead with plans to rebuild the Columbia Basin's salmon and steelhead runs, despite many unanswered questions about how best to accomplish their goal. With time, the useful information revealed by these "experiments" can guide future projects.

APPENDIX B
SMART ANALYSIS

To help select the preferred strategies for each subbasin, planners used a decision-making tool known as Simple Multi-Attribute Rating Technique (SMART). SMART examined each proposed strategy according to the following five criteria. In all cases, SMART assumed that all of the Columbia River mainstem passage improvements would be implemented on schedule.

1) Extent the subbasin objectives were met

2) Change in maximum sustainable yield

3) Impact on genetics

4) Technological and biological feasibility

5) Public support

Once SMART assigned a rating for each criteria, it multiplied each rating by a specific weight applied to each criteria to get the "utility" value (see following tables). Because the criteria were given equal weights, utility values were proportional to ratings. The confidence in assigning the ratings was taken into consideration by adjusting the weighted values, (multiplying the utility value by the confidence level) to get the "discount utility." SMART then totaled the utility values and discount utility values for all five criteria, obtaining a "total value" and a "discount value" for each strategy.

System planners used these utility and discount values to determine which strategy for a particular fish stock rated highest across all five criteria. If more than one of the proposed strategies shared the same or similar discount value, system planners considered other factors, such as cost, in the selection process. Some special cases arose where the planners' preferred strategy did not correspond with the SMART results. In those cases, the planners provide the rationale for their selection.

SUBBASIN: John Day

STOCK: Spring Chinook

STRATEGY: 1

CRITERIA	RATING	CONFIDENCE	WEIGHT	UTILITY	DISCOUNT UTILITY
1	5	0.6	20	100	60
2	6	0.6	20	120	72
3	9	0.9	20	180	162
4	8	0.6	20	160	96
5	9	0.6	20	180	108

TOTAL VALUE 740

DISCOUNT VALUE 498

CONFIDENCE VALUE 0.67297297

SUBBASIN: John Day

STOCK: Spring Chinook

STRATEGY: 2

CRITERIA	RATING	CONFIDENCE	WEIGHT	UTILITY	DISCOUNT UTILITY
1	5	0.6	20	100	60
2	6	0.6	20	120	72
3	9	0.9	20	180	162
4	8	0.6	20	160	96
5	9	0.6	20	180	108

TOTAL VALUE 740

DISCOUNT VALUE 498

CONFIDENCE VALUE 0.67297297

SUBBASIN: John Day

STOCK: Spring Chinook

STRATEGY: 3

CRITERIA	RATING	CONFIDENCE	WEIGHT	UTILITY	DISCOUNT UTILITY
1	5	0.6	20	100	60
2	6	0.6	20	120	72
3	9	0.9	20	180	162
4	8	0.6	20	160	96
5	9	0.6	20	180	108

TOTAL VALUE	740	
DISCOUNT VALUE		498
CONFIDENCE VALUE		0.67297297

SUBBASIN: John Day

STOCK: Summer Steelhead

STRATEGY: 1

CRITERIA	RATING	CONFIDENCE	WEIGHT	UTILITY	DISCOUNT UTILITY
1	7	0.6	20	140	84
2	9	0.6	20	180	108
3	9	0.9	20	180	162
4	9	0.9	20	180	162
5	9	0.9	20	180	162

TOTAL VALUE 860

DISCOUNT VALUE 678

CONFIDENCE VALUE 0.78837209

SUBBASIN: John Day

STOCK: Summer Steelhead

STRATEGY: 2

CRITERIA	RATING	CONFIDENCE	WEIGHT	UTILITY	DISCOUNT UTILITY
1	5	0.6	20	100	60
2	8	0.6	20	160	96
3	9	0.9	20	180	162
4	9	0.9	20	180	162
5	7	0.6	20	140	84

TOTAL VALUE 760

DISCOUNT VALUE 564

CONFIDENCE VALUE 0.74210526

SUBBASIN: John Day

STOCK: Summer Steelhead

STRATEGY: 3

CRITERIA	RATING	CONFIDENCE	WEIGHT	UTILITY	DISCOUNT UTILITY
1	7	0.6	20	140	84
2	10	0.6	20	200	120
3	9	0.9	20	180	162
4	9	0.9	20	180	162
5	8	0.6	20	160	96

TOTAL VALUE	860	
DISCOUNT VALUE		624
CONFIDENCE VALUE		0.72558139

APPENDIX C
SUMMARY OF COST ESTIMATES

The cost estimates provided in the following summary tables represent new or additional costs necessary to implement the alternative strategies. Although many strategies involve projects already planned or being implemented under the Columbia River Basin Fish and Wildlife Program or other programs, such as the Lower Snake River Compensation Plan, the associated costs and hatchery production do not appear in the following tables.

In many cases, the following costs are no more than approximations based on familiarity with general costs of similar projects constructed elsewhere. Although the costs are very general, they can be used to evaluate relative, rather than absolute, costs of alternative strategies within a subbasin.

Particular actions are frequently included in strategies for more than one species or race of anadromous fish. In these cases, the same costs appear in several tables, but would only be incurred once, to the benefit of some, if not all, of the species and races of salmon and steelhead in the subbasin.

Subbasin planners used standardized costs for actions "universal" to the Columbia River system, such as costs for installing instream structures, improving riparian areas, and screening water diversions (see the Preliminary System Analysis Report, March 1989). For other actions, including the removal of instream barriers, subbasin planners developed their own cost estimates in consultation with resident experts.

Planners also standardized costs for all new hatchery production basinwide. To account for the variability in fish stocking sizes, estimates were based upon the cost per pound of fish produced. For consistency, estimated capital costs of constructing a new, modern fish hatchery were based on $23 per pound of fish produced. Estimated operation and maintenance costs per year were based on $2.50 per pound of fish produced.

All actions have a life expectancy, a period of time in which benefits are realized. Because of the variation in life expectancy among actions, total costs were standardized to a 50-year period. Some actions had life expectancies of 50 years or greater and thus costs were added as shown. Other actions (such as instream habitat enhancements) are expected to be long term, but may only have life expectancies of 25 years. Thus the action would have to be repeated (and its cost doubled) to meet the 50-year standard. Still other actions (such as a study or a short-term supplementation program) may have life expectancies of 10 years after which no further action would be taken. In this case, operation and maintenance costs were amortized over 50 years to develop the total O&M per year estimate. Capital costs, being up-front, one-time expenditures, were added directly.

Subbasin planners have estimated all direct costs of alternative strategies except for the purchase of water rights. No cost estimates have been or will be made for actions that involve purchasing water. Indirect costs, such as changes in water flows or changes in hydroelectric system operations, are not addressed.

ESTIMATED COSTS FOR ALTERNATIVE STRATEGIES

Subbasin: John Day River
Stock: Spring Chinook

Action	Cost Categories*	Proposed Strategies 1	2	3 **
Habitat Enhancement	Capital:	6,717,713	9,873,672	13,416,854
	O&M/yr:	97,850	171,570	217,170
	Life:	50	50	50
Screening	Capital:	295,480	295,480	295,480
	O&M/yr:	13,875	13,875	13,875
	Life:	50	50	50
Barrier Removal	Capital:			
	O&M/yr:			
	Life:			
Misc. Projects	Capital:			
	O&M/yr:			
	Life:			
Hatchery Production	Capital:			
	O&M/yr:			
	Life:			
TOTAL COSTS	Capital:	7,013,193	10,169,152	13,712,334
	O&M/yr:	111,725	185,445	231,045
	Years:	50	50	50
Water Acquisition		Y	Y	Y
Fish to stock	Number/yr:			
	Size:			
	Years:			

* Life expectancy of the project is defined in years. Water acquisition is defined as either Y = yes, the strategy includes water acquisition; N = no, water acquisition is not part of the strategy. The size of fish to stock is defined as E = eggs; F = fry; J = juvenile, fingerling, parr, subsmolt; S = smolt; A = adult.

** Recommended strategy.

ESTIMATED COSTS FOR ALTERNATIVE STRATEGIES

Subbasin: John Day River
Stock: Summer Steelhead

Action	Cost Categories*	Proposed Strategies 1	2	3 **
	Capital:	8,712,239		8,712,239
Habitat	O&M/yr:	284,430		284,430
Enhancement	Life:	50		50
	Capital:			
	O&M/yr:			
Screening	Life:			
	Capital:		1,180,000	1,180,000
Barrier	O&M/yr:		15,000	15,000
Removal	Life:		50	50
	Capital:			
Misc.	O&M/yr:			
Projects	Life:			
	Capital:			
Hatchery	O&M/yr:			
Production	Life:			
	Capital:	8,712.239	1,180,000	9,892,239
TOTAL	O&M/yr:	284,430	15,000	299,430
COSTS	Years:	50	50	50
Water Acquisition		Y	Y	Y
	Number/yr:			
Fish to	Size:			
stock	Years:			

* Life expectancy of the project is defined in years. Water acquisition is defined as either Y = yes, the strategy includes water acquisition; N = no, water acquisition is not part of the strategy. The size of fish to stock is defined as E = eggs; F = fry; J = juvenile, fingerling, parr, subsmolt; S = smolt; A = adult.

** Recommended strategy.